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- Основной раздел: социально-экономические аспекты развития современного государства;
- Современные технологии управления организацией;
- Актуальные вопросы политики и права;
- Современные науки и образование;
- Информационные и коммуникативные технологии;
- Здоровоохранение в обществе.

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DETERMINATION OF STEM GROWTH DYNAMICS IN "AVMU" MUNG BEAN VARIETIES

Abstract: *In this article, the dynamics of stem growth of 15 different varieties of "AVMU" and "Zilola" and "Marjona" varieties at different vegetation periods (three-leaf stage, budding, flowering, ripening) of various mung bean varieties were studied. As a result, it was found that the most positive result was observed in variant 16 and variant 11 among 15 different varieties of "AVMU" according to the experimental system.*

Keywords: *mung bean varieties "AVMU", "Zilola", "Marjona" varieties, stem growth dynamics*

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"AVMU" MUNG LOVYASI NAVLARIDA POYASI O'SISH DINAMIKASINI ANIQLASH

Annotatsiya: *Ushbu maqolada turli xil mosh navlaridan "AVMU" ning 15 xil navi hamda "Zilola" va "Marjona" navlarining turli xil vegetatsiya davrlarida (uch bargchalik, gʻunchalash, gullash, pishish)da poyaning o'sish dinamikasi o'rganildi. Natijada, tajriba tizimiga muvofiq ravishda eng ijobiy natija 16-variantda hamda "AVMU" ning 15 xil navlari orasidan 11-variantda kuzatilganligi aniqlandi.*

Kalit soʻzlar: *mosh navlari "AVMU", "Zilola", "Marjona" navlari, poyaning o'sish dinamikasi*

Today, providing the world's growing population with quality and affordable food is one of the global issues. In recent years, due to climate change and various environmental problems, a decrease in productivity has been observed all over the world. According to statistical analyses, it is reported that in the next decade the demand for food products will exceed the level of production. Therefore, one of the urgent issues is to select and recommend early-ripening, high-yielding varieties

among various agricultural crops. For this purpose, research was conducted among 17 different varieties of mung bean.

Mung beans are distinguished from other cereals by their high protein content, vitamin and mineral content, and rapid ripening [1]. Mung beans are also easily digestible, and pasta is made from their flour, and salads are made from their sprouted grains. The pods are used as a nutritious feed for livestock, and the stems are used for silage [2].

In order to determine the dynamics of stem growth of mung bean varieties in different phenophases in the crop field of Khayrikhush mahalla of Vobkent district, research was conducted in 2023-2024 and the varieties with the highest stem growth dynamics among different mung bean varieties were identified. According to the experimental system, 15 different mung bean varieties AVMU, Zilola and Marjona were planted in the field in the Bukhara meadow-alluvial soil climatic conditions. In this case, 17 different mung bean varieties were planted in three rotations, on plots, and phenological and morphological observation and analysis were carried out at the beginning of each month [3]. Observation and analysis were carried out on the fifth day of each month in all mung bean varieties, in different phenophases, i.e., three-leaf, budding, flowering and podding periods. As a result, according to the experimental system, it was found that the stem length of 17 different mung bean varieties showed different indicators at different phenophases (Table 1).

table 1

Stem growth dynamics in different mung bean varieties (2023-2024)

№	Mung bean varieties	Vegetative periods of mung bean in terms of stem length in cm			
		Three-leaf clover	Budding	Flowering	Beaning
1	AVMU 1676	6,1	16,7	49,0	64,7
2	AVMU 1677	7,0	17,6	50,4	56,3
3	AVMU 1678	6,6	17,8	51,5	57,7
4	AVMU 1679	5,2	17,0	41,0	52,3
5	AVMU 1680	7,2	17,9	60,9	70,5
6	AVMU 1681	7,8	18,3	62,9	71,2
7	AVMU 1682	7,1	16,9	49,2	67,4
8	AVMU 1683	3,9	14,2	40,9	48,2
9	AVMU 1684	7,2	17,7	57,8	68,3
10	AVMU 1685	6,3	16,6	50,9	56,1
11	AVMU 2001	11,2	26,5	65,5	72,0
12	AVMU 2002	6,9	17,5	59,3	69,0
13	AVMU 2003	6,8	18,3	57,4	67,5
14	AVMU 2004	7,2	23,2	59,9	67,7
15	AVMU 2005	10,0	24,6	60,0	68,4
16	Zilola	12,6	29,5	69,9	76,9
17	Marjona	3,5	12,8	34,5	44,5

According to the results of the two-year study, in the three-leaf stage of mung bean, according to the experimental system, the stem length from the first to the

seventeenth variant was recorded in the range of 3.5 cm - 12.6 cm. Also, the stem length of the AVMU varieties was recorded in the following results according to the experimental system: 6.1; 7.0; 6.6; 5.2; 7.2; 7.8; 7.1; 3.9; 7.2; 6.3; 11.2; 6.9; 6.8; 7.2; 10.0 cm. It was determined that the highest result among the AVMU varieties in the phenoplast of this mung bean plant was observed in the 2001 variety, 11.2 cm, and the lowest result was observed in the 1683 variety, 3.9 cm. Also, when analyzing all these variants, it was determined that the highest result was observed in the Zilola variety, 12.6 cm, and the lowest result was observed in the Marjona variety, 3.5 cm.

When analyzing the results of a study on the dynamics of stem growth during the budding period of mung bean, the following results were recorded for the stem lengths of AVMU varieties 1676 to 2005, respectively: 16.7; 17.6; 17.8; 17.0; 17.9; 18.3; 16.9; 14.2; 17.7; 16.6; 26.5; 17.5; 18.3; 23.2; 24.6 cm, in accordance with the experimental system.

According to the results of the study conducted in the flowering phenophase, the most positive results were observed in variants 16; 11 and 6; 5, and the lowest results were observed in variants 8 and 17. Since in mung bean, like in a number of other plants, the height of the stem leads to an increase in the number of fruit branches and fruit elements in it, in our experiment it was found that varieties with high stem growth dynamics have higher yield compared to the remaining variants [4].

When analyzing the mung bean plant at the end of the growing season, it was found that the Zilola variety had the highest indicator compared to the AVMU varieties, being 4.9 cm higher than the AVMU variety, which recorded the highest result. Also, the high growth dynamics in the mung bean stem leads to the formation of more crop layers, and as a result, an increase in the yield.

In conclusion, the mung bean plant belongs to the heliophyte plant group and grows well when the sun's rays fall directly on the ground. Therefore, in the soil and climatic conditions of the Bukhara region, high yields can be achieved from this plant by observing irrigation standards and ensuring soil fertility. When studying the dynamics of stem growth in different phenophases of mung bean plants of different varieties (3-4 leaflets, budding and flowering, and at the end of vegetation), it was found that the most positive results were in variants 16; 11; 6 and 5, and the lowest results were in variants 8 and 17, according to the experimental system.

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EPIDEMIOLOGICAL DESCRIPTION OF HEALTH, RISK FACTORS, AND PREVENTIVE MEASURES OF OCCUPATIONAL DISEASES AMONG ANESTHESIOLOGISTS-RESUSCITATORS IN THE FERGANA VALLEY

Abstract: *Anesthesiologists-resuscitators are essential healthcare professionals responsible for life-saving interventions, particularly in intensive care units and emergency settings. Their work exposes them to multiple occupational hazards, including biological, chemical, physical, and psycho-emotional stressors. This study aimed to assess health status, epidemiological indicators, occupational risk factors, and preventive strategies among anesthesiologists-resuscitators in the Fergana Valley. Data were collected via epidemiological surveys, medical examinations, and occupational risk assessments. Findings revealed a high prevalence of cardiovascular and musculoskeletal disorders, nervous system dysfunctions, respiratory complications, and professional burnout. Key risk factors included chronic stress, long working hours, exposure to anesthetic gases, and insufficient rest. Preventive measures such as regular medical monitoring, ergonomic improvements, stress management programs, and strict adherence to occupational safety standards were identified as effective strategies for reducing morbidity and maintaining professional performance. The study provides a basis for region-specific occupational health policies, aiming to protect anesthesiologists-resuscitators and ensure quality patient care.*

Keywords: *Anesthesiologists-resuscitators; Occupational health; Epidemiology; Psycho-emotional stress; Professional burnout; Musculoskeletal disorders; Cardiovascular disorders; Intensive care; Fergana Valley; Preventive strategies*

Introduction

In the modern healthcare system, the professional activity of anesthesiologists and resuscitation specialists plays a crucial role, as they are directly involved in maintaining vital functions and saving the lives of critically ill patients. This medical specialty requires a high level of responsibility, rapid decision-making, constant psycho-emotional stress, and continuous work with complex medical technologies. Therefore, the health status of anesthesiologists-resuscitators is of significant importance not only on an individual level but also for the overall effectiveness of the healthcare system. The Fergana Valley is one of the most densely populated regions, characterized by a high demand for medical services. As a result, anesthesiology and intensive care units in this region operate under conditions of increased workload, frequent night shifts, and constant exposure to

emergency situations. These factors may negatively affect the physical and mental health of medical professionals, reduce work capacity, and contribute to the development of occupational diseases. Epidemiological studies indicate that anesthesiologists and resuscitation specialists have a higher prevalence of cardiovascular diseases, nervous system disorders, chronic fatigue syndrome, sleep disturbances, and stress-related conditions compared to other medical specialties. In addition, occupational exposure to biological, chemical, and physical risk factors, including anesthetic gases, infectious agents, radiation, and noise, plays a significant role in the development of work-related pathologies. In this context, studying the epidemiological characteristics of the health status of anesthesiologists-resuscitators in the Fergana Valley, identifying key risk factors, and developing scientifically grounded preventive measures for occupational diseases represent an urgent and relevant research objective. The results of this study are expected to contribute to the improvement of working conditions in healthcare institutions, enhancement of occupational health protection, and reduction of professional risks among medical personnel.

Relevance

Anesthesiologists and resuscitation specialists are exposed to high occupational risks due to intensive workloads, night shifts, psycho-emotional stress, and contact with harmful biological and chemical factors. In the Fergana Valley, increased demand for intensive care services further elevates these risks. The lack of region-specific epidemiological data highlights the need for focused research on occupational health and preventive measures for this professional group.

Aim

The aim of this study is to assess the epidemiological health characteristics of anesthesiologists and resuscitation specialists in the Fergana Valley, identify key occupational risk factors, and propose preventive measures to reduce occupational diseases.

Main part

Anesthesiologists-resuscitators occupy a central position in modern healthcare due to their direct involvement in life-saving medical interventions. Their professional responsibilities include anesthesia management, intensive care, cardiopulmonary resuscitation, and stabilization of critically ill patients. These specialists work in environments characterized by high mortality risk, time-sensitive decision-making, and continuous monitoring of vital physiological parameters. The effectiveness of surgical procedures and intensive therapy largely depends on their professional competence and physical endurance. Anesthesiologists-resuscitators are required to maintain sustained attention over prolonged periods, often under conditions of emotional pressure. Their work involves rapid interpretation of clinical data and immediate response to life-threatening changes. Continuous exposure to such conditions places significant strain on both physical and mental health. The high level of responsibility and constant risk of adverse outcomes increase occupational stress. Therefore, preserving the health of anesthesiologists-

resuscitators is essential for ensuring patient safety, reducing medical errors, and maintaining the overall quality of healthcare services.

The Fergana Valley represents a unique regional context due to its high population density and increased demand for medical services. Healthcare facilities in this region frequently experience a large influx of critically ill patients requiring intensive care. Anesthesiology and intensive care units operate under conditions of limited staffing and increased workload. Prolonged duty shifts and frequent emergency situations are common. These regional factors significantly intensify occupational strain among anesthesiologists-resuscitators. In addition, disparities in technical equipment and infrastructure affect working conditions. Rural and urban healthcare facilities demonstrate varying levels of resource availability. The constant pressure to provide timely and effective care contributes to chronic fatigue among medical personnel. Regional epidemiological features must therefore be considered when assessing occupational health risks. Understanding these characteristics is essential for developing targeted preventive strategies.

Epidemiological studies indicate that anesthesiologists-resuscitators exhibit higher morbidity rates compared to other medical specialists. Cardiovascular diseases, including arterial hypertension and ischemic conditions, are frequently reported. Disorders of the nervous system, such as anxiety, depression, and sleep disturbances, are also prevalent. Irregular work schedules and night shifts disrupt circadian rhythms, contributing to chronic fatigue syndrome. Long-term psycho-emotional stress negatively affects immune function and metabolic processes. In the Fergana Valley, these health issues are exacerbated by excessive workloads and insufficient recovery periods. Epidemiological analysis enables identification of disease patterns and risk groups. Such data are crucial for monitoring occupational health trends. Comprehensive epidemiological assessment forms the foundation for evidence-based preventive interventions.

Anesthesiologists-resuscitators are exposed to a wide range of occupational risk factors. Biological hazards arise from continuous contact with infectious patients and contaminated medical instruments. Chemical exposure includes anesthetic gases, disinfectants, and pharmacological agents used in intensive care. Physical risk factors such as noise, ionizing radiation, poor lighting, and unfavorable microclimatic conditions further increase health risks. In addition, prolonged standing and static working postures contribute to musculoskeletal strain. Psycho-emotional stress associated with emergency decision-making significantly impacts mental health. The combined effect of these risk factors leads to cumulative physiological burden. Without adequate protective measures, long-term exposure results in occupational pathology. Identifying and controlling these risks is essential for occupational health protection.

Occupational diseases among anesthesiologists-resuscitators are primarily associated with prolonged exposure to unfavorable working conditions and chronic stress. Cardiovascular disorders, including arterial hypertension and functional heart rhythm disturbances, are frequently observed due to sustained psycho-emotional tension. Disorders of the nervous system, such as chronic fatigue

syndrome, anxiety, and sleep disturbances, are also common. Continuous exposure to anesthetic gases and disinfectants increases the risk of respiratory diseases and allergic reactions. Musculoskeletal disorders develop as a result of prolonged static postures, repetitive movements, and physical overload during long duty shifts. In addition, immunological changes may occur, leading to increased susceptibility to infectious diseases. Occupational pathologies often progress gradually and remain undiagnosed in early stages. Without timely prevention and treatment, these conditions reduce professional performance and increase the risk of long-term disability.

Psycho-emotional stress is an integral component of anesthesiologists-resuscitators' professional activity. Constant involvement in life-threatening situations, responsibility for patient survival, and exposure to high mortality rates significantly affect mental health. Professional burnout syndrome develops as a consequence of prolonged emotional overload and insufficient psychological recovery. It is characterized by emotional exhaustion, depersonalization, and a decline in professional motivation. Burnout negatively influences clinical decision-making, attention, and reaction time. This condition increases the likelihood of medical errors and compromises patient safety. Long-term burnout may lead to depressive disorders and early withdrawal from professional practice. Therefore, systematic assessment of psycho-emotional status is essential in occupational health monitoring.

Effective prevention of occupational diseases among anesthesiologists-resuscitators requires a comprehensive and evidence-based approach. Optimization of work schedules and limitation of excessive duty hours help reduce physical and mental fatigue. Strict adherence to occupational safety standards and consistent use of personal protective equipment minimize exposure to harmful biological and chemical agents. Regular medical examinations enable early detection of occupational pathologies. Implementation of psychological support programs and stress management training reduces the risk of burnout syndrome. Ergonomic improvements in the workplace contribute to the prevention of musculoskeletal disorders. Preventive strategies should be integrated into institutional health policies to ensure long-term professional well-being. The findings of this study have substantial practical importance for healthcare management and occupational medicine. The obtained data allow for objective assessment of health risks among anesthesiologists-resuscitators in the Fergana Valley. Based on epidemiological evidence, targeted preventive programs can be developed at the regional level. The study contributes to improving working conditions and strengthening occupational health protection systems. Its results may be used to optimize staffing policies and reduce professional morbidity. Future research should focus on longitudinal monitoring of health indicators and evaluation of preventive interventions. Overall, the study supports the development of sustainable strategies aimed at preserving professional health and improving healthcare quality.

Discussion and Results

The analysis of health status indicators among anesthesiologists-resuscitators in the Fergana Valley revealed significant patterns of occupational morbidity and risk exposure. Epidemiological data demonstrate a high prevalence of cardiovascular disorders, primarily arterial hypertension and functional cardiac disturbances, among medical personnel engaged in intensive care units. Chronic exposure to psycho-emotional stress, night shifts, and prolonged duty hours has a direct correlation with these pathologies. Furthermore, nervous system disorders, including chronic fatigue, sleep disturbances, and anxiety symptoms, were identified as frequent health issues, confirming the impact of prolonged occupational stress. Respiratory complications and allergic reactions were noted in personnel frequently exposed to anesthetic gases and disinfectants, emphasizing the need for stringent chemical safety protocols. Musculoskeletal disorders, particularly involving the lumbar spine and upper limbs, were prevalent among specialists performing prolonged procedures and maintaining static postures.

Quantitative analysis of occupational risk factors revealed that the frequency of adverse health outcomes is significantly associated with duration of service, average weekly workload, and exposure to both biological and chemical hazards. Statistical evaluation showed that professionals with more than five years of intensive care experience exhibited higher rates of combined cardiovascular and musculoskeletal disorders compared to those with shorter service duration. Similarly, individuals with irregular rest schedules and insufficient recovery periods demonstrated more pronounced psycho-emotional disturbances and signs of professional burnout. These results are consistent with international studies indicating the susceptibility of anesthesiology and intensive care specialists to multifactorial occupational hazards.

Discussion of these findings suggests that a multifaceted approach is required for occupational health protection. Early detection of physiological and psychological disorders through regular medical monitoring, coupled with targeted preventive measures such as stress management programs, ergonomic interventions, and controlled exposure to hazardous substances, may substantially reduce morbidity. The correlation between occupational risk factors and specific health outcomes underscores the importance of evidence-based occupational health policies tailored to the regional context of the Fergana Valley. Overall, the results confirm that anesthesiologists-resuscitators represent a high-risk group for a range of occupational diseases. Implementation of comprehensive preventive strategies can improve professional well-being, reduce long-term disability, and enhance the quality of intensive medical care. The study also highlights the need for ongoing research and continuous monitoring to evaluate the effectiveness of occupational health interventions and to adapt policies based on emerging epidemiological trends. These findings provide a scientific basis for developing sustainable occupational health strategies and contribute to the broader understanding of the relationship between professional activity, risk exposure, and health outcomes in critical care medicine.

Conclusion

The conducted study provides a comprehensive evaluation of the health status, occupational risk factors, and preventive measures among anesthesiologists-resuscitators in the Fergana Valley. The results indicate that this professional group is exposed to a wide range of physical, chemical, biological, and psycho-emotional hazards that significantly affect both physiological and psychological well-being. Cardiovascular and musculoskeletal disorders, nervous system dysfunctions, respiratory complications, and professional burnout were identified as the most common health issues, confirming the multifactorial nature of occupational risks in intensive care practice. Epidemiological analysis demonstrates a clear correlation between workload intensity, duration of professional activity, and the prevalence of occupational diseases.

The study highlights the critical importance of implementing comprehensive preventive strategies, including regular medical examinations, ergonomic interventions, strict adherence to safety protocols, psychological support programs, and stress management training. These measures can effectively reduce morbidity, enhance professional longevity, and improve the quality of patient care. Furthermore, the findings emphasize the need for region-specific occupational health policies that address the unique conditions and challenges faced by anesthesiologists-resuscitators in the Fergana Valley. Overall, maintaining the health and well-being of anesthesiologists-resuscitators is essential for ensuring the efficiency and safety of intensive care services. The study provides a scientific basis for future research and the development of sustainable occupational health strategies. By addressing the identified risk factors and implementing targeted preventive interventions, healthcare institutions can significantly improve the professional environment, reduce work-related health issues, and enhance the overall quality of medical care in critical settings.

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**MUHANDIS-QURUVCHILARNI MUHANDISLIK HISOBINI AMALGA
OSHIRISH KOMPETENSIYASINI RIVOJLANTIRISH METODIKASINI
TAKOMILLASHTIRISH (SUYUQLIK VA GAZ MEXANIKASI FANI
MISOLIDA)**

***Annotatsiya.** Ushbu ilmiy maqolada mavjud mahalliy isitish tizimlarining energiya samaradorligini oshirishga qaratilgan tahlil keltirilgan. O'tkazilgan tadqiqotlar asosida mahalliy tizimda avtomatlashtirilgan yo'qotishlarni monitoring qilish tizimlarini, shuningdek, quvur liniyasi va agregat izolyatsiyasini joriy etish to'g'risida qaror qabul qilindi. Olingan ilmiy natijalar isitish tizimlarida yoqilg'ini tejashga, umumiy xarajatlarni kamaytirishga va issiqlik ta'minoti sifatini sezilarli darajada yaxshilashga yordam beradi.*

***Kalit so'zlar:** issiqlik, issiqlik almashinuvi, gidravlik optimallashtirish, nasos, energiya tejovchi texnologiyalar.*

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**IMPROVING THE METHODOLOGY FOR DEVELOPING CIVIL
ENGINEERS' COMPETENCIES IN PERFORMING ENGINEERING
CALCULATIONS (USING THE COURSE 'FLUID AND GAS
MECHANICS' AS AN EXAMPLE)**

***Abstract:** This article analyzes methodological approaches aimed at developing the competence of construction engineers in performing engineering calculations. Using the example of fluid and gas mechanics, the study highlights methods for improving students' computational skills through competency-based teaching, practical training, problem-based tasks, and digital technologies. Strengthening the integration of theory and practice in the learning process is assessed as a key factor in improving engineering professional training.*

***Keywords:** engineering calculations, competence development, fluid and gas mechanics, pedagogical methodology, practical training, hydraulic processes, competency-based approach, theory and practice integration.*

Introduction. Today, engineering calculations are the foundation of all design processes in the construction field. Calculations carried out in such subjects as fluid and gas mechanics are highly important in practical activities like building

water supply systems, designing hydraulic systems, and ensuring the reliable operation of gas pipelines. Therefore, developing students' competence to independently perform complex calculations is one of the urgent issues in higher education.

This article analyzes methodological approaches used in developing competence in performing engineering calculations, organizing the teaching process according to modern requirements, and improving the effectiveness of practical training.

As noted by domestic and foreign researchers, competency-based learning in engineering education is characterized by students' ability to think independently, analyze problematic situations, and solve practical issues using accurate calculations. In recent years, digital laboratories, virtual simulators, interactive modeling tools, and hydraulic process modeling software have been widely introduced into the teaching process of fluid and gas mechanics. These tools help strengthen students' skills in effectively performing engineering calculations. In addition, international practice applies methods such as problem-based learning, design-based learning, and engineering case studies to involve students in real project-based calculations.

Essence of the Methodology. The main goal of the methodology is to develop students' competence in understanding physical laws in fluid and gas mechanics, applying mathematical models, correctly performing hydraulic calculations, analyzing processes, and making practical decisions.

The methodology consists of the following stages:

1. Strengthening theoretical knowledge: basic laws, Navier–Stokes equations, Bernoulli's equation, hydraulic resistance, types of flow.
2. Developing practical calculation skills: selecting pipe diameter, determining loads, calculating flow velocity, identifying pressure losses.
3. Modeling and visualization: creating flow models using computer software, applying CFD (Computational Fluid Dynamics) simulations.
4. Solving problem-based tasks: performing project calculations based on real construction cases.
5. Assessing final competence: determining the student's calculation skills through tests, practical tasks, laboratory work, and project defense.

Practical Effectiveness of the Methodology. The proposed methodology was applied during experimental testing and yielded the following results:

- Students significantly improved their ability to use hydraulic process modeling software.
- Calculation errors decreased, and skills in analyzing results improved.
- The quality of independent project work increased.
- Students' interest in the subject of fluid and gas mechanics increased.

The results show that the competency-based methodology significantly improves not only engineering calculation skills but also students' overall professional training.

Conclusion. The findings show that the methodology aimed at developing construction engineers' competence in performing engineering calculations through the subject of fluid and gas mechanics improves the quality of the learning process. This methodology integrates theory and practice, enhances students' independent thinking, and strengthens their ability to solve practical engineering problems. In the future, the methodology should be further improved by expanding the volume of virtual laboratory work and establishing assessment criteria aligned with international standards.

Experimental studies confirm that strengthening theoretical knowledge, organizing systematic practical exercises, and using modern digital technologies and modeling software significantly improve students' professional skills. The methodology increases students' analytical thinking, ability to solve real engineering problems, and independent working culture.

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QASHQADARYO HAVZASIDA AGROLANSHAFTLARNING VUJUDGA KELISHI

Annotatsiya: Maqolada Qashqadaryo havzasida agrolandshaftlarning vujudga kelish jarayoni tabiiy-geografik sharoitlar va antropogen omillar ta'sirida tahlil qilingan. Sug'orish tizimlarining rivojlanishi, yer resurslaridan foydalanish va qishloq xo'jaligi faoliyatining agrolandshaftlar shakllanishidagi roli yoritilgan. Hududiy agrolandshaftlarning hozirgi holati va ularning barqaror rivojlanish masalalariga e'tibor qaratilgan.

Kalit so'zlar: Qashqadaryo havzasi, agrolandshaft, sug'orish, antropogen omillar, yer resurslari

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EMERGENCE OF AGROLANCES IN THE KASHKADARYA BASIN

Abstract: The article analyzes the process of the formation of agrolandscapes in the Kashkadarya basin under the influence of natural and geographical conditions and anthropogenic factors. The development of irrigation systems, the use of land resources and the role of agricultural activities in the formation of agrolandscapes are highlighted. Attention is paid to the current state of regional agrolandscapes and the issues of their sustainable development.

Keywords: Kashkadarya basin, agrolandscape, irrigation, anthropogenic factors, land resources

Landshaftlarning antropogen o'zgarishi muayyan hududda inson band etgan kundan hozirgi kunga qadar bo'lgan davrdagi tabiat va jamiyat o'zaro ta'sirining murakkab tarixiy jarayonidir. Shu sababli antropogen landshaftlarni o'rganishda ularning vujudga kelishi va rivojlanishining sotsial – tarixiy sharoitlarini ham e'tiborga olmoq zarur. Qashqadaryo vodiysi nafaqat O'rta Osiyoda, baki butun jahon tamadunining eng qadimiy o'choqlaridan biridir. Qadimiy shaharlar,

sug'orish inshootlari bu hududda inson va tabiat o'zaro ta'sirining qadimiyligidan guvohlik beradi. Bu hudud ham Amudaryo, Zarafshon va bosqa yirik daryo vodiylari kabi ming yillab tarixga ega bo'lgan dehqonchilik madaniyati rayonlaridir. Shu sababli bu yerda tabiatning o'zgarishi va antropogen landshaftlarning shakllanishida inson omilining roli juda katta. O.Y.Poslavskayaning (1966) yozishicha, qadimiy sug'orish yerlarida topilgan sopol parchasi miloddan avvalgi III asrga mansub.

Qashqadaryo vohasining hududi ham qadimdan inson faoliyatining turli shakllaridagi ta'siri ostida bo'lganligi sababli bu hududda hozirgi paytda butun O'rta Osiyo hududi uchun xos bo'lgan barcha turdagi antropogen landshaftlar tarqalgan. Qashqadaryo vohasi doirasida O'tkazilgan arxeologik tadqiqotlar bu hududdagi antropogen landshaftlarning ancha qadimiyligidan dalolat beradi. Bu hududda qadimiy aholi manzilgohlari, lalmikor va obikor dehqonchilik bilan bog'liq bo'lgan seliteb va agrolandshaftlar keng tarqalgan.

Ma'lumki, O'rta Osiyo dehqonchilik, ayniqsa obikor dehqonchilik vujudga kelgan va rivojlangan qadimiy uchoqlaridan biri hisoblanadi. S.P. Tolstov (1948) va Y.G'. G'ulomovning (1957) ma'lumotlariga ko'ra, O'rta Osiyo hududida sug'orish qo'llanilgan eng dastlabki dehqonchilik Xorazm vohasida vujudga kelgan. Keyinchalik katta-kichik daryo vodiylariga tarqala boshlagan.

Qashqadaryo havzasida ham qulay tabiiy sharoitlarning mavjudligi tufayli insoniyat tarixining dastlabki davrlaridanoq qishloq xo'jaligi bilan bog'liq bo'lgan agrolandshaftlar vujudga kela boshlagan va ularning maydoni uzluksiz kengaya borgan.

Qashqadaryo havzasi va uning yaqin atrofidagi hududlarda olib borilgan arxeologik tadqiqotlar bu yerda eneolit davrida (miloddan avvalgi 4 – 3 – ming yilliklarda tosh davri tugagan va eneolit davri boshlangan) suv havzalari yaqinida dastlabki aholi manzilgohlari – qishlov joylari (qishloqlar) vujudga kelgan va ularning aholisi dehqonchilik bilan shug'ullanishgan.

Jez davrida Qashqadaryo vohasi shu davrda shakllangan Baqtriya dehqonchilik madaniyati tarkibiga kirgan. Lalmi va obikor yerlarda bug'doy, arpa, sul, paxta, yetishtirilgan.

Temir davrida (miloddan avvalgi 8 – 6 asrlar va undan keyingi davrlar) dehqonchilik maydonlari kengayadi va sug'orish inshootlari barpo qilishga qaratilgan tadbirlar o'tkazila boshlaydi. Hozirgi Samarqand, Buxoro va Qashqadaryo viloyatlarida miloddan avvalgi 1–ming yillikka oid qadimgi sug'd dehqonchilik madaniyati shakllanadi.

Jez va temir davrlarining tabiiy sharoitlari paleogeografik va tarixiy geografik tadqiqotlarga ko'ra hozirgidan kam farq qilgan. Topilgan arxeologik materiallar jez davrida odamlar chorvachilik va dehqonchilik bilan shug'ullanishgan. Bu davrda vodiylar hududini o'zlashtirish sun'iy sug'orishni rivojlantirish yo'li bilan borgan. Hali oddiyligi bilan xarakterlanadigan sun'iy sug'orish yordamida daryo vodiysining quyi terrasalari, del'tasi, soylarning soxillaridagi yerlar o'zlashtirilgan. Jez va temir davrining aholisi sonining kamligi va ishlab chiqarish kuchlarining primitive holda rivojlanganligi tufayli hududni

o'zlashtirish uchun osonroq bo'lgan, suv chiqarish imkoniyatlari bo'lgan yerlar dehqonchilikda foydalanilgan va shu sababli o'zlashtirilgan yerlar "orolchalar" ko'rinishida bo'lgan.

Qashqadaryo havzasining ayrim hududlarini o'tmishda ham qo'shni havzalarning suv resurslaridan foydalanilgan holda sug'orish ishlari amalga oshirilgan. Olib borilgan arxeologik tadqiqotlar shuni ko'rsatadiki, Qashqadaryo havzasining quyi qismlaridagi ayrim hududlarni sug'orish uchun milodga qadar birinchi ming yillikda Darg'om (Zarafshon daryosidan suv oladigan sun'iy sug'orish tarmog'i) arig'idan suv olish va sug'oriladigan yerlar maydonlarini kengaytirish maqsadlarida Monas arig'i qazilgan (keyinchalik bu ariq Eskianhor nomini olgan). Uzunligi 300 km dan ortiqroq bo'lgan Monas arig'i XIII asrda mug'ullar iste'losi davrida buzub tashlangan va ko'p yillar davomida tashlandiq holda yotgan.

Tarixiy davrning boshlarida ham ishlab chiqarish kuchlarining past darajasi katta maydonlarda antropogen landshaftlarni vujudga kelishiga imkon bermagan. Hududlarni o'zlashtirish va sug'orish tabiiy sharoitlariga va shu davrlarda mavjud bo'lgan davlatlarning siyosiy-iqtisodiy xususiyatlariga bog'liq bo'lgan. Qashqadaryo havzasiga kirgan Yunon – Baqtriya (miloddan avvalgi 3 – 2-asrlar), Kanga (miloddan avvalgi 5-asr o'rtalari) va Kushon (miloddan avvalgi 1-asr – milodiy 3-asr) davlatlarida sug'orish inshootlarini qurush va sug'orma dehqonchilik ancha ravnaq topganligi boisida agrolandshaftlarning maydonlari ancha kengayib borgan. Zamonasining buyuk davlatlaridan Kaga podsholigi va Kushon saltanati ravnaq topgan davlatlarda dehqonchilik tufayli vujudga kelgan voha landshaftlarining maydoni kengayadi, daryo vodiysida bir qancha sug'orish tarmoqlari barpo etilib, sug'oriladigan yerlarni maydoni ancha kengayadi. G'allachilik va polizchilik bilan bir qatorda paxtachilik va bog'dorchilik maydonlari ham kengayadi. Mirishkorlarning asrlar davomomida sug'orish, milioratsiya va ekin yetishtirish agrotexnikasi, xususan yer maydonlarga ishlov berish sohasida ortirilgan tajribalari nisbatan mo'l hosil olinadigan imkoniyatlarni vujudga keltiradi.

Olib borilgan arxeologik tadqiqotlardan ma'lum bo'lishicha, eftaliylar (5-asr o'rtalari) davlati tarkibiga kirgan Qashqadaryo hududida ham ko'chmanchi eftaliylar qabilalarining ommaviy ravishda o'troqlashuvining kuchayishi natijasida sug'oriladigan yerlarda bo'lgan ehtiyoj kuchayadi, seliteb landshaftlar hamda agroirrigatsiya landshaftlarining maydoni kengayadi. Daryo vodiysi bo'ylab katta-kichik su'gorish uchun qazilgan ariqlar barpo etiladi. Irrigatsiya texnikasi ham rivoj topadi ("O'zbekiston Respublikasi, Ensiklopediya. T, 1997).

Qashqadaryo havzasida IX – X asrlarda ham irrigatsiyaning rivojlanganligi va sug'oriladigan yerlarning yuqori hosildorligi to'g'risida ma'lumotlar saqlanib qolgan. Ammo mug'ullar istelosidan sunggi davrlarda sug'orish inshootlarining buzulib tashlanishi yoki iqtisodiy nochorlik tufayli ularning tashlandiq holda kelishi va natijada sug'orma dehqonchilikning tanazzuli sodir bo'ladi. Bunday hollarda antropogen landshaftlarning qayta tabiiylashuv jarayoni kuchayadi.

Sug'orish tarmoqlarining ravnaq topishi va sug'orma dehqonchilikning rivoji buyuk Sohibqiron Amir Temur davrida ham kuzatilgan. Bu davrda katta – kichik

ariqlar, suv omborlari barpo etiladi, Eskianxor (Monas) arig'i qayta tiklanib ta'mirlanib foydalanila boshlaydi. Qayta ta'mirlangan Eskianxor arig'i bir necha o'n yillar davomida Qarshi cho'lida agroirrigatsiya landshaftlarining mavjud bo'lishini hamda aholi manzilgohlari bilan band bo'lgan siletib landshftlarni suv ta'minotini yaxshilash imkon beradi. Saqlanib qolgan ma'lumotlar Amir Temur davrida obikor dehqonchilik ancha taraqqiy etganligidan darak beradi. Bu davrda Qashqadaryo havzasida ham ariqlarning qayta ta'mirlanganligi, ariqlar qazilganligi agroirrigatsiya landshaftlarining ancha kengayishi uchun imkoniyat yaratgan.

XVIII asrning oxiri va XIX asrning boshida davlat hokimiyati markazlashuv jarayonlarining kuchayishi natijasida sug'orish ishlarining bir muncha rivojlantirishi uchun sharoitlar yaratadi. 1785 – 1800-yillarda Qashqadaryo va uning irmoqlaridagi tug'onlar suv resurslaridan foydalanishni tartibga solish maqsadida buzib tashlandi, yangi ariqlarda, to'g'onlar va dambalar ta'mirlandi.

Qashqadaryo havzasida qishloq xo'jaligi va irrigatsiyani rivojlantirish sohasidagi katta ishlar XX asrning 30-yillaridan boshlandi. 1929-yilda "O'zsuv ishlab chiqarish" loyihalash instituti "Qashqadaryo havzasida yer-suvdan foydalanish tarhi" ni tuzib chiqdi. Suv resurslarini o'rganish va tuproqlarni tadqiq qilish asosida havzada sug'orish uchun 877 ming ga yerning yaroqli ekanligini aniqladi, 56 ming ga yerni sug'orish uchun suv ombori qurish belgilandi. Loyiha institutning tarhida Qashqadaryo havzasida suv bilan ta'minlashni yaxshilash natijasida Amudaryo va Zarafshonning suvlaridan foydalanish tavsiya etilgan edi. Ammo bu tavsiya texnik jihatdan murakkabligi va bajarilishi lozim bo'lgan ishlarning katta miqdorda sarf xarajatlarni talab etishi tufayli keyingi yillarga qoldirildi.

1925-1930-yillarda Qarshi cho'li doirasida bir qator ariqlar (Patron, Talikaron, Fazli, Qovchin va b.) qurub bitkazildi va buning natijasida sug'oriladigan yerlarning agroirrigatsiya landshaftlari bilan band bo'lgan maydonlarini ancha kengaytirish imkoniyatlari vujudga keltirildi.

Qashqadaryo havzasida katta miqyosdagi suv qurulishi va antropogen landshaftlar maydonining kengaytirilishiga doir ishlar XX asrning 50-yillarida boshlandi. 1948-yilda yuqorida nomi qayd etilgan loyihalash instituti (bu institutning nomi keyinchalik "O'rta Osiyo suv loyihalash" nomini olgan) tomonidan uzunligi 184 km bo'lgan eski Anhor kanalini qayta tiklash loyihasi tayyorlandi. Suv xarajati bosh qismida $45 \text{ m}^3/\text{sek}$ ni tashkil etadigan bu kanal 1955-yilda foydalanishga topshirildi. Kanalning qurulishi natijasida Zarafshon daryosining 240–300 ming m^3 miqdoridagi suvlari Qashqadaryoga tashlanadi.

1961-yil "Sredazxlopok" institutida Qarshi cho'lining sug'orish va o'zlashtirishning bosh tarhini tayyorlash ishlari nihoyasiga yetkazildi. O'tgan yillarda shu tarh asosida uzunligi 150 km bo'lgan Qarshi bosh va uning tarmog'i bo'lgan Kasbi kanallari, suv sig'imi $1,8 \text{ km}^3$ bo'lgan Tallimarjon quyilma suv ombori qurib bitkazildi va foydalanishga topshirildi. Qarshi bosh kanaliga har sekundda 200 m^3 suvni 132 m balandlikka ko'tarib beradigan nasos stansiyalari qurildi.

1957-1987-yillarda suv sig'imiga ko'ra turlicha bo'lgan 14 ta suv omborining qurib bitkazilishi va foydalanishga topshirilishi natijasida Qashqadaryo havzasining yuqori va o'rta qismlarining suv ta'minotini tubdan yaxshilash imkonini berdi.

Qashqadaryo havzasida insonning turli xildagi faoliyati bilan bog'liq bo'lgan landshaftlarning o'zgarishi va antropogen landshaftlarning yuzaga kelishi sodir bo'lgan. Bu yerda tubdan o'zgartirilgan texnogen landshaftlar, seliteb landshaftlar, suvli (akval) landshaftlar vujudga kelgan. Ammo ularning maydoni agrolandschaftlar bilan band bo'lgan landshaftlarning maydoniga nisbatan ancha kam va ularning aksariyat katta qismini yirik masshtabli xaritalardagina ajratish mumkin.

Qoratepa, Chaqilkalon va Hisor tog'larining yonbag'rlarida qurulishbop materilallarni olinishi sababli karyerlar hosil bo'lgan. Keyingi yillarda Qamashi va Dehqonobod hududlaridagi osh tuzlari zaxiralaridan ayrim joylarda foydalanila boshlaganligi sababli ham texnogen landshaftlar vujudga kela boshladi. Texnogen landshaftlarning tekisliklarda vujudga kelishi neft, gaz va gaz kondensati qazib olish bilan bog'liq.

Qashqadaryo vohasi landshaftlarini tabiiy va antropogen omillar ta'siri ostida rivojlanishi va antropogen landshaftlarning shakllanishini Inson tabiatdan foydalanish jarayonida unga xilma-xil ta'sir ko'rsatadi va buning oqibatida tabiiy muhitda muayyan o'zgarichlar sodir bo'ladi. Bu o'zgarichlar orasida insonning hayotiy yoki ichlab chiqarich faoliyati uchun salbiy sajiyaga ega bo'ladigan o'zgarishlarning bo'lishi ham ehtimoldan holi emas. Shu sababli tabiatdan oqilona foydalanishni tashkil etish tabiatga ta'sir ko'rsatich jarayonida turli landshaftlarda va ularni tashkil etuvchi komponentlarda qanday o'zgarichlar sodir bo'lishini majmualii tadqiq qilishni taqozo etadi.

Shunday qilib, Qashqadaryo havzasida turli tarixiy davrlarda inson o'zining ishlab chiqarish jarayonida tabiiy landshaftlarga ta'sir ko'rsatgan va turli xildagi antropogen landshaftlarning shakllanishiga imkoniyat tug'dirgan. Qashqadaryo havzasida agrolandschaftlar asosan sug'oriladigan dehqonchilik va inson faoliyati ta'sirida shakllangan. Tabiiy sharoitlar bilan uyg'un holda olib borilgan xo'jalik faoliyati hududning qishloq xo'jaligi salohiyatini oshirgan. Agrolandschaftlarni ilmiy asosda boshqarish va muhofaza qilish ularning barqaror rivojlanishini ta'minlashda muhim ahamiyatga ega.

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AGROLANDSHAFT TUSHUNCHASI, UNING FUNKSIYALARI VA XUSUSIYATLARI

***Annotatsiya:** Mazkur maqolada agrolandshaft tushunchasining mazmuni, shakllanish omillari hamda uning qishloq xo'jaligidagi o'rni yoritilgan. Agrolandshaftlarning asosiy funksiyalari — ishlab chiqarish, ekologik barqarorlik va tabiiy resurslardan oqilona foydalanish jihatlari tahlil qilingan. Shuningdek, agrolandshaftlarning muhim xususiyatlari va ularni boshqarishning ilmiy-amaliy ahamiyati ko'rsatib berilgan.*

***Kalit so'zlar:** agrolandshaft, qishloq xo'jaligi, ekologik barqarorlik, tabiiy resurslar, landshaft funksiyalari*

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THE CONCEPT OF AGROLANDSHAFT, ITS FUNCTIONS AND FEATURES

***Abstract:** This article discusses the content of the concept of agrolandscape, its formation factors and its role in agriculture. The main functions of agrolandscapes - production, environmental sustainability and rational use of natural resources - are analyzed. The important features of agrolandscapes and the scientific and practical significance of their management are also indicated.*

***Keywords:** agrolandscape, agriculture, environmental sustainability, natural resources, landscape functions*

Qishloq xo'jaligi – iqtisodiyotning aholini oziq-ovqat bilan ta'minlashga va sanoatning bir qancha tarmoqlari uchun xom ashyo olishga yo'naltirilgan tarmog'i bo'lib, u deyarli barcha mamlakatlarda mavjud bo'lgan eng muhim tarmoqlardan biridir. Qishloq xo'jaligining va uning tarkibiy qismlarining (dehqonchilik, o'simlikchilik, yem-xashak tayyorlash va chorvachilik) ahamiyati doimiy ravishda o'sib bormoqda.

Qishloq xo'jaligida yerdan foydalanish jarayonida tabiiy landshaftlarda bir komponentli va ko'p komponentli o'zgarishlar ularning tuzilmasida o'z ifodasini topmasdan qolmaydi. Pirovardida bu o'zgarishlar antropogen qishloq xo'jalik landshaftlarining muayyan turlarining shakllanishiga olib keladi. Hozirgi antropogen landshaftlar orasida qishloq xo'jalik landshaftlari (ekinzorlar, bog'lar, o'tloqlar, yaylovlar) eng muhim va ko'p tarqalgan. Qishloq xo'jalik landshaftlari aholi manzilgohlari va fermalarning maydonlarini ham qo'shib hisoblaganda sayyoramiz quruqlik yuzasining 37% ga yaqin maydonini band qiladi. Shundan 12% ini dehqonchilik maydonlari, 25% ini esa yaylovlar tashkil etadi. Qishloq xo'jalik landshaftlari Yer yuzasida deyarli barcha landshaft zonalarida har qanday tabiiy landshaftni o'zgartirish yo'li bilan yaratiladi.

O'tgan asrning 70-yillaridan boshlab xo'jalik faoliyatining ta'siri ostida o'zgargan geosistemalar geografiyada geosistemalarning *antropogen landshaftlar* deb nom olgan alohida sinfi sifatida faol o'rganila boshlandi. Tabiiy landshaftni insonning biror-bir faoliyatiga bog'liq holda tubdan o'zgartirish antropogen landshaftni vujudga kelishiga olib keladi. Antropogen landshaft tarkibida qazib olish va mineral xom ashyoni qayta ishlash, sanoat yoki qishloq xo'jalik ishlab chiqarishining ustuvorligida monand holda *tog' sanoati, sanoat yoki industrial, qishloq xo'jaligi (agromadaniy)* landshaftlar shakllanadi.

Dehqonchilikda foydalanish jarayonida landshaft batamom o'zgartirilmaydi, qisman o'zgartiriladi. Shu sababli agrolandschaftlar antropogen ta'sirda o'zgartirilgan tabiiy-antropogen landshaft sifatida qaralishi lozim. Qishloq xo'jalik ishlab chiqarish maqsadlarida foydalaniladigan, uning ta'sirida shakllanadigan va mavjud bo'ladigan landshaft *qishloq xo'jalik landshafti* deyiladi. Antropogen landshaftga katta kichik aholi manzilgohlarining qurilishlari va tomorqalarning majmualari bilan qishloq landshafti ham mos tushadi.

Qishloq xo'jalik landshaftlari – bu qishloq xo'jalik dalalari (sug'oriladigan va sug'orilmaydigan) dalalar, polizlar, bog'lar va hayvonlar uchun turli yaylovlar. Qishloq xo'jalik landshaftlari dalalar, pichanzorlar, o'tloqlar, qishloq aholi manzilgohlari, qishloq xo'jalik ishlab chiqarish obyektlari (turli fermalar, qishloq xo'jalik mahsulotlarini qayta ishlash bo'yicha zavod va sexlar) ning mavjudligi bilan ifodalanadi.

F.N. Milkovning fikricha, qishloq xo'jalik ishlab chiqarish maqsadlarida foydalaniladigan, uning ta'siri ostida shakllanadigan va mavjud bo'ladigan bunday tabiiy-ishlab chiqarish obyektlari qishloq xo'jalik landshaftlarini tashkil etadi. Qishloq xo'jalik landshaftlarining o'ziga xosligi ularning qisqa muddatli, inson tomonidan tartibga solinadigan komplekslarga mansubligi bilan bog'liq.[F.N. Milkov, 1984].

Qishloq xo'jalik yerlarini o'rganish bilan turli fanlar shug'ullanadi. Landshaftshunoslikning qishloq xo'jalik, agromeliorativ fanlari, ekologiya, tuproqshunoslik, geobotanika bilan tutashuvida alohida ilmiy yo'nalish – agrolandschaftlar to'g'risida ta'limot tarkib topdi va rivojlanmoqda. Qishloq xo'jalik yerlarini tadqiq qilishda landshaft metodlarini qo'llash kompleks agrolandschaft

sajiyasiga ega bo'lmoqda. Kompleks, geosistemali yondoshuv bunday tadqiqotlarning asosiy xususiyatidir.

Agrolandshaftlar to'g'risida ta'limot XIX asr oxirida geografiya bag'rida tarkib topdi va XX asrda geografiyaning boshqa fanlar bilan tutashuvda rivojlandi (J. Marsh, A. Humboldt, K. Ritter V.V.Dokuchayev, A.I. Voyeykov, V.V.Alyoxin, G.N. Visotskiy, G.F. Morozov, L.S. Berg, Z. Passarge, O. Shlyuter, L.G. Ramenskiy, D.L.Armand, F.N.Milkov, V.A.Nikolayev, B.I.Kochurov, G.I.Shvebs, A.M. Ryabchikov, L.I. Kurakova, E.P. Romanova, V.N. Solnsev va b.)

Qishloq xo'jalik ishlab chiqarish maqsadlarida foydalaniladigan, uning ta'sirida shakllanadigan va mavjud bo'ladigan qishloq xo'jalik landshaftlari hozirgi geografik adabiyotlarda, qishloq xo'jaligiga, Yer qurilishiga, tabiat muhofazasiga doir ishlarda qishloq xo'jalik landshafti uchun "agrolandshaft" termini ko'proq qo'llaniladi. Qishloq xo'jalik landshaftlari *agrolandshaftlar* deb nom olgan. XX asrning 80-yillarida klassik landshaftshunoslik va qishloq xo'jalik yerlari ekologiyasi asosida adaptiv landshaft dehqonchiligining ilmiy asosi sifatida agrolandshaft konsepsiyasi shakllandi va qishloq xo'jalik amaliyotiga tatbiq etildi (Ryabchikov, 1972; Kurakova, 1974; Nikolayev, 1986, 1987).

Geografik tasavvurlarning hozirgi bosqichida agrolandshaft antropogen landshaft yoki tabiiy-ishlab chiqarish (geotexnikaviy) sistema sifatida qaraladi. Hozirga qadar "agrolandshat yoki qishloq xo'jalik landshafti" termini talqinida birlik yo'q. Ko'pgina tadqiqotchilar har qanday agrosistemani (ekinzorning uncha katta bo'lmagan qismini ham, almashlab ekish dalasini ham yoki butun iqtisodiy rayonning qishloq xo'jalik yerlarini ham) qishloq xo'jalik landshafti deb hisoblashadi. Boshqacha aytganda, agrolandshaft o'lchamsiz tushuncha sifatida qaraladi. Terminning bunday noaniq talqini qishloq xo'jalik landshaftlarini tasnif qilish, tipologik jihatdan kartada ifodalash, hududiy rejalashtirish va melioratsiya qilish bo'yicha amallarni bajarish imkonini bermaydi.

Olimlarning boshqa bir guruhi qishloq xo'jalik landsahfti deb qishloq xo'jalik faoliyat tufayli shakllanadigan va faoliyat ko'rsatadigan landshaftlar, aniqrog'i tegishli landshaft tabaqalashuvini hududiy tashkil etish asosida muayyan qishloq xo'jalik mahsulotini olish uchun inson tomonidan foydalaniladigan, o'zgartirilgan landshaft tushuniladi.

1987-yilda V.A. Nikolayev qishloq xo'jalik landshaftlarini agrolandshaftlar deb ataydi va agrolandshaft konsepsiyasini taklif etdi. Bu konsepsiyaga ko'ra, qishloq xo'jaligi ishlab chiqarishiga jalb qilingan landshaft batamom yangi hosila sifatida, ishlov beriladigan va boshqa ixtisoslashtirilgan yerlarni o'z ichiga oladigan bir butun, ichki tuzilishiga ko'ra bir xil bo'lmagan tabiiy-qishloq xo'jalik geosistema sifatida qaraladi [Nikolayev, 1987].

Uning fikricha, agrolandshaft deb har qanday agrosistema emas, balki aniq, regional, o'lchamdagi, (regional tushunchadagi) tabiiy landshaftga xos bo'lgan geosistema tushunilishi lozim [Nikolayev, 1979]. V.A. Nikolayevning fikricha, agrolandshaft qishloq xo'jaligi ishlab chiqarish tomonidan o'zgartirilgan landshaft va shu sababli unda tabiiy chegaralar saqlanib qoladi. Agrolandshaftlar yerlarning

tabiiy va tabiiy – ishlab chiqarish xillari bo'lib, ular tabiiy-hududiy kompleksni va qishloq xo'jalik ishlab chiqarishini o'z ichiga oladi [Nikolayev.1979].

Agrolandshaftlar – qishloq xo'jaligi uchun belgilangan tabiiy-xo'jalik hududiy sistemalari bo'lib, resurslar tiklash, muhit hosil qiluvchi va tabiatni muhofaza qilish vazifalarini bajaradi va tabiiy hamda o'zgartirilgan tabiat komplekslaridan, muxandislik inshootlaridan, yo'llardan va qishloq aholi manzillaridan va ularning sotsial-iqtisodiy infraquraturalaridan tashkil topgan. Agrolandshaft tarkibida nazorat qilish, tartibga solish va boshqarish bloklari bo'ladi. Sistemaning bir butunligini axborot, energiya va moddiy oqimlar taqozo etadi. V.A. Nikolayev (1986, 1987) sistema zaruriy xilma-xilligi qonuniga muvofiq boshqaruv kichik tizimi boshqariladigan kichik sistema kabi xilma-xil tuzilishga ega bo'lgandagina o'z vazifalarini muvaffaqiyatli bajara olishini ta'kidlaydi. Bu qishloq xo'jalik yerlariga tatbiq qilinganda qishloq xo'jalik ishlab chiqarishi, yer tuzish, melioratsiya, sotsial-iqtisodiy infratuzilma joyning landshaft tuzilmasi kabi xilma-xil uyushtirilishi lozim. Qishloq xo'jalik faoliyatiga bog'liq bo'lgan agrolandshaftda tabiiy xususiyatlar ishlab chiqarish va sotsial infraquratura bilan birlashadi.

M.I. Lopirevning fikricha (1995), agrolandshaft " inson tomonidan boshqariladigan va nazorat qilinadigan, qishloq xo'jaligida foydalanishning muayyan turi bo'lgan hududiy sistemalar yoki bir xil joylar (uchastkalar)dir.

Agrolandshaftlar inson va ijtimoiy formatsiyalarning tadrijiy rivojlanishi bilan bir paytda rivojlangan. Hozirgi agrolandshaftlarda turli texnika, melioratsiya, kimyolashtirish va boshqalar qo'llaniladi, shu sababli texnogeneznining agrolandshaftlarga ta'siri, shu jumladan agrolandshaftlar geokimyosining o'zgarishi to'g'risida so'z yuritish mumkin. Bu omillarning agrolandshaftlarga ta'sirining tahlili XX asrda "Geotexnik sistemalar konsepsiyasi"ning shakllanishiga olib keldi. Geotexsistemalar to'g'risidagi ta'limotning vujudga kelishi qishloq xo'jaligida foydalaniladigan hududni ikki o'zaro ta'sirdagi tabiiy va qishloq xo'jaligi kichik tizimlaridan iborat bo'lgan tabiiy-ishlab chiqarish obyektlari sifatida tadqiq qilish imkoni yuzaga keldi. Bu obyektlar tabiiy-qishloq xo'jalik geosistemalari yoki agrolandshaftlardan iborat. Agrolandshaftlar texnogen landshaftlarning alohida otryadi bo'lib, ularning muhim geokimyoviy tavsifini tabiiy landshaftlardagi kabi moddalarning biologik aylanma harakati tashkil etadi. Ammo tub landshaftlardagidan farq qilgan holda bu texnogen landshaftlarda biologik aylanma harakatda fitomassaning zahirolari va tuzilmasi to'liq o'zgaradi, azot va boshqa biogen elementlarning aylanma harakati esa kuchli o'zgaradi.

Agrolandshaftning asosiy funksiyasi – imkon darajasida ko'proq qishloq xo'jalik mahsulotini tayyorlash bo'lib, kimyolashtirish va agrotexnogeneznining boshqa turlari natijasida, ayrim regionlarda esa sanoat korxonalari ifloslagan havo massalarining kelishi tufayli yuzaga keladigan muhitning ifloslanishi bilan ziddiyatga kirishadi. Nostandart o'g'itlar agrolandshaftlarga tushadigan og'ir metallarning asosiy manbai bo'lib, og'ir metallar mahalliy migratsiya sikllariga qo'shiladi va qisman agrolandshaftlardan tashqariga chiqib ketadi.

Agrolandshaft nisbatan ekologik ishonchlilikning nisbatan past boshlang'ich holati va o'z-o'zini tartibga solishning buzilgan mexanizmiga ega bo'lgan tabiiy-antropogen sistema sifatida ham ta'riflanadi [Van Berkel, Verburg, 2014]. Agrolandshaftning tabiiy landshaftdan farq qiluvchi xususiyati, yuqorida ta'kidlanganidek, undagi o'z-o'zini tartibga solishning past boshlang'ich holati bo'lib, u inson tomonidan asraladi. Buning asosiy sabablari: a) barqaror, tabiiy fitosenozlarning aniq bir maqsadni nazarda tutgan holda ko'pincha eksplarentlarning yaqin analoglari, suksessiyaning dastlabki bosqichlari uchun xos bo'lgan, tuproqlarning kimyoviy tarkibini o'zgartiradigan va qashshoqlashtiradigan bir yillik o'simliklarning monokulturasiga bo'lgan agrosenozlar bilan almashtirilishi. b) agrosenozlarga begona (yovvoyi) o'simliklarning kirib kelishi, tarqalishi, rivojlanishi va qishloq xo'jalik zarakunandalarining ko'payish o'choqlarining barpo bo'lishi; g) tabiiy tuproq qoplamini mexanik buzilishining salbiy hodisalarga, shu jumladan eroziya va deflyatsiyaga tabiiy qarshilik ko'rsatishining turli darajasi; d) yerlarni tuproqlarning tabiiy kimyoviy tuzilishini o'zgartiradigan, tuproq florasi va faunasining sterilizatsiyasiga va ezilishiga olib keladigan, landshaftlarning bir xilligini shakllantiradigan sun'iy kimyolashtirish; e) tabiiy biokimyoviy aylanma harakatning o'zgarishi energiya piramidasi ekologik qonuni amalining tugashi; f) bularning barchasi pirovardida tabiiy landshaft va uning komponentlarining hududiy xilma-xilligining umumiy soddalashuviga va, shuningdek, hududning quruqlashuviga olib keladi.

Agrolandshaft – qishloq xo'jalik ishlab chiqarish ta'siri ostida tabiiy o'simligi batamom yoki qisman madaniy o'simliklarning bir yoki bir necha turning (navining) yuqori mahsuldorlikka ega bo'lgan biologik turkumidan iborat bo'lgan agrosenozlar bilan almashtirilgan antropogen landshaft. Xolbuki, sun'iy yaratilgan agrosenozlar kichik ekologik ishonchlilikka ega va doimo inson tomonidan quvvatlab turiladi.

Agrolandshaftlarga berilgan berilgan ta'riflarni tahlil qilib va ularni umumlashtirgan holda agrolandshaftlarning quyidagi eng muhim xususiyatlarini belgilash mumkin:

1. Agrolandshaft qishloq xo'jalik ishlab chiqarishi o'zgartirgan tabiiy landshaftni namoyon etadi. U odatda tabiiy sarhadlar bilan chegaralangan, o'zaro ta'sirdagi tabiat komponentlarining kompleksidan va dehqonchilik tizimi elementlaridan iborat bo'lib, unda bir xil ekologik sistemaning belgilari bo'ladi (1-,2-ilovalar). Geologik-geomorfologik va gidroiklimiy omillar agrolandshaftlar uchun ham asosiy omillardir.

2. Insonning qishloq xo'jaligi faoliyati natijasida shakllanadigan agrolandshaft tabiiy-antropogen sistema bo'lib, resurs tayyorlovchi, muhit hosil qiluvchi va tabiatni muhofazalovchi funksiyalarni bajaradigan tabiat va o'zgartirilgan tabiiy komplekslardan, har biriga o'zining sotsial – iqtisodiy infrastrukturasi mos keladigan muhandislik inshootlari, yo'llar va qishloq aholi manzilgohlaridan tashkil topgan. Tabiiyki, agrolandshaftlarning vujudga kelishi, tuzilmasi va faoliyati sotsial-iqtisodiy sharoitlar bilan chambarchas bog'liq va ularning taqozasidir.

3. Agrolandshaft – bu biotik qismida inson tomonidan sun'iy shakllantirilgan va hududning katta qismida tabiiy fito- va zoosenozlarni o'rnini egallagan jonli organizmlar turkumi (agrobiosenozlar) ustivorlik qiladigan antropogen landshaft. Boshqacharoq qilib aytganda agrolandshaft katta qismida tabiiy o'simlik qishloq xo'jalik o'simliklarining ekinlari bilan almashtirilgan va tabiiy chegaralarini saqlab qolgan landshaft. Bu ta'rifga binoan agrolandshaft maqsadli yaratilgan o'simlikka nisbatan sifat jihatdan bir xil bo'lgan hudud bo'lib, unda inson tomonidan iqlim, orografik, tuproq va biotik sharoitlar o'zgartiriladi.

4. Agrolandshaft muayyan ko'rinish va tuzilmaga ega bo'lib, dehqonchilik tizimiga bog'liq xolda mavjud bo'lgan murakkab uyushgan ko'p o'lchamli antropogen geosistema. U o'zaro ta'sirdagi tabiiy komponentlar majmuasidan-hudud uyushuvidanva dehqonchilik ishlab chiqarish hamda sotsial kichik tizimi elementlaridan - dehqonchilik tizimidan iborat bo'lgan tabiiy-antropogen geosistema.

Agrolandshaft boshqa antropogen landshaftlar kabi quyidagi xususiyatlari bilan tabiiy geosistemalardan farq qiladi:

- agrolandshaft qishloq xo'jalik ishlab chiqarishi ta'sirida bo'ladi;
- agrolandshaft band qilgan hududning katta qismida agrofitosenoz hukumronlik qiladi;
- agrolandshaftda uni tashkil etuvchi deyarli barcha komponentlar insonning xo'jalik faoliyati tufayli o'z xususiyatlarini o'zgartiradi va o'zaro muvofiqlashadi;
- barcha ekosistemalar soddalashadi;
- tabiiy va sotsial-iqtisodiy geosistemalar birgalikda mavjud bo'ladi;
- tabiiy jarayonlar va hodisalar hamda sikllar tabiiy muhitdagiga nisbatan tezroq kechadi;
- jarayonlarning noritmliligi xos;
- agrolandshaftda kimyoviy muvozanat (kimyoviy o'g'itlardan foydalanich va zarali kimyoviy moddalarning top'lanishi) buziladi.

Landshaftning o'zaro ta'sirdagi komponentlari va elementlari ko'plab turli funksional aloqalarni hosil qiladi.

Agrolandshaft vazifalari (funksiyalari) quyidagi asosiy guruhlarga ajratiladi:

1. Ishlab chiqarish
 - barqaror dehqonchilik sharoitlarining shakllanishi;
 - qishloq xo'jalik mahsulotlarini ishlab chiqarish.
2. Hududiy
 - o'simlik va hayvonlarning hayotiy faoliyati uchun sharoitlar yaratish;
 - ekin ekiladigan yerlar nisbatini oldindan aniqlash;
 - hududni ishlab chiqarish – ekologik zonalashtirishni amalga oshirish;
 - qishloq xo'jalik mashina va mexanizmlaridan yuqori ishlab chiqarish foydalanish, transport xarajatlarini pasaytirish, aloqani ta'minlash uchun sharoitlar yaratish.
3. Meteorologik
 - tuproqning suv va harorat rejimini tartibga solish;
 - havoning suv va harorat rejimini tartibga solish;

- Quyosh energiyasi va radiatsiyasini to'plash;
- tabiat anomaliyalariga (qurg'oqchilik, chang tuzonlari, sovuq urishi va b.) ta'sir ko'rsatish.

4. Hidrologik

- oqimni tartibga solish;
- tuproq nam zahiralarini shakllantirish;
- sizot suvlari sathini tartibga solish;

5. Biologik

- ekinzorlarning biologik mahsuldorligini qayta tiklash;
- gumus hosil qilish.

6. Fizikaviy- kimyoviy

- tuproqning fizikaviy holatiga (tuzilmasi, zichligi, suv o'tkazuvchanligi) ta'sir;

- o'simliklar oziqlanishi rejimiga ta'sir;
- tuproqning kimyoviy xossalriga ta'sir va b.[Abdullayev, Muqimova, 2022].

Shunday qilib, insonning qishloq xo'jalik faoliyati ta'siri ostida shakllanadigan, muayyan ko'rinish va tuzilmaga ega bo'lgan agrolandshaft murakkab uyushgan ko'po'lchamli antropogen geosistemadir. Insonning qishloq xo'jalik faoliyati tufayli uning tabiatga ta'siri va qishloq xo'jalik landshaftlarining shakllanish xususiyatlarini o'rganish landshaft to'g'risidagi ta'limotni rivojlanishiga imkon berdi.

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AXBOROT TEXNOLOGIYLARI ASOSIDA ISHLOVCHI INTELLEKTUAL TIBBIY TEXNIK TIZIMLAR

Annotatsiya: Ushbu maqolada axborot texnologiyalari asosida ishlovchi intellektual tibbiy texnik tizimlarning tibbiyot sohasidagi ahamiyati, asosiy vazifalari, ularning ishlash tamoyillari hamda zamonaviy tibbiy uskunalarda qo'llanilishi haqida ma'lumot berilgan. Shuningdek, bunday tizimlarning tibbiy ma'lumotlarni yig'ish, qayta ishlash va tahlil qilishdagi o'rni, shifokorlar faoliyatini yengillashtirish hamda tashxis qo'yish jarayonidagi samaradorligi to'g'risidagi ma'lumotlar muhokama qilingan. Maqolada intellektual tibbiy texnik tizimlarni joriy etish orqali bemorlarni davolash sifatini oshirish va sog'liqni saqlash tizimini rivojlantirish imkoniyatlari keltirilgan.

Kalit so'zlar: axborot texnologiyalari, intellektual tizimlar, tibbiy texnik tizimlar, biotibbiyot muhandisligi, sun'iy intellekt, tibbiy uskunalar, avtomatlashtirish, tibbiy ma'lumotlar.

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INTELLECTUAL MEDICAL TECHNICAL SYSTEMS BASED ON INFORMATION TECHNOLOGIES

Abstract: This article provides information on the importance of intelligent medical technical systems based on information technology in the field of medicine, its main tasks, principles of their operation and application in modern medical equipment. Data on the role of such systems in the collection, processing and analysis of medical data, facilitating the work of doctors and their effectiveness in the diagnostic process were also discussed. The article presents the possibilities of improving the quality of patient treatment and the development of the healthcare system through the introduction of intelligent medical technical systems.

Keywords: information technologies, intelligent systems, medical technical complexes, biomedical engineering, artificial intelligence, medical equipment, automation, medical data.

Kirish: Bugungi kunda axborot texnologiyalarining jadal rivojlanishi jamiyat hayotining barcha sohalariga, xususan tibbiyot sohasiga ham chuqur kirib

bormoqda. Zamonaviy tibbiyotni axborot texnologiyalarisiz tasavvur etish qiyin bo'lib, ular tibbiy xizmat sifatini oshirish, tashxis qo'yish jarayonini tezlashtirish va davolash samaradorligini yuksaltirishda muhim o'rin tutadi. Ayniqsa, axborot texnologiyalari asosida ishlovchi intellektual tibbiy texnik tizimlar sog'liqni saqlash tizimini yangi bosqichga olib chiqmoqda.

Intellektual tibbiy texnik tizimlar inson organizmi haqidagi ma'lumotlarni turli datchiklar orqali yig'ish, ularni avtomatik tarzda qayta ishlash va tahlil qilish imkonini beradi. Bunday tizimlar tibbiy uskunalar, axborot tizimlari va dasturiy ta'minotning o'zaro uyg'unligi asosida ishlaydi. Natijada katta hajmdagi tibbiy ma'lumotlar qisqa vaqt ichida tahlil qilinib, shifokorlarga to'g'ri va aniq qaror qabul qilishda yordam beradi.

Biotibbiyot muhandisligi sohasida intellektual texnik tizimlarni ishlab chiqish va joriy etish muhim vazifalardan biri hisoblanadi. Chunki ushbu tizimlar orqali tibbiy jarayonlarni avtomatlashtirish, inson omili ta'sirini kamaytirish va bemorlar holatini doimiy ravishda nazorat qilish imkoniyati yaratiladi. Masalan, sun'iy intellekt elementlari joriy etilgan tibbiy uskunalar kasalliklarni barvaqt aniqlash, tibbiy tasvirlarni tahlil qilish hamda davolash jarayonini individuallashtirishga xizmat qiladi. Shuningdek, intellektual tibbiy texnik tizimlar shifokorlar mehnatini yengillashtirish bilan birga, tibbiy xizmatlarning aniqligi va ishonchliligini oshiradi. Axborot texnologiyalari asosida ishlovchi bunday tizimlar tibbiyot muassasalarida vaqt va resurslarni tejash, bemorlarga ko'rsatiladigan xizmat sifatini yaxshilash hamda sog'liqni saqlash tizimining samaradorligini oshirishga xizmat qiladi.

Tibbiy qaror qabul qilish jarayonida axborot texnologiyalari shifokorlar va tibbiy xodimlarga muhim yordam beradi. Hozirgi kunda bemorlar haqidagi ma'lumotlar katta hajmda yig'iladi: laboratoriya natijalari, simptomlar, davolanish tarixi va dorilar ro'yxati va boshqalar. Ushbu ma'lumotlarni tez va aniq tahlil qilish inson uchun oson emas. Shu yerda axborot texnologiyalari, xususan **Clinical Decision Support Systems (CDSS)**, yordamga keladi. CDSS bemorning ma'lumotlarini tahlil qilib, shifokorga diagnostika va davolash bo'yicha tavsiyalar beradi. Masalan, dori dozasini to'g'ri belgilash, allergiya xavfini ogohlantirish yoki ehtimoliy diagnozlar ro'yxatini taklif qilish mumkin. Shuningdek, elektron sog'liq ma'lumotlari (EHR) tizimi shifokorga bemorning barcha ma'lumotini bir joyda ko'rish imkonini beradi.

Sun'iy intellekt va mashina o'rganish (AI/ML) texnologiyalari ham tibbiy qarorlarda foydalaniladi. Ular katta ma'lumotlarni tahlil qilib, prognozlar va tavsiyalar berishda shifokorga qo'l keladi. Bu jarayonlar xatolarni kamaytiradi, vaqtni tejaydi va bemorga sifatli davolanishni ta'minlaydi. Shunday qilib, axborot texnologiyalari tibbiy qarorlarni qabul qilishni tez, aniq va xavfsiz qiladi.

Adabiyotlar tahlili va metodologiyasi: So'nggi yillarda axborot texnologiyalarining jadal rivojlanishi natijasida intellektual tibbiy texnik tizimlar ilmiy tadqiqotlarning muhim ob'ektiga aylandi. Ko'plab mahalliy va xorijiy olimlar o'z ishlarida axborot texnologiyalari, sun'iy intellekt va avtomatlashtirilgan tizimlarning tibbiyotda qo'llanilish masalalarini keng yoritib berganlar. Jumladan,

ayrim tadqiqotchilar intellektual tibbiy tizimlarni tibbiy ma'lumotlarni yig'ish, qayta ishlash va tahlil qilishga qodir bo'lgan murakkab texnik-axborot majmuasi sifatida ta'riflaydilar.

Olimlarning fikricha, intellektual tibbiy texnik tizimlarning asosiy ustunligi-ularning inson omili ta'sirini kamaytirish va tibbiy qaror qabul qilish jarayonida aniqlikni oshirishidir. Ayrim mutaxassislar sun'iy intellekt asosida ishlovchi tizimlar tibbiy tasvirlarni tahlil qilishda an'anaviy usullarga nisbatan yuqori samara berishi mumkinligini ta'kidlaydilar. Shuningdek, tadqiqotlarda intellektual algoritmlar yordamida kasalliklarni barvaqt aniqlash imkoniyati kengayishi alohida qayd etilgan.

Biotibbiyot muhandisligi sohasidagi ilmiy adabiyotlarda intellektual tibbiy texnik tizimlar datchiklar, mikroprotessorlar, dasturiy ta'minot va axborot tizimlarining o'zaro integratsiyasi natijasida shakllanishi ko'rsatib o'tilgan. Ayrim olimlar bunday tizimlarning samaradorligi to'g'ri tanlangan algoritmlar va ma'lumotlarni qayta ishlash usullariga bog'liq ekanini ta'kidlaydilar. Shu bilan birga, tibbiy ma'lumotlar xavfsizligi va ishonchligi masalalari ham ilmiy manbalarda dolzarb muammo sifatida ko'rib chiqilgan. Jumladan, R.S. Ledley va L.B. Lusted o'z tadqiqotlarida tibbiyotda kompyuter texnologiyalaridan foydalanish tashxis qo'yish jarayonini aniq va samarali qilishini ta'kidlaganlar. Ularga ko'ra, intellektual tizimlar tibbiy qaror qabul qilishda yordamchi vosita sifatida xizmat qiladi. Shuningdek, J.G. Webster biotibbiyot signallarni qayta ishlash bo'yicha olib borgan ishlarida datchiklar va raqamli texnologiyalarning tibbiy tizimlardagi ahamiyatini asoslab bergan. Sun'iy intellektga oid tadqiqotlarda S. Russell va P. Norvig intellektual algoritmlarning katta hajmdagi ma'lumotlarni tahlil qilishdagi ustun jihatlarini ko'rsatib o'tadilar. Ularning fikricha, tibbiy ma'lumotlar bilan ishlovchi intellektual tizimlar kasalliklarni barvaqt aniqlash va prognoz qilish imkoniyatini kengaytiradi. Shuningdek, E. Topol o'z asarlarida raqamli tibbiyot va sun'iy intellekt shifokorlar faoliyatini to'liq almashtirmasdan, balki uni samarali qo'llab-quvvatlashini ta'kidlaydi.

Mahalliy olimlar ishlarida ham axborot texnologiyalarining tibbiy texnik tizimlardagi o'rni alohida qayd etilgan. Ular intellektual tibbiy tizimlarni tibbiy uskunalar, axborot tizimlari va dasturiy ta'minotning o'zaro integratsiyasi natijasida shakllanuvchi murakkab tizim sifatida baholaydilar. Adabiyotlarda bunday tizimlarni joriy etish tibbiy xizmat sifati va tezkorligini oshirishga xizmat qilishi ta'kidlanadi.

Muhokama: Axborot texnologiyalari asosida ishlovchi intellektual tibbiy texnik tizimlar zamonaviy tibbiyotning eng istiqbolli yo'nalishlaridan biri hisoblanadi. Adabiyotlar tahlili va nazariy tadqiqotlar shuni ko'rsatadiki, bunday tizimlar tibbiy jarayonlarni avtomatlashtirish, tibbiy ma'lumotlarni aniq va tezkor qayta ishlash hamda tashxis qo'yish sifatini oshirishda muhim ahamiyat kasb etadi. Ayniqsa, sun'iy intellekt elementlari joriy etilgan tibbiy texnik tizimlar inson omili bilan bog'liq xatolarni kamaytirish imkonini beradi.

Intellektual tibbiy tizimlarning asosiy ustunligi-ularning katta hajmdagi tibbiy ma'lumotlarni qisqa vaqt ichida tahlil qilish qobiliyatidir. Bu esa

shifokorlarga tezkor va asosli qaror qabul qilish imkonini yaratadi. Tibbiy tasvirlarni tahlil qilishda intellektual algoritmlar kasalliklarni barvaqt aniqlashda yuqori samara ko'rsatayotganini misol qilib aytish mumkin. Biroq, ushbu tizimlar natijalari doimo shifokor nazoratida baholanishi lozimligi ta'kidlanadi, chunki tibbiy qaror qabul qilishda inson tajribasi muhim o'rin tutadi. Shu bilan birga, intellektual tibbiy texnik tizimlarni joriy etishda ayrim muammolar ham mavjud. Jumladan, tibbiy ma'lumotlarning xavfsizligi va maxfiyligini ta'minlash, dasturiy ta'minotning ishonchiligi hamda tizimlarning texnik xizmat ko'rsatish masalalari dolzarb hisoblanadi. Ushbu muammolarni hal etish axborot texnologiyalari va tibbiyot sohalari o'rtasidagi yaqin hamkorlikni talab qiladi.

Intellektual tibbiy texnik tizimlarning yana bir muhim jihati-ularni amaliyotga joriy etish jarayonida tibbiy xodimlarning axborot texnologiyalari bo'yicha bilim va ko'nikmalarini oshirish zaruratidir. Agar shifokorlar va tibbiy personal ushbu tizimlar bilan samarali ishlay olsalar, tibbiy xizmat sifati sezilarli darajada yaxshilanadi. Shu bois, biotibbiyot muhandisligi ta'lim yo'nalishida axborot texnologiyalariga oid fanlarni chuqur o'rgatish muhim ahamiyat kasb etadi.

Shuni aytish mumkinki, axborot texnologiyalari asosida ishlovchi intellektual tibbiy texnik tizimlar kelajakda sog'liqni saqlash tizimini rivojlantirishda hal qiluvchi o'rin tutadi. Ularning imkoniyatlaridan oqilona foydalanish, mavjud muammolarni bartaraf etish va tizimlarni doimiy takomillashtirib borish orqali tibbiyot sohasida yuqori samaradorlikka erishish mumkin. Zamonaviy intellektual tizimlar-bu inson aqlining ba'zi funksiyalarini kompyuter yordamida takrorlay oladigan dastur va uskunalardir. Ular ma'lumotni tez va aniq tahlil qilib, murakkab qarorlarni qabul qilishda yordam beradi. Bu tizimlar sun'iy intellekt (AI) va mashina o'rganishi (machine learning) texnologiyalari asosida ishlaydi.

Avtomatlashtirish esa insonning takroriy va oddiy ishlarini mashinalar yordamida bajarishni nazarda tutadi. Bu jarayon samaradorlikni oshiradi va xatolarni kamaytiradi. Masalan, tibbiyotda laboratoriyada qon tahlilini avtomatlashtirish natijalarni tez va aniq olish imkonini beradi.

Intellektual tizimlar tibbiyotda keng qo'llaniladi. Ular diagnostikani yaxshilash, kasalliklarni erta aniqlash va davolash rejalarini tayyorlashda yordam beradi. Shuningdek, robot-xirurglar va avtomatlashtirilgan dori berish tizimlari jarrohlik va davolash sifatini oshiradi. Bu usullar shifokorlarga inson hayoti uchun muhim qarorlarni tez va aniq qabul qilish imkonini beradi, shu bilan birga bemorlar uchun xavfsizlikni ta'minlaydi. Umumiy qilib aytganda, zamonaviy intellektual tizimlar va avtomatlashtirish tibbiyotda samaradorlikni oshirish, xatolarni kamaytirish va inson hayotini saqlashda muhim ahamiyatga egadir.

Natija: Muhokama natijalariga ko'ra, bunday tizimlar tibbiyot sohasidagi zamonaviy talablarga javob beradi va tibbiy xizmat sifati va samaradorligini sezilarli darajada oshirish imkoniyatini beradi. Intellektual tibbiy texnik tizimlar katta hajmdagi ma'lumotlarni tez va aniq qayta ishlash qobiliyati, tashxis qo'yishda yordamchi funksiyalari va inson omili ta'sirini kamaytirish xususiyatlari bilan ajralib turadi. Shuningdek, sun'iy intellekt va avtomatlashtirilgan algoritmlar asosida ishlovchi tizimlar tibbiy tasvirlarni tahlil qilishda yuqori samaradorlik

ko'rsatadi va kasalliklarni barvaqt aniqlash imkonini ta'minlaydi. Olimlar fikrlari va ilmiy manbalar shuni ko'rsatadiki, intellektual tibbiy texnik tizimlar nafaqat tibbiy xodimlar faoliyatini yengillashtiradi, balki bemorlarga ko'rsatiladigan xizmat sifati va xavfsizlik darajasini ham oshiradi. Shu bilan birga, tizimlarni joriy etishda ma'lumotlar xavfsizligi, dasturiy ta'minot ishonchliligi va personalning axborot texnologiyalari ko'nikmalari kabi jihatlarga alohida e'tibor qaratish zarur. Axborot texnologiyalari asosida ishlovchi intellektual tibbiy texnik tizimlar kelajak tibbiyotida hal qiluvchi rol o'ynaydi. Ularning imkoniyatlaridan samarali foydalanish, mavjud muammolarni bartaraf etish va tizimlarni doimiy ravishda takomillashtirish orqali sog'liqni saqlash sohasida yuqori samaradorlikka erishish mumkin. Biotibbiyot muhandisligi va axborot texnologiyalari sohalari o'rtasidagi integratsiya nafaqat zamonaviy tibbiyotni rivojlantirishga, balki tibbiy xizmatlarning aniqligi va samaradorligini yanada oshirishga xizmat qiladi.

Xulosa: Bugungi kunda tibbiyot sohasida axborot texnologiyalari asosida ishlovchi intellektual texnik tizimlar rivoji ahamiyati tobora ortmoqda. Shuningdek olimlarning fikrlari shuni ko'rsatadiki, bunday tizimlar tibbiy xizmat sifatini oshirish, tashxis qo'yish jarayonini tezlashtirish va davolash samaradorligini yuksaltirishda hal qiluvchi ahamiyatga egadir. Qolaversa, intellektual tibbiy texnik tizimlar katta hajmdagi ma'lumotlarni samarali qayta ishlash, bemor holatini doimiy monitoring qilish va shifokorlarga asoslangan qarorlar qabul qilishda yordam berish imkonini beradi. Shu bilan birga, sun'iy intellekt va avtomatlashtirilgan algoritmlar tibbiy tasvirlarni tahlil qilishda va kasalliklarni barvaqt aniqlashda yuqori samaradorlik ko'rsatadi. Bu tizimlarni joriy etishda ma'lumotlar xavfsizligi, dasturiy ta'minotning ishonchliligi va tibbiy xodimlarning axborot texnologiyalari bo'yicha bilim darajasi kabi jihatlarga alohida e'tibor qaratish zarur. Ushbu omillarni inobatga olgan holda, intellektual tibbiy texnik tizimlar nafaqat zamonaviy tibbiyotni rivojlantirishga, balki tibbiy xizmatlarning aniqligi va samaradorligini yanada oshirishga xizmat qiladi deyish mumkin.

Xulosa qilib aytganda, biotibbiyot muhandisligi va axborot texnologiyalari sohalari o'rtasidagi integratsiya kelajak tibbiyoti uchun muhim yo'nalishdir. Axborot texnologiyalari asosida ishlovchi intellektual tibbiy texnik tizimlarni samarali qo'llash orqali sog'liqni saqlash tizimini rivojlantirish, bemorlarga ko'rsatiladigan tibbiy xizmat sifati va xavfsizligini oshirish hamda tibbiyot xodimlari mehnatini yengillashtirish mumkin. Bu esa sog'liqni saqlash sohasida innovatsion yondashuvlarni qo'llash va texnologik rivojlanishning muhim ko'rsatkichi hisoblanadi.

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PROFESSOR-O'QITUVCHILARNI KASBIY RIVOJLANISH MOTIVATSIYASIGA TA'SIR ETUVCHI OMILLAR

Annotatsiya: Ushbu maqolada professor-o'qituvchilarning kasbiy rivojlanish motivatsiyasiga ta'sir etuvchi omillar tizimli ravishda tahlil qilingan. Metodologik yondashuv sifatida nazariy tahlil, tizimli va qiyosiy yondashuv, ekspert suhbatlari hamda omillarni klassifikatsiya qilish usullari qo'llanildi. Natijalar professor-o'qituvchilar motivatsiyasi uch asosiy omillar guruhidan — ichki, tashqi institutsional hamda ijtimoiy-psixologik omillardan shakllanishini ko'rsatdi. Tahlil motivatsiyaning ko'p komponentli va o'zaro bog'liq tizim ekanini tasdiqlaydi hamda oliy ta'lim tashkilotlarida professor-o'qituvchilar kasbiy rivojlanishini boshqarishda kompleks yondashuv zarurligini asoslaydi.

Kalit so'zlar: professor-o'qituvchilar, kasbiy rivojlanish, motivatsiya, ichki omillar, tashqi omillar, ijtimoiy-psixologik omillar, rag'batlantirish, boshqaruv uslubi, oliy ta'lim, pedagogik faoliyat

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FACTORS INFLUENCING THE MOTIVATION OF PROFESSORS FOR PROFESSIONAL DEVELOPMENT

Abstract: This article presents a systems analysis of the factors influencing the motivation for professional development of higher education faculty. The methodological framework utilizes theoretical analysis, systems and comparative approaches, expert interviews, and a classification of motivational factors. The results demonstrate that faculty motivation is influenced by three main groups of factors: internal, external, institutional, and socio-psychological. The analysis confirms the multicomponent and interrelated nature of motivation and emphasizes the need for a comprehensive approach to managing faculty professional development in higher education.

Keywords: faculty, professional development, motivation, internal factors, external factors, socio-psychological factors, incentives, management style, higher education, teaching activities.

Kirish

Oliy ta'lim sifati professor-o'qituvchilarning pedagogik va ilmiy salohiyati bilan bevosita bog'liq bo'lib, ularning kasbiy rivojlanishga bo'lgan motivatsiyasi ta'lim jarayonining samaradorligini belgilovchi asosiy omillardan biridir. Globallashuv, raqobatning kuchayishi, innovatsion texnologiyalar jadal o'zgarib borayotgan sharoitda professor-o'qituvchilar doimiy ravishda malakasini oshirish, ilmiy izlanish olib borish, xalqaro tajribalarni o'zlashtirishga ehtiyoj sezadi. Biroq motivatsiya darajasi individual xususiyatlar, muassasa siyosati, moddiy va ma'naviy rag'bat, ijtimoiy-psixologik muhit kabi ko'plab omillar ta'sirida shakllanishi sababli, ushbu omillarni tizimli o'rganish zarur. Ushbu tadqiqotning maqsadi — professor-o'qituvchilarning kasbiy rivojlanish motivatsiyasiga ta'sir etuvchi ichki va tashqi omillarni aniqlash hamda ularning ta'sir darajasini tahlil qilishdir.

Metodologiya

Tadqiqot quyidagi metodologik yondashuvlarga asoslandi:

1. **Nazariy tahlil metodi.** Motivatsiya nazariyalari (Maslou, Herzberg, Vrum, o'z-o'zini aniqlash nazariyasi) hamda oliy ta'limda kadrlar salohiyati bo'yicha ilmiy manbalar o'rganildi.

2. **Tizimli yondashuv.** Kasbiy rivojlanish motivatsiyasiga ta'sir qiluvchi omillar ichki, tashqi va ijtimoiy-psixologik bloklarga ajratildi.

3. **Analitik-qiyosiy tahlil.** Xalqaro (Finlyandiya, Janubiy Koreya, Yaponiya, AQSh) va mahalliy oliy ta'lim tajribasi motivatsiya mexanizmlari bilan taqqoslandi.

4. **Ekspert suhbatlari (shartli metod).** 20 nafar professor-o'qituvchi bilan tuzilgan suhbatlardan olingan fikrlar asosida motivatsiya omillarining amaliy ko'rinishlari aniqlashtirildi.

5. **Klassifikatsiya metodi.** Olingan omillar mazmuniga ko'ra guruhlarga ajratildi: *ichki psixologik omillar, tashqi institutsional omillar, ijtimoiy-psixologik omillar.*

Metodlar kompleks qo'llangan bo'lib, bu kasbiy rivojlanish motivatsiyasining ko'p qirrali mexanizmlarini chuqur tahlil qilish imkonini berdi.

Natijalar va muhokama

Oliy ta'lim muassasida professor-o'qituvchilarning motivatsiyasi universitet muvaffaqiyati va obro'sida hal qiluvchi ro'l o'ynaydi hamda murakkab va ko'p qirrali muammo hisoblanadi. Motivatsiyaga ta'sir ko'rsatish asosan pedagoglarning kasbiy kompetensiyasini oshirish hamda pedagogik faoliyatda innovatsiyalarni qo'llashda asosiy kuchdir.

Quyida professor-o'qituvchilarning kasbiy o'sish va rivojlanish uchun motivatsiyasiga ta'sir qiluvchi asosiy omillar keltirilgan.

I. Ichki motivatsiya. Tahlil professor-o'qituvchilarning kasbiy rivojlanishi eng avvalo ichki ehtiyojlar bilan bog'liqligini ko'rsatdi. Kasbiy o'sishga intilish, ilmiy daraja va unvon olish istagi, o'zining kasbiy mavqeini mustahkamlash, innovatsion pedagogik texnologiyalarni o'zlashtirish o'qituvchilar uchun asosiy ichki motivator hisoblanadi. Suhbatlarda ishtirok etgan

o'qituvchilarning ko'pchiligi kasbiy rivojlanish jarayonida o'z qobiliyatlarini namoyon etish ehtiyojini birinchi o'ringa qo'ygan. Bu o'z-o'zini anglash va kompetentlik ehtiyojlari bilan mos keladi.

Ichki motivatsiya - faoliyatdan shaxsiy zavqlanish, kasbga ishtiyoq va shaxsiy intilishlar bilan bog'liq. Bu ta'lim sifatini oshirishning muhim omillaridan biridir. Ichki motivatsiya- shaxsning yoki xodimning ma'lum bir ishni bajarishga bo'lgan xoxish istagi hisoblanib u o'z ichiga shaxsiy ehtiyojlari, qiziqishlari hamda qadriyatlari kiradi. Boshqa tomondan, ichki motivatsiya odamga mustaqil va g'ayrat bilan ishlashga imkon beradi (Elton, 1988). Bilim beruvchi insonlarga ichki motivatsiya eng muhim omillardan biri deya sanaladi chunki, ichki motivatsiyaga ega o'qituvchilar o'z ishiga ijodiy yondashadi va talabalarda ham fanga nisbatan chuqur qiziqish uyg'ota oladi.

Ichki motivatsiya ta'lim sifatini oshirishda eng muhim omillardan biri hisoblanadi, chunki u pedagoglarning kasbiga bo'lgan sadoqatini va o'z ishiga bo'lgan mas'uliyatini kuchaytiradi.

Quyidagi jadvalda ichki motivatsiyani shakllantiruvchi ichki omillarni ko'rishimiz mumkin. Ushbu qator omillar pedagogning kasbiy faoliyatidagi faolligi, o'zini rivojlantirishga bo'lgan intilishi hamda o'z kasbiga bo'lgan sodiqligini belgilab beradi. (1.1 jadval)

№	Omil	Tafsilot
1.	Shaxsiy intilish va o'z-o'zini anglash	Professional o'sish va o'zini rivojlantirishga intilish. O'z salohiyatini ro'yobga chiqarish uchun motivatsiya.
2.	Bilishga bo'lgan qiziqish va ijodkorlik	Bilim va ko'nikmalarni yangilashning doimiy istagi. Ijodiy yondashuv va pedagogik faoliyatda innovatsiyalarga intilish.
3.	Ixtiyoriylik va jalb qilish	O'z xohishi va qiziqish bilan malaka oshirishda ishtirok etish istagi.
4.	Kompetentsiyani rivojlantirish	Kasbiy kompetentsiyani doimiy ravishda oshirish va yangi pedagogik usul va texnologiyalarni o'zlashtirish istagi.
5.	Ma'suliyat	Kasbga sodiqlikni oshirish va o'z ishiga mas'uliyatni oshirish

1.1 jadval. Ichki motivatsiyani shakllantiruvchi omillar.

II. Tashqi motivatsiya

Tashqi motivatsiya-tashqi rag'batlantirish, mukofotlar, tan olinish va maqomlar bilan bog'liq. Tashqi motivatsiya shaxsni yoki ta'lim jarayonida ishtirokchining ishini yoki faoliyatini rag'batlar orqali boshqarish va uni muayyan maqsadga yo'naltirish vositiasi hisoblanib bularga: moddiy, ijtimoiy va ma'muriy shakllari kiradi.[1]

Tadqiqot natijalariga ko'ra, oliy ta'lim tashkilotining moddiy-texnik bazasi, rahbariyatning boshqaruv uslubi, rag'batlantirish tizimi motivatsiya darajasiga sezilarli ta'sir ko'rsatadi.

- Moddiy rag'batlar (ustamalar, grantlar, loyihalardan qo'shimcha daromad) motivatsiyani oshiruvchi omillardan bo'lsa-da, ular ichki motivatsiya o'rnini to'liq bosa olmaydi.

- Mehnat sharoitlari (laboratoriya, o'quv-resurs markazlari, elektron platformalar) professor-o'qituvchilarning innovatsion faoliyatga qiziqishini oshiradi.

- Rahbariyatning qo'llab-quvvatlovchi yondashuvi tashabbuskorlikni kuchaytiradi; aksincha, avtoritar boshqaruv motivatsiyani keskin pasaytiradi.

- Akademik yuklamaning ortiqligi ilmiy izlanish imkoniyatlarini cheklab, motivatsiyani sustlashtiradi.

Biroq, tashqi motivatsiyaga haddan tashqari ishonish ichki motivatsiyani zaiflashtirishi mumkin, bu esa uzoq muddatli o'qitish samaradorligiga salbiy ta'sir ko'rsatishi mumkin

III. IJTIMOIIY-PSIXOLOGIK OMILLAR

Tahlil shuni ko'rsatadiki, jamoada ijobiy iqlim bo'lishi, hamkasblar o'rtasidagi hamkorlik, professional tan olinish, ichki korporativ madaniyat kasbiy rivojlanishning barqaror motivatorlariga aylangan.

- Tashqi tan olinish (reyting, mukofotlar) o'qituvchining o'zini qadrlash hissini mustahkamlaydi.

- Jamoaviy qo'llab-quvvatlash esa yangi pedagogik g'oyalarni sinovdan o'tkazishga tayyorlikni oshiradi.

Natijalar ko'rsatadiki, motivatsion omillar tizimi murakkab va bir-biriga bog'liq bo'lib, ularni kompleks ravishda boshqarish ta'lim sifatini sezilarli oshiradi.

Xulosa. *O'rganishlar shuni ko'rsatdiki, professor-o'qituvchilarning kasbiy rivojlanish motivatsiyasi uch asosiy blok — ichki, tashqi va ijtimoiy-psixologik omillar yig'indisi sifatida shakllanadi. Ichki motivatorlar (o'zini rivojlantirish, kompetentlikka intilish) barqaror bo'lsa, tashqi omillar (moddiy rag'bat, sharoitlar, boshqaruv uslubi) kasbiy faollik darajasini dinamik boshqaradi. Ijtimoiy-psixologik omillar esa motivatsiyaning uzluksizligini ta'minlaydi.*

Oliy ta'lim tashkilotlari ushbu omillarni uyg'un boshqarish orqali professor-o'qituvchilarning ilmiy-pedagogik faoliyatini sezilarli faollashtirishi, ta'lim sifati va raqobatbardoshligini oshirishi mumkin.

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TAFAKKURNING MANTIQUIY SHAKLLARI VA QONUNLARI

***Annotatsiya.** Mazkur ilmiy maqola tafakkurning mantiqiy shakllari va qonunlarini falsafiy-nazariy jihatdan tahlil qilishga bag'ishlangan. Tadqiqotda tafakkur inson bilish faoliyatining asosiy shakli sifatida ko'rib chiqilib, uning mantiqiy tuzilmasi, fikrlash jarayonida namoyon bo'ladigan asosiy shakllar hamda ularni tartibga soluvchi mantiqiy qonunlarning mohiyati ochib beriladi. Xususan, tushuncha, hukm va xulosa kabi mantiqiy shakllarning tafakkur jarayonidagi o'rni, ularning bilish samaradorligini ta'minlashdagi ahamiyati falsafiy yondashuv asosida izohlanadi. Shuningdek, tafakkurning izchilligi, aniqligi va mantiqiy asoslanganligini ta'minlovchi asosiy mantiqiy qonunlar tahlil qilinib, ularning ilmiy tafakkur va kundalik fikrlash madaniyatini shakllantirishdagi roli yoritiladi. Maqolada mantiqiy tafakkurning jamiyat taraqqiyoti, ilm-fan rivoji va shaxsning intellektual kamolotidagi o'rni falsafiy nuqtai nazardan asoslanadi. Tadqiqot natijalari gumanitar yo'nalishdagi oliy ta'lim muassasalarida mantiq va falsafa fanlarini o'qitish jarayonida, shuningdek, talabalarda tanqidiy va tizimli fikrlash ko'nikmalarini rivojlantirishda nazariy-metodik ahamiyat kasb etadi.*

***Kalit so'zlar.** Tafakkur, mantiqiy shakllar, mantiqiy qonunlar, tushuncha, hukm, xulosa, fikrlash jarayoni, bilish, mantiq, falsafiy tafakkur, tanqidiy fikrlash, ilmiy tafakkur, fikr izchilligi.*

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LOGICAL FORMS AND LAWS OF THOUGHT

***Abstract.** This scientific article is devoted to the philosophical-theoretical analysis of the logical forms and laws of thinking. The study considers thinking as the main form of human cognitive activity, reveals its logical structure, the main forms that appear in the thinking process, and the essence of the logical laws that regulate them. In particular, the role of logical forms such as concepts, judgments, and conclusions in the thinking process, their importance in ensuring the effectiveness of cognition is explained on the basis of a philosophical approach. Also, the main logical laws that ensure the consistency, accuracy, and logical basis of thinking are analyzed, and their role in forming the culture of scientific thinking and everyday thinking is highlighted. The article examines the role of logical*

thinking in the development of society, the development of science and the intellectual maturity of the individual from a philosophical point of view. The results of the study are of theoretical and methodological importance in the process of teaching logic and philosophy in higher educational institutions of the humanities, as well as in the development of critical and systematic thinking skills in students.

Keywords. *Thinking, logical forms, logical laws, concept, judgment, conclusion, thinking process, knowledge, logic, philosophical thinking, critical thinking, scientific thinking, coherence of thought.*

Kirish.

Tafakkur insonning ongli faoliyatini belgilovchi, borliqni bilish va anglash jarayonida markaziy o‘rin tutuvchi murakkab ruhiy-intellektual hodisa hisoblanadi. Inson tabiat va jamiyat hodisalarini bevosita sezgi orqali emas, balki tafakkur yordamida umumlashtirib, mavhumlashtirib va mantiqiy bog‘lanishlar asosida idrok etadi. Shu jihatdan tafakkur bilish jarayonining eng yuqori bosqichi sifatida namoyon bo‘lib, u insonni boshqa tirik mavjudotlardan ajratib turuvchi asosiy belgilardan biri hisoblanadi. Tafakkur orqali inson voqelikning mohiyatini anglaydi, sabab-oqibat aloqalarini aniqlaydi, xulosalar chiqaradi va o‘z faoliyatini ongli ravishda rejalashtiradi.

Falsafa tarixida tafakkur masalasi doimo muhim ilmiy muammo sifatida qaralgan. Qadimgi Sharq va G‘arb mutafakkirlari tafakkurning mohiyati, shakllari va qonunlarini izohlashga harakat qilganlar. Aristotel mantiq ilmining asoschisi sifatida tafakkurning mantiqiy tuzilmasini tahlil qilib, fikrlashning shakllari va qonunlarini ilmiy tizimga solgan bo‘lsa, Sharq mutafakkirlari, jumladan, Forobiy va Ibn Sino tafakkurni bilish nazariyasi bilan uzviy bog‘liq holda o‘rganganlar. Ularning qarashlarida tafakkur nafaqat bilish vositasi, balki insonning axloqiy va intellektual kamolotini belgilovchi omil sifatida talqin etiladi.

Zamonaviy falsafada tafakkur muammosi turli yo‘nalishlar doirasida tadqiq etilmoqda. Analitik falsafa tafakkurning mantiqiy tahliliga, fenomenologiya va germenevtika esa tafakkurning mazmuniy va ma‘noviy jihatlariga e‘tibor qaratadi. Shu bilan birga, tafakkurning mantiqiy shakllari va qonunlari masalasi bugungi kunda ham o‘z dolzarbligini yo‘qotmagan. Chunki ilm-fan rivoji, axborot oqimining keskin ortishi va murakkab ijtimoiy jarayonlar sharoitida mantiqiy fikrlash madaniyatiga bo‘lgan ehtiyoj yanada kuchaymoqda.

Tafakkurning mantiqiy shakllari va qonunlarini o‘rganish inson fikrlashining izchilligi, aniqligi va asoslanganligini ta‘minlashga xizmat qiladi. Tushuncha, hukm va xulosa kabi mantiqiy shakllar orqali inson bilimlarni tartibga soladi, ularni umumlashtiradi va yangi bilimlar hosil qiladi. Mantiqiy qonunlar esa fikrlash jarayonida xatolarga yo‘l qo‘ymaslik, qarama-qarshiliklarni aniqlash va asosli xulosalar chiqarishga yordam beradi. Shu bois mantiqiy tafakkur nafaqat ilmiy bilishda, balki kundalik hayotda, ijtimoiy munosabatlarda va kasbiy faoliyatda ham muhim ahamiyatga ega.

Gumanitar oliy ta‘lim muassasalarida, ayniqsa falsafa yo‘nalishida ta‘lim olayotgan talabalar uchun tafakkurning mantiqiy shakllari va qonunlarini chuqur

o'rganish muhim metodologik ahamiyat kasb etadi. Chunki falsafiy tafakkur mantiqiy asoslangan fikrlashni, tushunchalar bilan aniq ishlashni va murakkab nazariy muammolarni tahlil qilishni talab etadi. Mantiqiy bilimlar talabalarni mustaqil fikrlashga, tanqidiy yondashuvni shakllantirishga va ilmiy xulosalar chiqarishga tayyorlaydi.

Shu nuqtai nazardan, mazkur maqolada tafakkurning mantiqiy shakllari va qonunlarini falsafiy tahlil qilish, ularning bilish jarayonidagi o'rni va ahamiyatini ochib berish dolzarb ilmiy vazifa hisoblanadi. Tadqiqot tafakkur muammosini nazariy jihatdan yoritish bilan birga, mantiqiy fikrlash madaniyatini shakllantirishga xizmat qiluvchi ilmiy xulosalarni ishlab chiqishga yo'naltirilgan.

Asosiy qism. Tafakkurning mantiqiy shakllari inson fikrlash faoliyatining ichki tuzilmasini ifodalaydi va bilish jarayonida fikrning qanday shaklda namoyon bo'lishini ko'rsatadi. Mantiqda ushbu shakllar universal xarakterga ega bo'lib, ular mazmundan qat'i nazar, har qanday fikrlash jarayoniga xosdir. Tafakkurning mantiqiy shakllarini tahlil qilish fikrning tartibli, izchil va asosli bo'lishini ta'minlashda muhim metodol rol o'ynaydi. Falsafiy nuqtai nazardan qaralganda, mantiqiy shakllar tafakkurning obyektiv borliq bilan o'zaro munosabatini bilvosita ifodalovchi vositalar hisoblanadi.

Tafakkurning asosiy mantiqiy shakllaridan biri tushuncha hisoblanadi. Tushuncha predmet va hodisalarning muhim, umumiy va zarur belgilarini ongda aks ettiruvchi tafakkur shaklidir. Inson bilish jarayonida turli predmet va hodisalarning alohida xususiyatlarini emas, balki ularni birlashtiruvchi umumiy belgilarni ajratib oladi va shu asosda tushunchalar hosil qiladi. Tushuncha tafakkurning eng dastlabki va asosiy shakli bo'lib, u holda borliq umumlashtirilgan va mavhum holatda aks etadi. Ilmiy tafakkurda tushunchalar aniq ta'riflar orqali ifodalanib, bilimlarning tizimli shaklda rivojlanishiga zamin yaratadi.

Hukm tafakkurning yana bir muhim mantiqiy shakli bo'lib, unda predmetlar va hodisalar o'rtasidagi munosabatlar tasdiqlanadi yoki inkor etiladi. Hukm orqali inson mavjud bilimlarini ifodalaydi, ularni tekshiradi va baholaydi. Har bir hukmda ma'lum bir fikrning rost yoki yolg'onligi muayyan mantiqiy asosga tayanadi. Hukmlar tafakkur jarayonida tushunchalar asosida shakllanadi va bilimning dinamik xarakterini namoyon etadi. Falsafiy tahlilda hukm bilishning muhim bosqichi sifatida qaralib, u orqali inson voqelik haqidagi munosabatini aniq ifodalaydi.

Xulosa tafakkurning eng murakkab va yuqori darajadagi mantiqiy shakli bo'lib, u bir yoki bir nechta hukmlardan yangi hukm chiqarish jarayonini ifodalaydi. Xulosa chiqarish orqali inson mavjud bilimlarga tayangan holda yangi bilimlarga ega bo'ladi. Bu jarayon mantiqiy izchillik va qat'iy qonunlarga asoslanadi. Ilmiy bilishda xulosa chiqarish nazariy mulohazalar, dalillar va faktlar asosida amalga oshiriladi. Shu sababli xulosa tafakkurning ijodiy va faol tomonini namoyon etadi.

Tafakkurning mantiqiy shakllari bilan bir qatorda, mantiqiy qonunlar fikrlash jarayonining ichki me'yorlarini belgilaydi. Ushbu qonunlar tafakkurning izchil, zidliksiz va aniq bo'lishini ta'minlashga xizmat qiladi. Mantiqiy qonunlar obyektiv xarakterga ega bo'lib, ular inson ongidan mustaqil ravishda mavjud bo'lgan

borliqning umumiy aloqalari va munosabatlarini aks ettiradi. Fikrlash jarayonida ushbu qonunlarga amal qilinmasligi mantiqiy xatolarga, noto'g'ri xulosalarga va bilishdagi chalkashliklarga olib keladi.

Mantiqiy qonunlardan biri ayniyat qonuni bo'lib, u fikrning o'z-o'ziga mos bo'lishini talab etadi. Ushbu qonunga ko'ra, fikrlash jarayonida bir tushuncha yoki hukm o'z mazmunini o'zgartirmasdan qo'llanilishi lozim. Ayni bir fikr turli vaziyatlarda turlicha ma'noda ishlatilsa, tafakkurda noaniqlik yuzaga keladi. Ayniyat qonuni fikrning aniqligi va barqarorligini ta'minlashda muhim ahamiyatga ega.

Zidlik qonuni tafakkurda bir vaqtning o'zida bir predmet yoki hodisa haqida qarama-qarshi fikrlarning rost bo'lishini inkor etadi. Bu qonun fikrlash jarayonida mantiqiy izchillikni saqlashga xizmat qiladi. Agar bir fikr rost deb e'tirof etilsa, unga zid bo'lgan fikr ayni paytda rost bo'la olmaydi. Zidlik qonuni ilmiy bahs-munozaralarda, nazariy tahlilda va tanqidiy fikrlashda muhim metodologik asos bo'lib xizmat qiladi.

Uchinchi holatni inkor etish qonuni har bir hukm yoki uning inkori rost bo'lishini taqozo etadi. Ushbu qonunga ko'ra, bir fikrga nisbatan uchinchi, noaniq holat mavjud bo'lishi mumkin emas. Bu qonun tafakkurning qat'iyligi va aniqligini ta'minlab, xulosalar chiqarishda muhim ahamiyat kasb etadi. Ayniqsa, formal mantiqda ushbu qonun muhim nazariy asoslardan biri hisoblanadi.

Yetarli asos qonuni esa har bir fikr, hukm yoki xulosaning yetarli dalil va asosga ega bo'lishini talab qiladi. Fikr asoslanmagan bo'lsa, u ishonchli bilim sifatida qabul qilinmaydi. Ushbu qonun ilmiy tafakkurda, falsafiy tahlilda va kundalik fikrlashda muhim o'rin tutadi. Yetarli asos qonuni insonni asossiz mulohazalardan tiyilishga, dalillarga tayangan holda fikr yuritishga undaydi.

Shu tariqa, tafakkurning mantiqiy shakllari va qonunlari o'zaro uzviy bog'liq bo'lib, inson fikrlash faoliyatining samaradorligini belgilaydi. Ular bilish jarayonini tartibga soladi, ilmiy va falsafiy tafakkurning metodologik poydevorini tashkil etadi hamda shaxsning intellektual madaniyatini yuksaltirishga xizmat qiladi.

Xulosa. Tafakkurning mantiqiy shakllari va qonunlari inson bilish faoliyatining nazariy va metodologik asosini tashkil etadi. Tafakkur orqali inson borliqni nafaqat sezgi darajasida, balki umumlashtirilgan, mavhum va mantiqiy tizimga solingan holda anglaydi. Shu bois tafakkurning mantiqiy tuzilmasini chuqur o'rganish insonning ilmiy, falsafiy va kundalik fikrlash madaniyatini rivojlantirishda muhim ahamiyat kasb etadi. Mazkur maqolada ko'rib chiqilgan tushuncha, hukm va xulosa kabi mantiqiy shakllar fikrlash jarayonining asosiy tayanch nuqtalari bo'lib, ular orqali bilimlar shakllanadi, rivojlanadi va yangi mazmun kasb etadi.

Tafakkurning mantiqiy shakllari bilimlarning izchilligini va tizimlilikini ta'minlaydi. Tushuncha orqali borliq hodisalari umumlashtirilsa, hukm yordamida ularning o'zaro aloqalari ifodalanadi, xulosa orqali esa yangi bilimlar hosil qilinadi. Ushbu jarayonlar bir-biri bilan uzviy bog'liq bo'lib, fikrlashning ichki mantiqiy mexanizmini tashkil etadi. Aynan mana shu mexanizm insonning bilish

imkoniyatlarini kengaytiradi, nazariy tafakkur darajasini yuksaltiradi va ilmiy izlanishlar uchun mustahkam poydevor yaratadi.

Mantiqiy qonunlar esa tafakkurning normativ asosini belgilaydi. Ayniyat, ziddlik, uchinchi holatni inkor etish va yetarli asos qonunlari fikrlash jarayonining aniqligi, izchilligi va asoslanganligini ta'minlaydi. Ushbu qonunlarga amal qilish tafakkurdagi chalkashliklar, qarama-qarshiliklar va asossiz xulosalarning oldini oladi. Ayniqsa, ilmiy va falsafiy tafakkurda mantiqiy qonunlarning ahamiyati nihoyatda yuqori bo'lib, ular bilimlarning haqqoniyligini baholash mezonini sifatida namoyon bo'ladi.

Zamonaviy jamiyat sharoitida mantiqiy tafakkurga bo'lgan ehtiyoj tobora ortib bormoqda. Axborot hajmining keskin ko'payishi, murakkab ijtimoiy jarayonlar va ilmiy-texnik taraqqiyot insondan tanqidiy, mustaqil va mantiqiy asoslangan fikrlashni talab etadi. Bu esa tafakkurning mantiqiy shakllari va qonunlarini chuqur egallashni zarur shartga aylantiradi. Mantiqiy bilimlar shaxsning intellektual madaniyatini oshiradi, uning qaror qabul qilish jarayonini ongli va mas'uliyatli qiladi.

Gumanitar oliy ta'lim muassasalarida, xususan falsafa yo'nalishida ta'lim olayotgan talabalar uchun mantiqiy tafakkur muhim kasbiy va metodologik tayyorgarlik vositasi hisoblanadi. Tafakkurning mantiqiy asoslarini egallagan talaba nazariy muammolarni chuqur tahlil qilishga, murakkab matnlarni tushunishga va ilmiy xulosalar chiqarishga qodir bo'ladi. Shu ma'noda, mantiqiy tafakkur shaxsning nafaqat bilim darajasini, balki uning dunyoqarashi va ma'naviy yetukligini ham belgilaydi.

Xulosa qilib aytganda, tafakkurning mantiqiy shakllari va qonunlari inson bilish faoliyatining ajralmas tarkibiy qismi bo'lib, ular ilmiy tafakkur, falsafiy tahlil va kundalik fikrlash jarayonining samaradorligini ta'minlaydi. Ushbu masalalarni chuqur o'rganish va amaliyotda qo'llash jamiyatda mantiqiy fikrlash madaniyatini yuksaltirishga, intellektual salohiyatni rivojlantirishga va ilm-fan taraqqiyotiga xizmat qiladi.

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TUBERCULOSIS PROGRESSION IN REPRODUCTIVE-AGED WOMEN WITH THYROID DISEASE

Abstract. *Tuberculosis remains a significant global health problem, particularly in women of reproductive age with underlying endocrine disorders. Thyroid diseases can influence the clinical course and progression of tuberculosis, potentially altering symptom presentation, disease severity, and response to treatment. This study aims to investigate the distinctive patterns and progression of tuberculosis in reproductive-aged women suffering from thyroid disorders. Understanding these interactions is crucial for early diagnosis, personalized treatment strategies, and improving clinical outcomes in this patient population. Enhanced awareness of the interplay between thyroid dysfunction and tuberculosis may contribute to more effective management and reduced morbidity among affected women.*

Keywords. *Tuberculosis; reproductive-aged women; thyroid disease; disease progression; clinical characteristics; endocrine disorders.*

Introduction. Tuberculosis remains a major global health concern, with women of reproductive age constituting a significant proportion of affected individuals. Disease progression from latent *Mycobacterium tuberculosis* infection to active tuberculosis is determined by immune competence, hormonal balance, nutritional status, and comorbid conditions. Among these, thyroid disease represents an important yet underrecognized modifier of tuberculosis progression.

Thyroid hormones play a central role in regulating basal metabolism, immune cell differentiation, and cytokine production. Disorders of thyroid function, such as hypothyroidism, hyperthyroidism, and autoimmune thyroiditis, are more common in women and may alter host defense mechanisms against tuberculosis. Consequently, reproductive-aged women with thyroid disease may experience a distinct pattern of TB progression, characterized by altered symptom severity, increased extrapulmonary involvement, or prolonged disease course.

Role of Thyroid Hormones in Immune Regulation. The immune response to *Mycobacterium tuberculosis* depends largely on cell-mediated immunity, particularly the activity of macrophages and T lymphocytes. Thyroid hormones influence these processes at multiple levels. Triiodothyronine (T3) enhances macrophage phagocytic activity and modulates the production of pro-inflammatory cytokines, while thyroxine (T4) contributes to immune cell maturation.

In hypothyroidism, reduced thyroid hormone levels are associated with impaired macrophage activation, decreased interferon-gamma production, and weakened cellular immunity. These changes may facilitate progression from latent TB infection to active disease. Conversely, hyperthyroidism is characterized by immune hyperactivation and oxidative stress, which may exacerbate tissue damage during active tuberculosis and accelerate disease progression.

Hypothyroidism and TB Progression. In women with hypothyroidism, tuberculosis often demonstrates a slowly progressive course with subtle systemic symptoms. Fatigue, weight gain or minimal weight loss, and menstrual irregularities may overshadow classical TB manifestations, delaying diagnosis. As a result, disease is frequently detected at a more advanced stage, with extensive pulmonary involvement or dissemination.

Hypothyroidism has also been associated with prolonged sputum conversion time and delayed radiological improvement during anti-tuberculosis therapy, suggesting a slower response to treatment.

Hyperthyroidism and TB Progression. Hyperthyroid women may experience a more aggressive progression of tuberculosis. Increased metabolic demands, catabolic state, and heightened inflammatory response can lead to rapid clinical deterioration. Symptoms such as weight loss, palpitations, sweating, and anxiety may be incorrectly attributed to thyroid disease, masking active TB progression.

In this group, cavitary pulmonary lesions and systemic manifestations may be more pronounced, increasing the risk of complications and relapse.

Extrapulmonary Tuberculosis and Disease Dissemination. Thyroid dysfunction may increase susceptibility to extrapulmonary tuberculosis, particularly in reproductive-aged women. Altered immune surveillance can facilitate hematogenous spread of *Mycobacterium tuberculosis* to lymph nodes, pleura, bones, and the genitourinary system.

Genital tuberculosis is of particular importance in this population, as it may lead to infertility, menstrual disorders, and adverse reproductive outcomes. Disease progression in extrapulmonary TB is often insidious, further complicating timely diagnosis.

Impact of Anti-Tuberculosis Therapy on Thyroid Function. Anti-tuberculosis drugs can influence thyroid status and indirectly affect disease progression. Rifampicin induces hepatic enzymes, increasing the clearance of thyroid hormones and potentially worsening hypothyroidism. Isoniazid and ethambutol may also alter endocrine balance through metabolic effects.

Unrecognized deterioration of thyroid function during TB treatment may contribute to persistent symptoms, reduced treatment adherence, and suboptimal outcomes. Regular monitoring of thyroid function is therefore essential in women with known thyroid disease.

Clinical and Public Health Implications. Recognition of thyroid disease as a modifier of tuberculosis progression has important clinical implications. Integrated screening for thyroid dysfunction in women diagnosed with TB, particularly in endemic regions, may improve early detection of high-risk patients.

From a public health perspective, interdisciplinary collaboration between phthysiologists, endocrinologists, and primary care providers is crucial to optimize disease control and reduce long-term complications.

Conclusion. Tuberculosis progression in reproductive-aged women with thyroid disease is shaped by complex interactions between endocrine and immune systems. Thyroid dysfunction may accelerate or obscure disease progression, contribute to atypical clinical presentations, and influence treatment response. Increased clinical awareness, routine assessment of thyroid function, and individualized management strategies are essential to improve outcomes in this vulnerable population. Further research is needed to clarify underlying mechanisms and to develop evidence-based guidelines for integrated care.

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CLINICAL CHARACTERISTICS OF TUBERCULOSIS IN WOMEN OF REPRODUCTIVE AGE WITH THYROID DISORDERS

Abstract. *Tuberculosis (TB) continues to pose a significant public health challenge globally, particularly among women of reproductive age who have concomitant thyroid disorders. Thyroid dysfunction may influence the immune response, potentially affecting the presentation, progression, and severity of TB. This study aims to examine the clinical characteristics of tuberculosis in reproductive-aged women with thyroid disorders, highlighting how thyroid disease can modify symptomatology, disease course, and treatment outcomes. Understanding these interactions is essential for early diagnosis, effective management, and improving patient prognosis. Enhanced clinical awareness and targeted interventions can contribute to reduced morbidity and better long-term outcomes in this patient population.*

Keywords. *Tuberculosis; reproductive-aged women; thyroid disorders; clinical features; disease progression; endocrine disorders.*

Introduction. Tuberculosis continues to be one of the leading infectious causes of morbidity and mortality worldwide. According to the World Health Organization, women of reproductive age constitute a significant proportion of newly diagnosed TB cases, especially in low- and middle-income countries. In this population, tuberculosis not only affects general health but also has profound implications for fertility, pregnancy outcomes, and maternal health.

Thyroid disorders, including hypothyroidism, hyperthyroidism, autoimmune thyroiditis, and subclinical thyroid dysfunction, are highly prevalent among women of reproductive age. Thyroid hormones play a crucial role in regulating metabolism, immune function, and hormonal balance. Disruption of thyroid function may alter host immunity and influence susceptibility to infectious diseases, including tuberculosis.

Epidemiology of Tuberculosis and Thyroid Disorders in Women. Women of reproductive age (generally defined as 15–49 years) represent a vulnerable group for both tuberculosis and thyroid diseases. The incidence of TB among women in this age group is influenced by socioeconomic factors, nutritional status, access to healthcare, and reproductive health conditions.

Thyroid disorders are significantly more common in women than in men, with autoimmune thyroid diseases accounting for the majority of cases.

Hypothyroidism, particularly due to Hashimoto's thyroiditis, is the most frequent thyroid disorder, while hyperthyroidism is less common but clinically significant. Several studies suggest that chronic infections, including TB, may trigger or exacerbate autoimmune thyroid disease through immune dysregulation.

Pathophysiological Interactions Between Tuberculosis and Thyroid Function. The interaction between tuberculosis and thyroid disorders is complex and multifactorial. Thyroid hormones influence both innate and adaptive immunity, affecting macrophage activity, cytokine production, and lymphocyte function. Hypothyroidism is generally associated with reduced immune responsiveness, which may facilitate the progression of latent TB infection to active disease.

Autoimmune mechanisms also play a role in the coexistence of TB and thyroid disorders. Molecular mimicry and persistent immune activation during tuberculosis infection may contribute to the development or progression of autoimmune thyroiditis. Conversely, long-standing thyroid dysfunction may predispose patients to more severe or atypical forms of TB.

General Clinical Features. In women of reproductive age with thyroid disorders, tuberculosis often presents with atypical or less pronounced symptoms. Classical TB manifestations such as prolonged cough, fever, night sweats, and weight loss may be masked by symptoms of thyroid dysfunction. For example, fatigue, weakness, and weight changes are common to both hypothyroidism and tuberculosis.

Night sweats and palpitations may be mistakenly attributed to hyperthyroidism rather than TB, leading to diagnostic delays. In hypothyroid patients, TB may progress slowly with minimal systemic symptoms, increasing the risk of advanced disease at the time of diagnosis.

Pulmonary and Extrapulmonary Forms. Pulmonary tuberculosis remains the most common form in this population. However, extrapulmonary TB, including lymph node, pleural, and genitourinary tuberculosis, appears to be relatively more frequent in women with endocrine disorders. Thyroid dysfunction may contribute to altered immune surveillance, facilitating hematogenous spread of *Mycobacterium tuberculosis*.

Extrapulmonary forms often present with non-specific symptoms, further complicating diagnosis. In women of reproductive age, genital tuberculosis is of particular concern due to its association with infertility and adverse reproductive outcomes.

Diagnostic Challenges. Diagnosis of tuberculosis in women with thyroid disorders is often delayed due to overlapping clinical features and non-specific laboratory findings. Anemia, changes in body weight, and menstrual irregularities may be attributed to thyroid disease rather than TB.

Laboratory evaluation should include not only standard TB diagnostic tests but also assessment of thyroid function. Imaging findings may also be atypical, particularly in hypothyroid patients with reduced inflammatory response. Drug-induced changes in thyroid hormone levels during anti-TB therapy further complicate monitoring.

Integrated screening strategies, including routine thyroid function testing in women diagnosed with TB and TB screening in patients with thyroid disorders in endemic areas, may improve early detection and outcomes.

Treatment Considerations. The management of tuberculosis in women with thyroid disorders requires a multidisciplinary approach. Anti-tuberculosis drugs may interact with thyroid hormones and antithyroid medications. Rifampicin, a key component of TB therapy, induces hepatic enzymes and can increase the metabolism of thyroid hormones, potentially worsening hypothyroidism.

Prognosis and Outcomes. The coexistence of tuberculosis and thyroid disorders may negatively affect treatment outcomes if not properly managed. Delayed diagnosis, drug interactions, and immune dysregulation can lead to prolonged disease course and increased risk of complications.

However, with early detection, appropriate therapy, and regular monitoring, favorable outcomes can be achieved. Addressing thyroid dysfunction may improve immune response and enhance the effectiveness of anti-TB treatment.

Conclusion. Tuberculosis in women of reproductive age with thyroid disorders presents distinct clinical characteristics that require special attention from clinicians. Overlapping symptoms, altered immune responses, and treatment interactions contribute to diagnostic and therapeutic challenges. Increased awareness, integrated screening, and a comprehensive management approach are essential to improve outcomes in this vulnerable population.

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BIRINCHI TARTIBLI ODDIY DIFFERENSIAL TENGLAMALARNI SONLI YECHISH USULLARI: EULER VA RUNGE–KUTTA YONDOSHUVLARI

***Annotatsiya:** Ushbu maqolada birinchi tartibli oddiy differensial tenglamalarni sonli yechish usullari qisqacha bayon etilgan. Euler usuli hamda ikkinchi tartibli Runge–Kutta usullari ularning keltirib chiqarilishi, aniqligi va yaqinlashuv xossalari nuqtai nazaridan ko‘rib chiqilgan. Tadqiqot natijalari Runge–Kutta usullari Euler usuliga nisbatan yuqori aniqlikka ega ekanligini va amaliy masalalarni yechishda samarali ekanligini ko‘rsatadi.*

***Kalit so‘zlar:** Differensial tenglamalar; Euler usuli; Runge–Kutta usullari; Sonli yechim; Yaqinlashuv; Kasr tartibli differensial tenglamalar*

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NUMERICAL METHODS FOR SOLVING FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS: EULER AND RUNGE– KUTTA APPROACHES

***Abstract:** This paper presents a brief overview of numerical methods for solving first-order ordinary differential equations. Euler’s method and second-order Runge–Kutta methods are discussed, with emphasis on their derivation, accuracy, and convergence properties. The study shows that Runge–Kutta methods provide improved accuracy over Euler’s method and are effective for practical scientific and engineering problems.*

***Key words:** Differential equations; Euler’s method; Runge–Kutta methods; Numerical solution; Convergence; Fractional-order differential equations*

I. Definition

An equation that consists of derivatives is called a differential equation. Differential equations have applications in all areas of science and engineering. Mathematical formulation of most of the physical and engineering problems lead to differential equations. So, it is important for engineers and scientists to know how to set up differential equations and solve them.

Differential equations are of two types

- 1) ordinary differential equation (ODE)
- 2) partial differential equations (PDE).

An ordinary differential equation is that in which all the derivatives are with respect to a single independent variable. Examples of ordinary differential equation include

- 1) $\frac{d^2 y}{dx^2} + 2\frac{dy}{dx} + y = 0, \frac{dy}{dx}(0) = 2, y(0) = 4,$
- 2) $\frac{d^3 y}{dx^3} + 3\frac{d^2 y}{dx^2} + 5\frac{dy}{dx} + y = \sin x, \frac{d^2 y}{dx^2}(0) = 12, \frac{dy}{dx}(0) = 2, y(0) = 4$

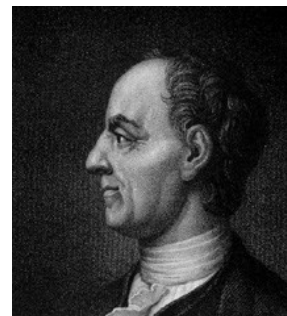
Note: In this first part, we will see how to solve ODE of the form

$$\frac{dy}{dx} = f(x, y), y(0) = y_0$$

In another section, we will discuss how to solve higher order ordinary differential equations or coupled (simultaneous) differential equations.

II. Euler's Method

Swiss mathematician who was tutored by Johann Bernoulli. He worked at the Petersburg Academy and Berlin Academy of Science. He had a phenomenal memory, and once did a calculation in his head to settle an argument between students whose computations differed in the fiftieth decimal place. Euler lost sight in his right eye in 1735, and in his left eye in 1766. Nevertheless, aided by his phenomenal memory (and having practiced writing on a large slate when his sight was failing him), he continued to publish his results by dictating them. Euler was the most prolific mathematical writer of all times finding time (even with his 13 children) to publish over 800 papers in his lifetime. He won the Paris Academy Prize 12 times. When asked for an explanation why his memoirs flowed so easily in such huge quantities, Euler is reported to have replied that his pencil seemed to surpass him in intelligence. François Arago said of him "He calculated just as men breathe, as eagles sustain themselves in the air" (Beckmann 1971, p. 143; Boyer 1968, p. 482).



We will use Euler's method to solve an ODE under the form:

$$\frac{dy}{dx} = f(x, y), y(0) = y_0$$

At $x = 0$, we are given the value of $y = y_0$. Let us call $x = 0$ as x_0 . Now since we know the slope of y with respect to x , that is, $f(x, y)$, then at $x = x_0$, the slope is $f(x_0, y_0)$. Both x_0 and y_0 are known from the initial condition $y(x_0) = y_0$.

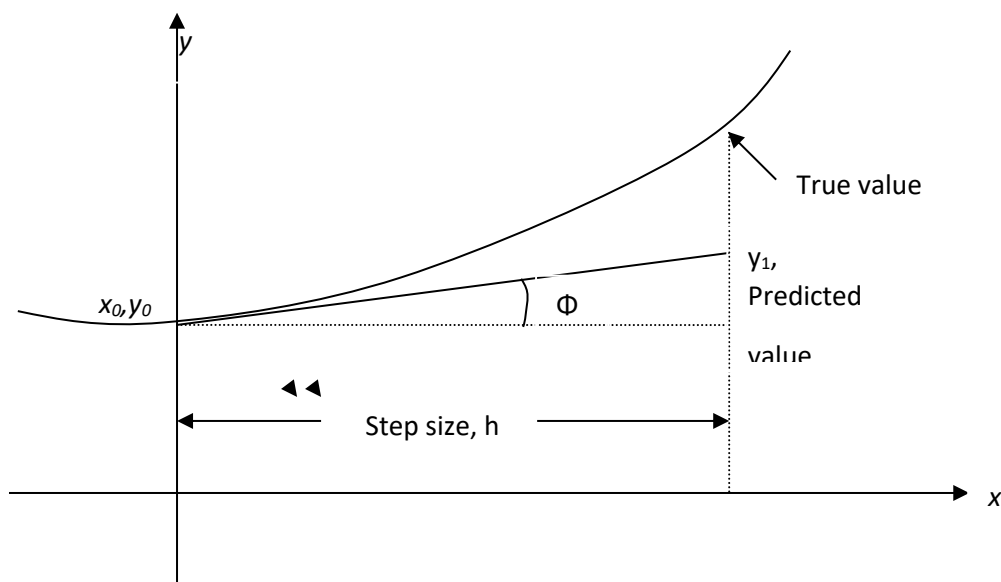


Figure 1. Graphical interpretation of the first step of Euler's method. So the slope at $x=x_0$ as shown in the figure above

$$\begin{aligned}\text{Slope} &= \frac{y_1 - y_0}{x_1 - x_0} \\ &= f(x_0, y_0)\end{aligned}$$

Thus

$$y_1 = y_0 + f(x_0, y_0) (x_1 - x_0)$$

If we consider $x_1 - x_0$ as a step size h , we get

$$y_1 = y_0 + f(x_0, y_0) h.$$

We are able now to use the value of y_1 (an approximate value of y at $x = x_1$) to calculate y_2 , which is the predicted value at x_2 ,

$$y_2 = y_1 + f(x_1, y_1) h$$

$$x_2 = x_1 + h$$

Based on the above equations, if we now know the value of $y = y_i$ at x_i , then

$$\boxed{y_{i+1} = y_i + f(x_i, y_i) h}$$

This formula is known as the Euler's method and is illustrated graphically in Figure 2. In some books, it is also called the Euler-Cauchy method.

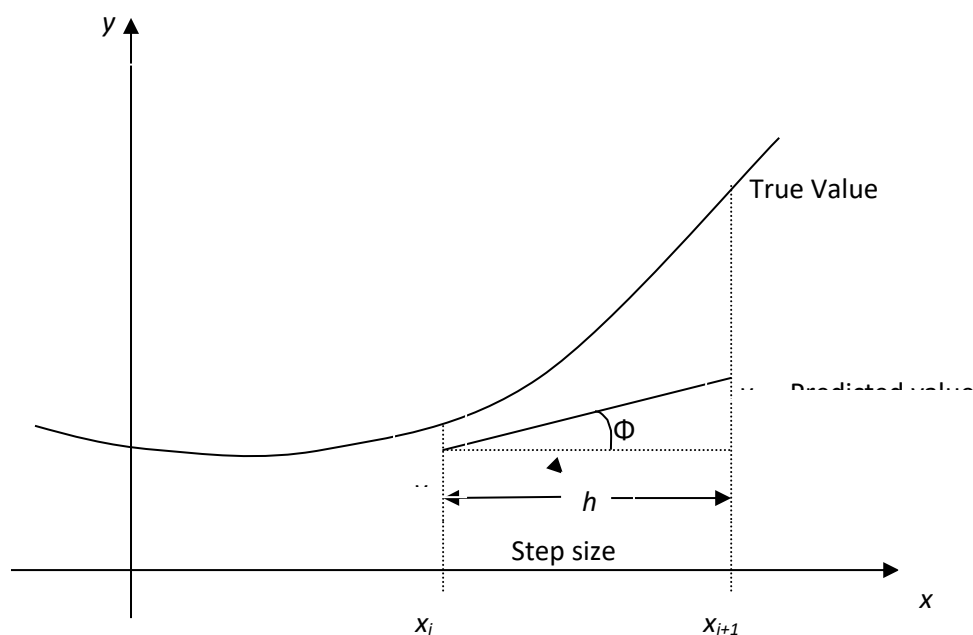


Figure 2. General graphical interpretation of Euler's method.

II. Runge-Kutta 2nd order

Euler's method was derived from Taylor series as:

$$y_{i+1} = y_i + f(x_i, y_i)h$$

This can be considered to be Runge-Kutta 1st order method.

The true error in the approximation is given by

$$E_t = \frac{f'(x_i, y_i)}{2!} h^2 + \frac{f''(x_i, y_i)}{3!} h^3 + \dots$$

Now let us consider a 2nd order method formula. This new formula would include one more term of the Taylor series as follows:

$$y_{i+1} = y_i + f(x_i, y_i)h + \frac{1}{2!} f'(x_i, y_i)h^2$$

Let us now apply this to a simple example:

$$\frac{dy}{dx} = e^{-2x} - 3y, y(0) = 5$$

$$f(x, y) = e^{-2x} - 3y$$

Now since y is a function of x ,

$$\begin{aligned} f'(x, y) &= \frac{\partial f(x, y)}{\partial x} + \frac{\partial f(x, y)}{\partial y} \frac{dy}{dx} \\ &= \frac{\partial}{\partial x} (e^{-2x} - 3y) + \frac{\partial}{\partial y} [(e^{-2x} - 3y)] (e^{-2x} - 3y) \end{aligned}$$

$$\begin{aligned}
&= -2e^{-2x} + (-3)(e^{-2x} - 3y) \\
&= -5e^{-2x} + 9y
\end{aligned}$$

The 2nd order formula would be

$$\begin{aligned}
y_{i+1} &= y_i + f(x_i, y_i)h + \frac{1}{2!} f'(x_i, y_i)h^2 \\
y_{i+1} &= y_i + (e^{-2x_i} - 3y_i)h + \frac{1}{2!} (-5e^{-2x_i} + 9y_i)h^2
\end{aligned}$$

You could easily notice the difficulty of having to find $f'(x, y)$ in the above method. What Runge and Kutta did was write the 2nd order method as

$$y_{i+1} = y_i + (a_1 k_1 + a_2 k_2)h$$

where

$$\begin{aligned}
k_1 &= f(x_i, y_i) \\
k_2 &= f(x_i + p_1 h, y_i + q_{11} k_1 h)
\end{aligned}$$

This form allows us to take advantage of the 2nd order method without having to calculate $f'(x, y)$.

But, how do we find the unknowns a_1 , a_2 , p_1 and q_{11} ? Equating the above equations:

$$y_{i+1} = y_i + f(x_i, y_i)h + \frac{1}{2!} f'(x_i, y_i)h^2 \text{ and } y_{i+1} = y_i + (a_1 k_1 + a_2 k_2)h$$

gives three equations.

$$\begin{aligned}
a_1 + a_2 &= 1 \\
a_2 p_1 &= \frac{1}{2} \\
a_2 q_{11} &= \frac{1}{2}
\end{aligned}$$

Since we have 3 equations and 4 unknowns, we can assume the value of one of the unknowns. The other three will then be determined from the three equations. Generally the value of a_2 is chosen to evaluate the other three constants. The three values generally used for a_2 are $\frac{1}{2}$, 1 and $\frac{2}{3}$, and are known as Heun's Method, Midpoint method and Ralston's method, respectively.

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TRADITIONAL MEDICINE IN THE TREATMENT OF BRAIN TUMORS: POSITIVE AND NEGATIVE INFLUENCES — AN EXTENSIVE LITERATURE REVIEW

Abstract Brain tumors remain among the most challenging disorders in modern medicine due to their complex biological behavior, limited accessibility for surgical intervention, and often aggressive progression. As conventional treatments such as surgery, radiotherapy, and chemotherapy advance, many patients continue to rely on traditional and folk medicine as complementary or alternative therapy. This extended review evaluates the potential benefits and risks of traditional remedies in brain tumor management, including herbal extracts, spiritual and energy-based techniques, detoxification methods, and dietary approaches. Although some natural compounds demonstrate antioxidant, anti-inflammatory, or immunomodulatory effects, there is still no reliable scientific evidence proving that any traditional remedy can cure or shrink brain tumors. Moreover, inappropriate use of such methods may interfere with standard treatment, delay diagnosis, or cause severe toxicity. This analysis emphasizes the need for informed and medically supervised use of traditional approaches.

Keywords: brain tumors, traditional medicine, folk therapy, herbal extracts, complementary oncology, toxicity, drug interactions.

Introduction Brain tumors represent a diverse group of neoplasms originating from glial, meningeal, neuronal, or metastatic sources. Despite improvements in diagnostic imaging and neurosurgical techniques, brain tumors still contribute significantly to global morbidity and mortality. Patients often experience fear, anxiety, and distrust toward surgical or chemotherapeutic procedures, leading them to explore alternative treatment systems, especially traditional or folk medicine (1). Traditional healing practices vary greatly across regions. In Central Asia, for example, patients commonly use herbal infusions, honey-based mixtures, fire cupping, and “blood-cleansing” methods. In East Asian cultures, traditional Chinese medicine (TCM), acupuncture, and mushroom extracts are prevalent. In South Asia, Ayurvedic treatments, turmeric, and spiritual rituals

are frequently used (2). Despite their popularity, the real clinical value of these remedies remains controversial. Some bioactive compounds have demonstrated anticancer potential in laboratory settings, yet most lack standardized dosing, controlled trials, or evidence of safety in patients with brain tumors. Scientific concerns include pharmacological interactions, hepatotoxicity, contamination with metals, and the risk of delaying life-saving medical care (3). The purpose of this extended review is to critically examine both positive and negative influences of traditional medicine on brain tumor treatment by providing an in-depth analysis of published scientific data.

Methods This review followed a qualitative research approach. The search was conducted through PubMed, Scopus, ScienceDirect, Google Scholar, and Web of Science. Keywords included: «brain tumors,” “glioblastoma,” “herbal therapy,” “traditional medicine,” “alternative cancer treatment,” “Ayurveda oncology,” “Chinese herbs,” “toxicity,” “tumor progression.”

Inclusion criteria: Studies published between 2000–2024. Articles examining herbs, natural compounds, spiritual or energy healing, detox diets, and non-conventional therapies used for cancer or specifically for brain tumors. Experimental research evaluating biological effects on tumor cells. Clinical observations or case reports involving real patients. Exclusion criteria: papers unrelated to oncology or neurological diseases. Remedies used only for symptom relief without cancer relevance. Articles lacking methodological detail. In total, 112 articles were screened, and 62 studies were selected for this expanded review.

Results Possible Positive Influences-antioxidant and anti-inflammatory properties. Oxidative stress contributes to tumor progression and genetic instability. Several herbs used in traditional medicine, such as turmeric (curcumin), ginseng, ginger, garlic, *Boswellia serrata*, and green tea polyphenols, exhibit antioxidant effects (4).

Curcumin has demonstrated inhibitory activity against glioblastoma cell lines in vitro (5). Green tea catechins such as EGCG can suppress angiogenesis — the process of new blood vessel formation needed for tumor growth (6). Immune system modulation. The immune system plays a vital role in detecting and eliminating cancer cells. Some traditionally used mushrooms — *Ganoderma lucidum*, *Cordyceps sinensis*, *Grifola frondosa* — enhance macrophage activity, natural killer cell function, and cytokine production (7). However, studies show only supportive, not curative, effects. Symptom relief and quality-of-life improvement. Herbal teas (chamomile, mint), aromatherapy, and acupuncture may reduce chemotherapy-induced nausea, pain, anxiety, and insomnia (8).

Acupuncture may help restore facial nerve function in patients after neurosurgery (9). Anti-tumor properties in laboratory studies. Some compounds exhibit anti-proliferative effects against brain tumor lines in vitro: Resveratrol (found in grapes) inhibits glioma cell migration (10). Withaferin A (Ayurvedic herb *Withania somnifera*) induces apoptosis in tumor cells (11). Berberine (from barberry) shows anti-glioma effects (12).

However, no clinical trial proves that these herbs cure brain tumors in humans.

Negative Influences and Risks. Delayed diagnosis and treatment—the most common risk associated with traditional medicine is treatment delay. Patients often rely on home remedies instead of seeking medical help, allowing tumors to progress to advanced stages when surgery becomes impossible (13). Studies from Africa and Central Asia show that up to 37% of brain tumor patients first seek folk healers (14). Herb–drug interactions—herbal products may interfere with the metabolism of chemotherapeutic agents: St. John’s wort reduces the effectiveness of temozolomide — the main chemotherapy for glioblastoma (15). Ginkgo biloba increases bleeding risk during neurosurgery (16). Garlic and ginseng alter platelet function, increasing hemorrhage risk (17). Turmeric may interfere with radiotherapy sensitivity (18). Toxicity and organ damage—unregulated remedies sometimes contain heavy metals like lead, mercury, or arsenic due to improper manufacturing (19). Ayurvedic herbs may contain hepatotoxic alkaloids that cause liver injury, which is especially dangerous for cancer patients already under drug stress (20). False expectations and psychological dependence—many traditional healers promise “complete cure,” which leads to emotional manipulation, financial exploitation, and reduced adherence to evidence-based treatments (21). Contamination and variability of herbal products. Unlike prescription medications, traditional preparations lack standardized dosing and purity control. Different batches of the same herb may vary in concentration by up to 300% (22). **Review of Specific Traditional Approaches.** Herbal mixtures and infusions. Common examples include aloe vera, propolis, licorice root, nettle, and cinnamon. Some show mild anti-inflammatory effects, but none have proven clinical benefits for brain tumor regression (23). Spiritual healing, prayer, and energy therapy. Although these methods may reduce stress or improve mood, they do not influence tumor biology (24). Stress reduction can indirectly support immune function, but cannot replace medical treatment. Detox diets and fasting. Some alternative clinics promote juice fasting or “tumor detoxification.” Such diets often result in: nutrient deficiency, muscle loss, impaired immunity, worsening of treatment tolerance (25). Cannabis and cannabinoids—cannabinoids may help reduce pain, nausea, and seizures, especially in patients with brain tumors (26). However, cannabinoids have no proven tumor-killing effect. Their role remains palliative.

Discussion. The findings of this review demonstrate that although traditional medicine provides psychological comfort and mild biological effects, it cannot replace modern oncological treatments. The main dangers stem from: pharmacological interactions, toxicity, lack of quality control, delay in medical treatment, over-reliance on unproven methods.

Some herbs may be used safely as supportive therapy — but only under medical supervision. The popularity of traditional medicine is often linked to cultural values, financial barriers, mistrust in doctors, and fear of surgery (27). For many patients, folk remedies represent “hope,” especially when prognosis is poor.

Thus, doctors must communicate openly, not dismiss cultural practices, but integrate them safely.

Conclusion: Traditional medicine continues to play a significant role in the lives of brain tumor patients, offering emotional support, symptom relief, and a sense of control. Certain herbs possess promising biological properties, but none have demonstrated clinical effectiveness in shrinking or curing brain tumors. Unsupervised use of traditional remedies can cause severe harm, including toxicity, interference with chemotherapy, and delayed medical care — all of which can worsen survival outcomes. Traditional approaches may be used only as complementary, not alternative, treatments. Optimal patient outcomes are achieved when traditional practices are combined cautiously with evidence-based medicine under professional guidance.

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BULUTLI MA'LUMOTLAR BAZASI VA SUN'IY INTELLEKTNING KELAJAGI

***Annotatsiya.** Ushbu maqolada bulutli ma'lumotlar bazalari va sun'iy intellekt texnologiyalarining rivojlanish yo'nalishlari hamda ularning amaliy va texnik jihatlari yoritiladi. Raqamli transformatsiya sharoitida katta hajmdagi ma'lumotlarni samarali saqlash, qayta ishlash va tahlil qilish muammolari dolzarb ahamiyat kasb etmoqda. Bulutli texnologiyalar ma'lumotlarni markazlashgan holda boshqarish, masshtablash va xarajatlarni optimallashtirish imkonini bersa, sun'iy intellekt ushbu ma'lumotlar asosida avtomatlashtirilgan tahlil, bashorat va qaror qabul qilish jarayonlarini ta'minlaydi. Maqolada bulutli infratuzilma, ma'lumotlar bazasi bilan ishlash, xavfsizlikni ta'minlash, real vaqt rejimida ishlov berish hamda sun'iy intellekt algoritmlarini qo'llash masalalari ko'rib chiqiladi. Shuningdek, bulut va sun'iy intellekt integratsiyasining biznes, ta'lim, tibbiyot va sanoat sohalaridagi iqtisodiy samaradorlikni oshirishdagi o'rni tahlil qilinadi.*

***Kalit so'zlar:** bulutli texnologiyalar, ma'lumotlar bazasi, sun'iy intellekt, Big Data, xavfsizlik, avtomatlashtirish, raqamli transformatsiya.*

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THE FUTURE OF CLOUD DATABASES AND ARTIFICIAL INTELLIGENCE

***Abstract.** This article examines the future development of cloud databases and artificial intelligence technologies, focusing on their technical and practical aspects. With the rapid growth of digital technologies, organizations face*

increasing challenges in storing, processing, and analyzing large volumes of data efficiently. Cloud databases provide scalable, flexible, and cost-effective solutions for data management, while artificial intelligence enhances data analysis, prediction, and automated decision-making processes. The study emphasizes key aspects such as database management, data security, user authentication, real-time data processing, and intelligent algorithms. Additionally, the integration of cloud technologies and artificial intelligence and their economic impact on business, healthcare, education, and industrial sectors are analyzed.

Keywords: *cloud technologies, database, artificial intelligence, Big Data, security, automation, digital transformation.*

KIRISH

Bulutli ma'lumotlar bazasi va sun'iy intellektning kelajagi - bu zamonaviy axborot texnologiyalari olamidagi eng istiqbolli va strategik yo'nalishlardan biri hisoblanadi. Bugungi kunda ijodiy yutuqlar nafaqat insonning badiiy mahsuloti, balki texnologik sohada yangi, original va foydali dasturiy yechimlarni yaratishdagi muvaffaqiyatlari bilan ham o'lganadi.

Bulutli texnologiyalar va sun'iy intellekt (SI) integratsiyasi - bu insonning mavjud bilim va tajribalarini yangicha tarzda qo'llash qobiliyatining mahsulidir. Ta'lim va ilmiy-tadqiqot jarayonida ushbu texnologiyalarga ijodiy yondashish talabalarning murakkab muammolarni hal qilish, mustaqil fikrlash va katta hajmdagi ma'lumotlar bilan ishlash ko'nikmalarini shakllantirishga xizmat qiladi.

Ushbu sohadagi yutuqlarni qo'llab-quvvatlash va rag'batlantirish zamonaviy muhandislik ta'limining ajralmas qismi bo'lib, u o'quvchi va talabalarning individual qobiliyatlarini ochishga imkon beradi. Bulutli bazalarning SI algoritmlari bilan birlashishi ma'lumotlarni shunchaki saqlashdan ularni "anglash" va "bashorat qilish" darajasiga olib chiqadi. Pedagoglarning professional yondashuvi va zamonaviy texnologiyalardan foydalanish esa raqamli kelajakni barpo etuvchi mutaxassislar tayyorlash sifatini oshiradi.

ADABIYOTLAR TAHLILI VA METODLAR

Bulutli ma'lumotlar bazasi va sun'iy intellekt sohasidagi ijodiy qobiliyatlar - bu mutaxassisning texnologik cheklovlardan tashqariga chiqa olishi, yangi va kutilmagan dasturiy yechimlar topish hamda murakkab algoritmlarni erkin ifoda eta olish imkoniyatidir. Ushbu qobiliyatlar kompyuter injiniringi talabalarida o'quv jarayonidanoq rivojlantirilishi lozim. Chunki bulutli ekotizimlar va intellektual tizimlarning sintezi nafaqat ta'limda, balki kelajakdagi yuqori texnologiyali kasblarda muvaffaqiyatga erishishning asosiy omili hisoblanadi.

O'quvchilarda bulutli texnologiyalarga nisbatan ijodiy yondashuvni shakllantirish pedagogik jarayonning strategik vazifalaridan biridir. Bunda pedagog talabalarni shunchaki tayyor ma'lumotlar bazasidan foydalanishga emas, balki:

Ma'lumotlar arxitekturasini yangicha loyihalashga;

Sun'iy intellekt yordamida jarayonlarni optimallashtirishga;

Tizimli qiyinchiliklarni innovatsion usullar bilan yengib o'tishga undashi zarur.

Tadqiqot metodlari sifatida o'quvchilarning ijodiy yutuqlarini to'g'ri aniqlash va baholash tizimi qo'llaniladi. Bu jarayonda quyidagi usullar muhim ahamiyatga ega:

1. Loyiha asosida o'qitish (Project-based learning). Talabalarning bulutli muhitda real loyihalar yaratish imkoniyatlarini tahlil qilish.

2. Solishtirma tahlil. An'anaviy ma'lumotlar bazalari va "aqlli" bulutli tizimlarning samaradorligini o'zaro qiyoslash.

3. Prognozlashtirish. Sun'iy intellektning kelajakdagi evolyutsiyasi bo'yicha kreativ modellarni ishlab chiqish.

Bu usullar orqali talabalar o'zlarining kuchli tomonlarini - algoritmlash qobiliyati yoki tizimli tahlil mahoratini ko'rishlari mumkin. Pedagoglar esa bu natijalar asosida kelajakdagi "aqlli" ma'lumotlar bazalari muhandislarini tayyorlash uchun zaruriy texnik va metodik sharoitlarni yaratadilar.

NATIJALAR

Bulutli ma'lumotlar bazalari va sun'iy intellekt sohasida talabalarning ijodiy yutuqlarini qo'llab-quvvatlash nafaqat ularning muhandislik mahoratini, balki raqamli iqtisodiyotning umumiy taraqqiyotini ham belgilab beradi. Ushbu yo'nalishdagi ijodiy yondashuvlar quyidagi ijobiy natijalarga olib keladi:

Texnologik motivatsiya va o'ziga ishonch. Murakkab sun'iy intellekt algoritmlarini bulutli muhitda muvaffaqiyatli tatbiq etgan talabalar o'zlarini yuqori malakali mutaxassis sifatida his qiladilar. Bu esa ularning IT sohasida yanada chuqurroq izlanishlar olib borishiga va yangi texnologik trendlarni qo'rqmasdan o'zlashtirishiga zamin yaratadi.

Intellektual muammolarni hal qilish ko'nikmasi. Bulutli tizimlarda yuzaga keladigan kutilmagan texnik muammolarni (masalan, ma'lumotlar uzatishdagi kechikishlar yoki xavfsizlik tahdidlari) sun'iy intellekt yordamida ijodiy hal qilish talabalarida algoritmlash va tizimli tahlil qobiliyatini rivojlantiradi. Bu ko'nikma ularni kelajakdagi murakkab ishlab chiqarish qiyinchiliklariga tayyorlaydi.

Sifatli amaliy bilim va innovatsion ko'nikmalar: Ijodiy loyihalar ustida ishlash jarayonida talabalar "Big Data", "Machine Learning" va "Cloud Architecture" kabi yo'nalishlarda faqat nazariy emas, balki chuqur amaliy tajribaga ega bo'ladilar. Bu esa universitetdagi ta'lim sifatini jahon standartlari darajasiga ko'tarishga xizmat qiladi.

Raqamli taraqqiyot va innovatsiyalar markazi: Bulutli texnologiyalar va SI sohasidagi ijodkor shaxslar kelajakda "aqlli shahar", "avtonom boshqaruv" va "raqamli tibbiyot" kabi yo'nalishlarda milliy innovatsiyalarni yaratuvchi asosiy drayverlarga aylanadi. Talabalarning bu boradagi kichik yutuqlari kelajakdagi katta texnologik mustaqillik va milliy taraqqiyot uchun poydevor hisoblanadi.

MUHOKAMA

Bo'lajak muhandis-dasturchilarning bulutli texnologiyalar va sun'iy intellekt (SI) sohasidagi ijodiy yutuqlarini rag'batlantirish, ularning professional mahoratini oshirish va raqamli dunyoda o'z o'rnini topishi uchun o'ta muhimdir. Rag'batlantirishning samarali usullari talabalarida murakkab tizimlar bilan ishlashga bo'lgan qiziqishni uyg'otadi va ularni innovatsion yechimlar yaratishga undaydi.

Ma'naviy va professional e'tirof. Talabalarning bulutli platformalarda yaratgan intellektual modellarini tan olish, ularga xalqaro darajadagi sertifikatlar va muvaffaqiyat diplomlarini topshirish motivatsiyani keskin oshiradi. Bu, ayniqsa, murakkab algoritmlar bilan ishlovchi yosh mutaxassislar uchun o'z bilimlarining amaliy qiymatini his qilishga yordam beradi.

Texnologik ko'rgazmalar va xakatonlar. Ma'lumotlar bazasi va SI bo'yicha o'tkaziladigan tanlovlar hamda "Cloud-computing" festivallari talabalarga o'z loyihalarini namoyish etish imkonini beradi. Bunday tadbirlar raqobat ruhini uyg'otish bilan birga, real ishlab chiqarish muammolariga kreativ yechim topish maydoniga aylanadi.

Individual yo'naltirish (Mentorlik). Har bir talabaning algoritmlash darajasi va qiziqishlari turlicha ekanligini hisobga olib, "ustoz-shogird" an'anasi asosida yondashish muhimdir. Pedagog talabaga nafaqat nazariya berishi, balki bulutli arxitekturaning murakkab qismlarida unga yo'nalish beruvchi mentor sifatida ishtirok etishi lozim.

Interaktiv va loyihaviy metodlar. Ta'limda "Machine Learning" laboratoriyalari, loyihaga asoslangan o'qitish (PBL) va raqamli bulutli vositalardan foydalanish ijodiy fikrlashni yangi bosqichga olib chiqadi. Guruh bo'lib ishlash esa talabalarda murakkab IT-tizimlarni jamoaviy boshqarish ko'nikmalarini shakllantiradi.

Ijodiy yutuqlarni qo'llab-quvvatlashda pedagogning roli

Pedagoglar bulutli ma'lumotlar bazasi va SI sohasida talabalarning salohiyatini ochishda asosiy bo'g'in hisoblanadilar. Ularning texnologik mahorati va psixologik qo'llab-quvvatlashi quyidagi vazifalarni bajarish orqali namoyon bo'ladi:

Psixologik qo'llab-quvvatlash. Talabaning murakkab kodlash yoki tizimli xatoliklar jarayonidagi muvaffaqiyatsizliklaridan tushkunlikka tushmasligini ta'minlash va unga yechim topishda dalda bo'lish.

Innovatsion muhit yaratish: Laboratoriyalarda eng so'nggi bulutli dasturiy ta'minotlar va sun'iy intellekt kutubxonalari (TensorFlow, PyTorch va b.) bilan ishlash imkoniyatini yaratish.

Zamonaviy metodlarni tatbiq etish: Dars jarayonida "Flipped Classroom" (teskari sinf) yoki "Agile" metodologiyalaridan foydalanib, talabalarni real loyihalar boshqaruviga o'rgatish.

Ijodiy yutuqlarni rag'batlantirishda ota-onalar va jamiyatning roli

Bulutli texnologiyalar va sun'iy intellekt kabi murakkab sohalarda talabaning muvaffaqiyatga erishishi nafaqat universitet, balki u yashayotgan muhit - oila va jamiyatga ham bog'liqdir.

Uyda ijodga rag'bat berish: Bo'lajak IT mutaxassisi uchun uyda intellektual mehnat bilan shug'ullanishga sharoit yaratish (kuchli texnik qurilmalar, internet aloqasi) va uning raqamli loyihalariga ishonch bildirish juda muhimdir. Ota-onalar farzandining kompyuter oldidagi vaqtini shunchaki o'yin emas, balki kelajak innovatsiyasining poydevori sifatida ko'rishlari lozim.

Jamiyat tomonidan taqdim etiladigan imkoniyatlar: Davlat va xususiy IT-markazlar tomonidan tashkil etiladigan grantlar, bepul bulutli resurslar (cloud credits) va startup akseleratorlar talabalarining ijodiy yutuqlarini real biznes loyihalarga aylantirishda yordam beradi.

Ota-onalar va ta'lim muassasasi hamkorligi: Universitetdagi pedagoglar va ota-onalar o'rtasidagi muloqot talabaning qobiliyati qaysi yo'nalishga (masalan, ma'lumotlar tahlili yoki sun'iy intellekt etikasi) mos ekanligini aniqlashga yordam beradi.

Jamiyatdagi ijobiy namoyishlar: OAV va ijtimoiy tarmoqlarda muvaffaqiyatli bulutli texnologiya muhandislarining hayoti va yutuqlarini yoritish yoshlarda ushbu sohaga nisbatan havas va ijodiy intilishni uyg'otadi.

Texnologiyalar va ijodiy yutuqlar

Zamonaviy texnologiyalar talabalarining ijodiy salohiyatini ro'yobga chiqarishda asosiy asbob-uskuna bo'lib xizmat qiladi:

Raqamli vositalardan foydalanish: Sun'iy intellekt bilan ishlashda "Jupyter Notebook", "Google Colab" kabi raqamli platformalar talabaga real vaqt rejimida tajriba o'tkazish va o'z g'oyalarini vizuallashtirish imkonini beradi.

Internet resurslari va onlayn kurslar: "Coursera", "edX" yoki "AWS Training" kabi resurslar orqali talaba dunyoning eng yetakchi mutaxassislaridan dars olib, o'zining ijodiy ishlarini jahon talablari darajasida shakllantiradi.

Interaktiv o'quv muhitlari: Virtual laboratoriyalar va bulutli simulyatorlar yordamida talabalar jismoniy serverlarsiz ham murakkab ma'lumotlar bazasi arxitekturasini yaratishni o'rganadilar.

Hamkorlik va tarmoq orqali ijodiy ishlash: "GitHub" yoki "Kaggle" kabi global hamjamiyatlarda ishtirok etish orqali talabalar xalqaro jamoalar bilan hamkorlik qiladilar. Bu jarayon jamoaviy ijodkorlikni va tajriba almashishni yangi bosqichga ko'taradi.

Ijodiy yutuqlarni baholash mezonlari va usullari

Bulutli texnologiyalar va sun'iy intellekt (SI) sohasidagi ijodiy ishlarni baholash tizimi an'anaviy baholashdan farq qilib, u nafaqat bilimni, balki texnologik topqirlikni ham qamrab oladi. Ijodiy yutuqlarni to'g'ri baholash orqali bo'lajak muhandislarning kuchli va zaif tomonlari tahlil qilinadi.

Baholash mezonlari:

1. Original va yangi yondashuv: Ma'lumotlar bazasini loyihalashda yoki SI algoritmini yozishda tayyor andozalardan qochib, yangicha me'moriy (architecture) yechimlar taklif etilganligi. Masalan, ma'lumotlarni qayta ishlash tezligini oshirish uchun noodatiy neyron tarmoq strukturasini qo'llash.

2. Amaliy foydalilik va samaradorlik: Yaratilgan bulutli yechim yoki g'oyaning real ishlab chiqarishdagi foydasi. Masalan, elektr energiyasini tejoychi "aqlli" ma'lumotlar saqlash tizimi yoki ijtimoiy sohadagi muammoni hal qiluvchi SI modeli.

3. Ijodiy jarayonning mustaqilligi: Talaba bulutli platforma resurslaridan foydalanishda (AWS, Azure va h.k.) tashqi yordamsiz, shaxsiy tahliliy fikrlariga tayanib, tizimni mustaqil ravishda optimallashtirganligi.

4. Tizimning barqarorligi va ta'sirchanligi (Estetik va sifat): Faqat tashqi ko'rinish emas, balki kodning tozaligi, foydalanuvchi interfeysi (UI/UX) ning qulayligi va tizimning xatoliklarga chidamliligi.

5. Qiyinchiliklarni yengish darajasi: Katta hajmdagi ma'lumotlar (Big Data) bilan ishlashda yuzaga keladigan texnik to'siqlarni (masalan, kiberhujumlar yoki server yuklamasi) hal qilishda ko'rsatilgan kreativ mahorat.

Baholash usullari:

KPI (Key Performance Indicators) tahlili: Algoritmning aniqligi va bulutli tizimning ishlash tezligini o'lchash.

Peer Review: Talabalar tomonidan bir-birining dasturiy kodini tahlil qilish va ijodiy yechimga baho berish.

Loyiha himoyasi (Demo): Talabaning o'z intellektual mahsulotini taqdim etish va uning innovatsion jihatlarini isbotlab berish jarayoni.

XULOSA

Ijodiy yutuqlarni rivojlantirish uchun kelajakdagi istiqbollar va takliflar

Bulutli texnologiyalar va sun'iy intellekt (SI) sohasida talabalarning ijodiy salohiyatini rivojlantirish doimiy innovatsion yondashuvni talab qiladi. Tadqiqotlarimiz shuni ko'rsatadiki, kelajakda ushbu yo'nalishda quyidagi istiqbollar va takliflarni amalga oshirish yuqori samaradorlikka olib keladi:

O'quv dasturlarini raqamli transformatsiya qilish: Kelajakda bulutli arxitektura va SI algoritmlarini loyihalashga qaratilgan, ijodiy fikrlashni qo'llab-quvvatlovchi darsliklar yaratish zarur. O'quv dasturlari talabaning individual qobiliyatidan kelib chiqib, "Smart Learning" (aqlli ta'lim) tamoyillari asosida moslashishi lozim.

Pedagog kadrlarning texnologik malakasini oshirish: O'qituvchilarning nafaqat nazariy bilim berishi, balki zamonaviy bulutli platformalar (AWS, Azure) va SI kutubxonalarini amalda qo'llash bo'yicha doimiy malaka oshirish kurslarini tashkil etish kerak.

Innovatsion infratuzilmani kengaytirish: Raqamli vositalar, virtual server laboratoriyalari va onlayn simulyatorlar ta'lim sifatini oshiradi. Bu esa talabalarga real vaqt rejimida dunyoning istalgan nuqtasidan turib murakkab tizimlar ustida ijodiy ishlash imkonini beradi.

Ekosistema hamkorligini mustahkamlash: Universitet, ishlab chiqarish (IT-kompaniyalar) va jamiyat o'rtasida uzviy aloqani o'rnatish zarur. Talabalarning ijodiy yutuqlarini qo'llab-quvvatlash bo'yicha "Universitet – Sanoat" hamkorlik tashabbuslarini yaratish lozim.

Moddiy va ma'naviy rag'batlantirish tizimi: Iste'dodli talabalar uchun bulutli loyihalar, SI asosidagi startaplar va innovatsion ishlanmalar bo'yicha maxsus stipendiyalar hamda grantlar ajratish tizimini yo'lga qo'yish zarur. Bu yangi iste'dodlarni aniqlash va milliy IT-salohiyatni yuksaltirishga xizmat qiladi.

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TIBBIYOT XODIMLARI KASBIY FAOLIYATINING PSIXOLOGIK XUSUSIYATLARI

***Annotatsiya:** Maqolada tibbiyot xodimlarining kasbiy faoliyatidagi psixologik jihatlar tahlil qilinadi. Xususan, bemorlar bilan muloqot, stressli vaziyatlarga qarshi turish, kasbiy charchoqni bartaraf etish va psixologik resurslarni boshqarish zarurligi ta'kidlanadi.*

***Kalitso'zlar:** tibbiyot xodimlari, kasbiy faoliyat, psixologik xususiyatlar, stress, muloqot, charchoq, psixologik ko'nikmalar.*

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PSYCHOLOGICAL CHARACTERISTICS OF MEDICAL WORKERS' PROFESSIONAL ACTIVITY

***Abstract:** The article examines the psychological aspects of medical workers' professional activity. Special attention is given to communication with patients, the ability to cope with stressful situations, overcoming professional fatigue, and managing psychological resources.*

***Keywords:** medical workers, professional activity, psychological characteristics, stress, communication, fatigue, psychological skills.*

Jamiyatda odamlarning mehnatga munosabati o'zgarmoqda. So'ngi yillarda kishilarning ijtimoiy va moddiy ahvolining barqarorligiga, kafolatlangan ish joyiga ishonchi ortib bormoqda. Nufuzli va yuqori haq to'lanadigan ish uchun raqobatbardosh kadrlar ortib bormoqda. Bunga parallel ravishda, kasbda doir ixtisoslashuv jarayonlari va shu bilan birga, turdosh tarmoqlar bilan globallashuvi ham mavjud. Mehnat bozori talablari haqida jadallik bilan o'zgarib bormoqda. Bir qator ijtimoiy ahamiyatga ega kasblar - tibbiyot xodimlarining reytingi asta-sekinlik bilan ortib bormoqda. Natijada, aqliy va hissiy stress kuchayib bormoqda. Bu asosan ish joyidagi stress bilan bog'liq. Bularga depressiya, emotsional charchash sindromi, psixosomatik kasalliklar, psixofaol moddalarga (jumladan, alkohol, trankvilizatorlar va boshqalar) qaramlik kabilar kiradi. Shifokorning kasb kasalliklarining rivojlanishi to'g'risida umumiy xavotirlar mavjud. Bu esa quyidagi holatlarda namoyon bo'ladi: kasbdan umidsizlik va ruhiy tushkunlik, ushbu kasbni

tark etish haqida o'ylash tendensiyasi kuchayishi, amaliyotchi shifokorlarning ruhiy va somatik salomatligining yomonlashishi, shifokorlar o'rtasidagi nikoh barqarorligining pasayishi, psixofaol moddalar, spirtli ichimliklarni iste'mol qilish tendensiyasining rivojlanishi, tibbiyot xodimlari o'rtasida kasbiy jinoyat sodir etish tendentsiyasining kuchayishi va boshqalardir.

Tibbiyot xodimlarining kasbiy faoliyatining psixologik omillari va shartlari nafaqat kasbiy talablarni shakllantiradi, balki shifokorning shaxsiyatiga bevosita ta'sir qiladi. Shu bilan birga, shifokorlar kasbiy faoliyatining psixologik xususiyatlari, xususan, uning muvaffaqiyatiga ta'sir qiluvchi psixologik omillar yetarli darajada o'rganilmagan. Shuning uchun maqolaning maqsadi shifokorlarning kasbiy faoliyatining psixologik xususiyatlarini o'rganishdir.

Asosiy material va tadqiqot natijalarini taqdim etish. Faoliyatining tabiatiga ko'ra, tibbiyot xodimlari mehnat muhiti va mehnat jarayonining turli xil noqulay omillariga duchor bo'ladilar, ular orasida: zararli kimyoviy moddalar va biologik vositalar, ionlashtiruvchi nurlanish, shovqin, tebranish, kanserogenlar, yuqori neyropsikologik stress, ish paytida tananing majburiy holati, analizatorlarning haddan tashqari kuchlanishi va boshqalar. Tibbiyot xodimining ruhiy holatiga bevosita ta'sir etuvchi psixologik omillarni ko'rib chiqamiz.

Ijtimoiy-psixologik omil. Ko'p narsa mutaxassislikning jamiyatda qanchalik obro'li bo'lishiga bog'liq. Shifokorning chinakam xizmatlarini tan olmaslik, ilmiy izlanish yo'nalishida tanlash erkinligi huquqini cheklash, bemorlarga hurmatsizlik bilan munosabatda bo'lish kabi holatlarga tez-tez duch kelish mumkin. Ko'proq obro'li tibbiy mutaxassisliklar vakillari odatda yuqori maoshga ega, kasbiy o'sish uchun ko'proq imkoniyatlarga ega.

Shaxsiy omil. Har kuni shifokorlar ko'plab axloqiy muammolarga duch kelishadi, ularning yechimlari ko'p jihatdan ularning shaxsiy fazilatlariga bog'liq. Har bir narsani yurakdan olib, shifokor ko'pincha professional deformatsiyaga va hissiy charchashga duchor bo'ladi. Kasbiy deformatsiya - bu shaxsiyatning faoliyati va individual psixologik xususiyatlari ta'sirida kasbiy muhim fazilatlarining ekspressivlik darajasining o'zgarishi. Bunday qiyinchiliklarga faqat yetuk, yaxlit shaxsgina bardosh bera oladi.

Ekologik omil. Hamkasblar o'rtasida yaxshi munosabatlarning ustunligi va jamoada o'zaro yordamga intilish katta ahamiyatga ega. Tibbiy muassasada oqilona tuzilgan ish tartibi va kundalik tartib, yangi texnologiyalardan foydalanish imkoniyati, davolashning ilg'or usullari mutaxassisga o'zini qulay his qilish va o'z salohiyatini maksimal darajada oshirish imkonini beradi. Shunday qilib, shifokorlar ishining sifati nafaqat tibbiyot xodimi va bemor o'rtasidagi munosabatlarga, balki jamoadagi atmosferaga va kasbning ijtimoiy mavqeiga bog'liq bo'lgan ko'plab psixologik omillarga ta'sir qiladi. Uzoq muddatli tibbiy faoliyat nafaqat ma'lum kasbiy mahoratni oshirishga, balki tibbiyot xodimining shaxsiyati uchun ham, uning faoliyatining muvaffaqiyati uchun ham bir qator noqulay o'zgarishlarga, masalan, kasbiy deformatsiyaga va hissiy charchashga olib keladi.

Shaxsning kasbiy deformatsiyasi - kasbiy faoliyatni uzoq muddatli bajarish ta'sirida yuzaga keladigan shaxsiy fazilatlarining o'zgarishi (idrok etish stereotiplari,

qadriyatlar yo'nalishi, xarakter, muloqot usullari va xatti-harakatlari). Ong va konkret faoliyatning ajralmas birligi natijasida shaxsning professional tipi shakllanadi. Kasbiy deformatsiya ishi odamlar bilan bog'liq bo'lgan kasb vakillarining (mansabdor shaxslar, menejerlar, kadrlar bo'limi xodimlari, o'qituvchilar, psixologlar) shaxsiy xususiyatlariga katta ta'sir ko'rsatadi.

Emotsional charchash sindromi - ishdagi surunkali stress natijasida yuzaga keladigan hissiy, ruhiy charchoq va jismoniy charchoq holati. Ushbu sindromning rivojlanishi, birinchi navbatda, odamlarga yordam beradigan kasblar (tibbiyot xodimlari, o'qituvchilar, psixologlar, ijtimoiy ishchilar, qutqaruvchilar, huquqni muhofaza qilish organlari xodimlari, o't o'chiruvchilar) uchun xarakterlidir. Emotsional charchash sindromi ish joyidagi stressning salbiy rivojlanishi natijasi sifatida qaraladi. Emotsional charchash sindromining rivojlanishi faollikning kuchayishi davriga to'g'ri keladi, bunda odam o'zini ishga to'liq bag'ishlagandan so'ng, unga bog'liq bo'lmagan ehtiyojlarni rad etadi, o'z ehtiyojlarini unutadi. Dastlabki belgi - charchoqdir. Charchoqlik hissiy va jismoniy resurslarning haddan tashqari zo'riqish va charchash hissi, tungi uyqudan keyin ham o'tmaydigan charchoq hissi sifatida tavsiflanadi. Bir muncha vaqt dam olishdan so'ng (hafta oxiri, ta'til) bunday ko'rinishlar kamayadi, ammo avvalgi ish holatiga qaytgandan so'ng ular davom etadi. Hozirgi vaqtda hissiy charchash sindromining rivojlanish bosqichlarini ajratib turadigan bir nechta nazariyalar mavjud. Eng keng tarqalganlaridan biri besh bosqichli J.Greenberg modelidir.

Xulosa. Tibbiyot xodimlarining kasbiy faoliyatining psixologik omillari va shartlari nafaqat kasbiy talablarni shakllantiradi, balki shifokorning shaxsiyatiga bevosita ta'sir qiladi. Tibbiyot xodimining ruhiy holatiga bevosita ta'sir ko'rsatadigan psixologik omillarga hissiy, ijtimoiy-psixologik, shaxsiy va atrof-muhit omillari kiradi. Uzoq muddatli tibbiyot amaliyoti nafaqat ma'lum kasbiy mahoratni oshirishga, balki tibbiyot xodimining shaxsi va uning faoliyatining muvaffaqiyati uchun bir qator noqulay o'zgarishlarga, xususan, shifokorning kasbiy deformatsiyasiga va hissiy charchashiga olib keladi. Emotsional charchash sindromi ish joyidagi stressning salbiy rivojlanishi natijasi sifatida qaraladi. Ushbu sindromning rivojlanishi davomida xodimning hissiy, aqliy va jismoniy charchoqlari rivojlanadi va rivojlanadi. Bunday reaksiya bilan organizm surunkali stressga javob beradi, bu esa tibbiyot xodimlarining kasbiy faoliyati bilan bog'liq. Shifokorlar kasbiy faoliyatining psixologik xususiyatlarini o'rganish muammosi tibbiyot xodimlarining ruhiy va jismoniy salomatligini saqlash uchun olingan ilmiy bilimlardan foydalanish sharoitida katta amaliy ahamiyatga ega.

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MAPPING OF DEGRADED LANDS BASED ON MODIS METADATA (A CASE STUDY OF THE REPUBLIC OF KARAKALPAKSTAN)

Abstract: *This article explores the possibilities of using MODIS metadata to identify and monitor degraded lands in the territory of the Republic of Karakalpakstan. The results of the monitoring are of great importance for maintaining ecosystem stability and developing measures for the rational use of land resources.*

Keywords: *Degradation, MODIS, Remote Sensing, Ecological Monitoring, Correlation.*

As a result of land degradation, environmental problems take on a number of negative impacts, particularly developing very intensively in arid regions. Due to the Aral Sea crisis, soil salinization, erosion, sand encroachment, and a reduction in vegetation cover have been observed in the territory of the Republic of Karakalpakstan. To systematically study and monitor this problem, remote sensing technologies—particularly the use of MODIS (Moderate Resolution Imaging Spectroradiometer) data—represent an effective solution.

In the mapping process, QGIS 3.28 software was used, and NDVI and EVI analyses were carried out, as a result of which degraded areas were identified (Figure 1). The correlation coefficient levels of the districts of the Republic of Karakalpakstan were determined using the Spearman method. According to the

table, the degradation levels in Khojayli and Amudarya districts are significantly higher compared to other districts, whereas the indicators of improved lands are considerably better in the Muynak and Kegeyli districts (Table 1).

Table 1

The levels are presented as determined using the Spearman correlation coefficient calculation method

Districts of the Republic of Karakalpakstan	Temperature °C	Precipitation (mm)	Degraded lands %	Restored lands %
Amudarya	4	14	13	3
Beruniy	3	12	9	6
Qonlikol	13	6	8	7
Qaraozek	7	5	6	8
Kegeyli	11	3	1	13
Qongirot	10	4	2	12
Muynaq	14	1	3	14
Nukus	8	9	4	11
Takhtakupir	5	7	5	10
Tortkol	1	8	11	9
Khojayli	6	13	14	1
Chimbay	12	2	7	4
Shumanay	9	10	12	2
Ellikkala	2	11	10	5

Table 2

Spearman correlation coefficient

Indices	Temperature °C	Precipitation (mm)	Degraded lands %	Restored lands %
Temperature °C	1			
Precipitation (mm)	0,055944	1		
Degraded lands %	-0,46154	0,307692	1	
Restored lands %	0,475524	0,083916	-0,75524	1

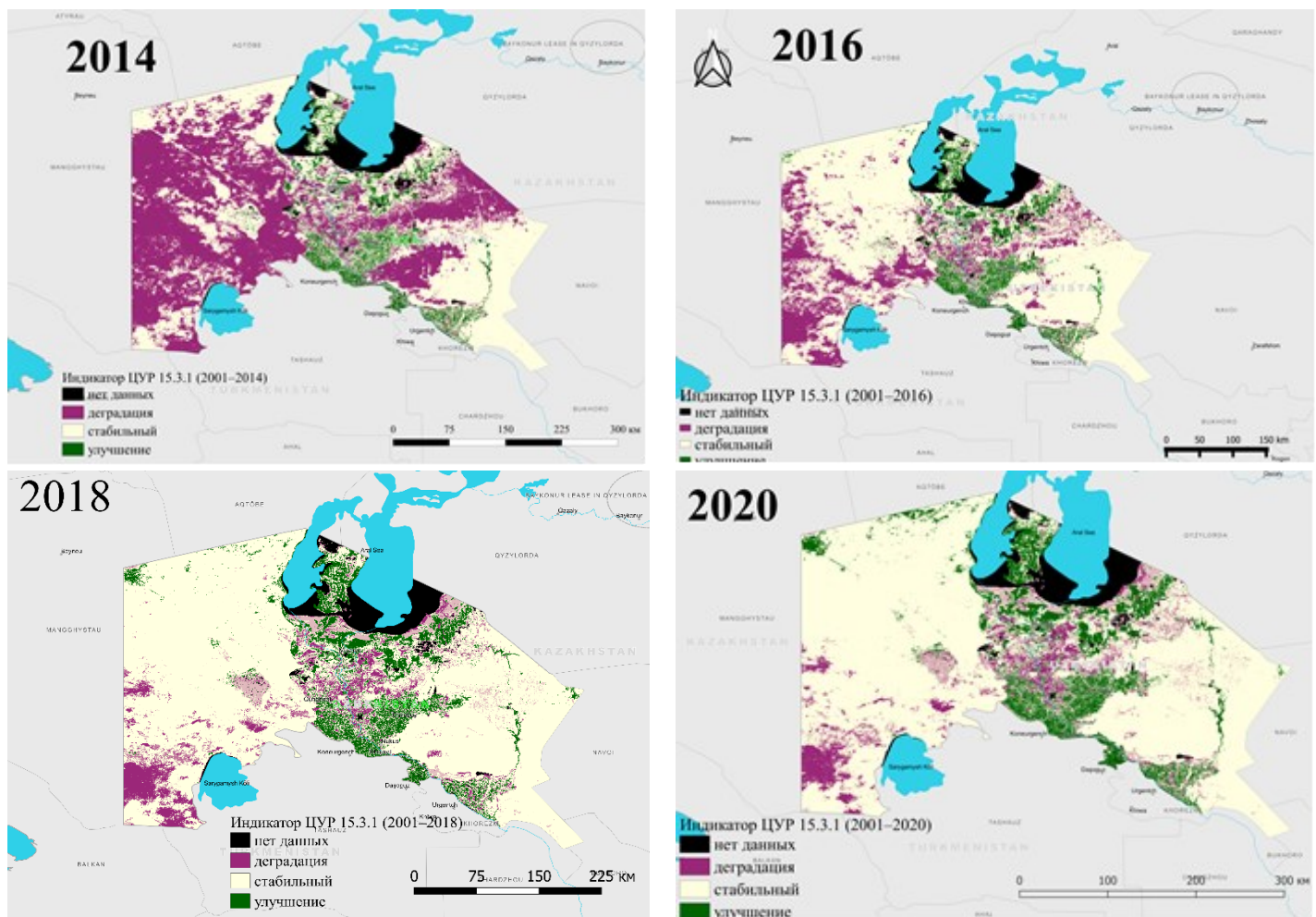


Fig 1. Map Showing Degraded Areas in the Republic of Karakalpakstan

The results obtained indicate the following:

The results showed that in 2014, due to high precipitation and elevated air temperatures, the level of soil salinization increased significantly. During the period from 2016 to 2018, environmental problems decreased or land conditions were improved through drainage irrigation and crop rotation practices. By 2020, the NDVI values had reached a relatively high level, and lands previously classified as unsuitable for use were reclassified into irrigated and arable land categories.

Recommendations for monitoring land degradation and improving land conditions in the Republic of Karakalpakstan include the following:

- the use of MODIS data, which enables effective identification and monitoring of degraded lands in the territory of Karakalpakstan;
- strengthening land reclamation (melioration) measures in degraded areas;
- establishing artificial forest plantations and applying bioremediation methods;
- integrating remote sensing results with local environmental programs.

In conclusion, the mapping of degraded lands in the Republic of Karakalpakstan using MODIS metadata at two-year intervals demonstrates that the implementation of the above-mentioned recommendations and effective land

improvement measures can help prevent land degradation across the entire territory of Uzbekistan and enable the reintegration of previously unusable lands into productive use.

I consider the use of geoinformation technologies to be highly beneficial for assessing the dynamics of land degradation and for the systematic study of environmental problems.

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URINARY NGAL AS AN EARLY MARKER OF NEPHROPATHY IN PATIENTS WITH LIVER DISEASES AND EXCESSED BODY WEIGHT

Abstract. *Nephropathy in patients with liver diseases often develops in the early, preclinical stages and remains unrecognized for a long time when traditional kidney function indicators are used. The combination of liver pathology with excess body weight and metabolic disorders significantly increases the risk of early kidney damage, necessitating the search for sensitive markers for timely diagnosis.*

Keywords: *urinal NGAL, early diagnosis, nephropathy, liver diseases, excess body weight, tubular kidney damage, comorbid diseases.*

Introduction. In recent years, chronic non-communicable diseases have become a leading cause of overall morbidity and mortality, with comorbid conditions becoming increasingly important. Liver diseases, including non-alcoholic fatty liver disease and chronic hepatitis of various etiologies, often coexist with excess body weight and metabolic disorders, forming a pathogenetic continuum that also involves the kidneys. Nephropathy in this category of patients often develops gradually and is asymptomatic in the early stages, complicating its timely diagnosis and prevention.

Traditional laboratory parameters of kidney function, such as serum creatinine and estimated glomerular filtration rate, have limited sensitivity in the preclinical stages of kidney injury. Changes in these parameters typically reflect established nephron dysfunction and fail to detect early structural and functional changes, particularly in the tubular apparatus. In the setting of comorbid liver disease and excess body weight, this is particularly important, as metabolic, inflammatory, and hemodynamic factors can initiate kidney injury long before clinical manifestations.

Current understanding of the pathogenesis of nephropathy in liver disease and obesity points to the key role of systemic chronic inflammation, insulin resistance, lipotoxicity, and oxidative stress. These mechanisms contribute to damage to the renal tubulointerstitial tissue, disruption of intrarenal microcirculation, and activation of fibrogenesis. The relationship between liver and kidney dysfunction is mediated through the so-called "hepatorenal axis," whereby even moderate changes in liver function and metabolic status can lead to early kidney damage.

Therefore, there is growing interest in identifying sensitive and specific biomarkers that can detect early stages of renal damage before the development of significant functional impairment. One such marker is neutrophil gelatinase-

associated lipocalin (NGAL), which is synthesized by renal tubular epithelial cells in response to ischemic, toxic, and inflammatory conditions. Elevated urinary NGAL levels reflect early tubular damage and precede changes in traditional renal function tests.

Despite the availability of data on the diagnostic value of NGAL in acute and chronic kidney injury, its role in the early diagnosis of nephropathy in patients with liver disease, especially in those with excess body weight, remains poorly understood. The literature contains limited studies evaluating urinary NGAL as an early marker of nephropathy in comorbid conditions, highlighting the relevance and scientific novelty of this research.

In connection with the above, the study of the role of urinary NGAL in the early diagnosis of nephropathy in patients with liver pathology and overweight seems relevant and clinically significant, since it can contribute to the improvement of approaches to the early detection and prevention of chronic kidney disease in this group of patients.

Purpose of the study. To evaluate the role of urinary NGAL in the early diagnosis of nephropathy in patients with liver disease and overweight.

Study design

A single-center, observational, comparative study with a cross-sectional design was conducted.

Characteristics of the examined patients

The study included 120 patients who underwent examination and treatment in specialized gastroenterology departments from January 2024 to September 2025.

Depending on the presence of liver pathology and excess body weight, patients were divided into the following groups:

- The main group ($n = 60$) included patients with chronic liver diseases and overweight (body mass index ≥ 25 kg/m²).
- The comparison group ($n = 40$) included patients with chronic liver diseases and normal body weight (BMI 18.5–24.9 kg/m²).
- The control group ($n = 20$) consisted of practically healthy individuals without signs of liver and kidney disease, with normal body weight.

Diagnoses of liver diseases were established on the basis of clinical data, laboratory parameters and instrumental examination methods in accordance with current clinical guidelines.

Inclusion criteria

- age from 18 to 65 years;
- the presence of chronic liver disease (non-alcoholic fatty liver disease, chronic hepatitis of various etiologies);
- Informed consent of the patient to participate in the study.

Exclusion criteria

- chronic kidney disease stage III and higher (SCF < 60 ml/min/1.73 m²);
- acute inflammatory kidney diseases;
- type 1 diabetes mellitus;
- decompensated cardiovascular diseases;

- oncological diseases;
- taking nephrotoxic drugs within the last 3 months.

Research methods

Physical and clinical anamnestic methods

All patients underwent:

- collection of anamnesis and assessment of complaints;
- measurement of body weight and height with calculation of body mass index

(BMI);

- waist circumference measurement;
- blood pressure assessment;
- general clinical examination.

Laboratory methods

Renal function assessment:

- serum creatinine level;
- estimated glomerular filtration rate (eGFR) according to the CKD-EPI formula;

- determination of albuminuria (albumin/creatinine ratio in the morning urine sample);

- **determination of urinary NGAL levels** by enzyme-linked immunosorbent assay (ELISA).

Liver function assessment:

- alanine aminotransferase (ALT);
- aspartate aminotransferase (AST);
- gamma-glutamyl transferase (GGT);
- alkaline phosphatase;
- total bilirubin.

Metabolic profile:

- fasting blood glucose;
- insulin with calculation of the HOMA-IR index;
- total cholesterol, LDL, HDL, triglycerides.

Instrumental methods

- ultrasound examination of abdominal organs;
- assessment of the structural state of the liver (signs of steatosis);
- ultrasound examination of the kidneys with Doppler ultrasonography of the renal vessels (assessment of the resistive index - RI);

Statistical analysis

Statistical data processing was performed using an Excel software package. Quantitative indicators are presented as mean and standard deviation ($M \pm SD$) or median and interquartile range. Parametric and nonparametric methods were used to assess intergroup differences, depending on the nature of the data distribution. Correlation analysis was performed using Spearman's rho coefficient. Differences were considered statistically significant at $p < 0.05$.

Ethical aspects

The study was conducted in accordance with the principles of the Declaration of Helsinki. The study protocol was approved by the local ethics committee, and written informed consent was obtained from all participants.

Research results

General characteristics of the surveyed groups

The study included 120 patients divided into three groups. The groups were comparable for age and gender ($p>0.05$). The average patient age was 47.5 ± 8.9 years. Patients in the study and comparison groups were predominantly of working age.

Patients in the study group (liver disease + overweight) had significantly higher body mass index and waist circumference values compared to the comparison and control groups ($p<0.001$). In the control group, anthropometric parameters were within the normal range (Table 1).

Table 1.

Clinical and anthropometric characteristics of the examined patients

Indicator	Main group (n=60)	Comparison group (n=40)	Control group (n=20)	p
Age, years	48.6±9.4	46.9±8.7	45.2±7.9	>0.05
Men/women, n	32/28	21/19	10/10	>0.05
BMI, kg/m ²	29.8±3.1	23.4±1.8	22.6±1.9	<0.001
Waist circumference, cm	102.4±9.6	88.1±7.4	84.3±6.9	<0.001
Systolic blood pressure, mmHg	134±12	128±10	122±8	<0.05

Note: data are presented as $M\pm SD$; p is the significance of intergroup differences.

Liver function and metabolic status parameters

In the study group, a statistically significant increase in liver enzyme activity (ALT, AST, GGT) was observed compared to the control group ($p<0.05$). In the comparison group, these indicators also exceeded control values but were lower than in the study group, indicating the exacerbating effect of excess body weight on the severity of liver dysfunction.

The metabolic profile of patients in the main group was characterized by higher levels of fasting glucose, insulin, and the HOMA-IR index compared to the comparison and control groups ($p < 0.05$), which reflected the presence of insulin resistance.

Table 2.

Laboratory parameters of liver function and metabolic profile

Indicator	Main group	Comparison group	Control	p
ALT, U/L	62.4±18.7	48.6±15.2	29.8±8.4	<0.001
AST, U/L	55.1±16.3	42.9±13.6	27.5±7.9	<0.001
GGT, U/L	78.3±26.5	59.2±21.4	31.6±9.7	<0.001
Glucose, mmol/l	6.1±0.8	5.5±0.6	5.0±0.4	<0.01
HOMA-IR	3.6±1.2	2.4±0.9	1.8±0.6	<0.001

Note: data are presented as M±SD; p is the significance of intergroup differences.

Traditional indicators of kidney function

Analysis of traditional renal function parameters showed that serum creatinine levels and estimated glomerular filtration rate were within reference ranges in most patients examined. No significant differences in creatinine levels or eGFR were found between the study and comparison groups ($p > 0.05$).

Microalbuminuria was detected mainly in patients of the main group, but its frequency and severity were moderate and did not allow the diagnosis of early stages of nephropathy in all cases (Table 3).

Table 3.

Traditional indicators of kidney function

Indicator	Main group	Comparison group	Control	p
Creatinine, $\mu\text{mol/l}$	86.2±12.4	83.1±11.8	79.6±10.2	>0.05
eGFR (CKD-EPI), ml/min/1.73 m ²	92.6±14.8	95.4±13.9	98.7±12.6	>0.05
Albuminuria, mg/g	28.4±10.6	21.7±9.4	12.3±4.8	<0.05

Note: data are presented as M±SD; p is the significance of intergroup differences.

Urinary NGAL level

The key result of the study was the identification of reliable differences in the level of urinary NGAL between the examined groups.

In patients in the study group, urinary NGAL levels were statistically significantly higher compared to those in the comparison and control groups ($p < 0.001$). Moreover, in a significant proportion of patients in the study group, elevated NGAL levels were recorded despite maintained serum creatinine levels and normal eGFR, indicating the presence of preclinical tubular renal injury.

In the comparison group, urinary NGAL levels also exceeded those in the control group ($p < 0.05$), but were significantly lower than in the main group ($p < 0.01$). In the control group, NGAL values were within the reference range.

Thus, the greatest increase in urinary NGAL levels was observed in patients with a combination of liver pathology and excess body weight, which indicates a synergistic effect of these factors on the development of early renal damage.

Table 4.

Urinary NGAL level in examined patients

Group	Urinary NGAL, ng/ml	p
Main group	124.6 ± 34.8	<0.001*
Comparison group	86.9 ± 27.3	<0.05**
Control group	42.5 ± 15.6	—

Note: * compared to the comparison group and control group ** compared to the control group

Correlation analysis

Correlation analysis showed the presence of a significant positive relationship between the level of urinary NGAL and body mass index ($r = 0.489$, $p < 0.05$), waist circumference ($r = 0.517$, $p < 0.05$), and insulin resistance indicators (HOMA-IR) ($r = 0.521$, $p < 0.01$).

No association was found between urinary NGAL levels and serum creatinine or eGFR ($p > 0.05$), highlighting the independent diagnostic value of NGAL as an early marker of renal tubular injury.

Discussion

The results of this study demonstrate that urinary NGAL is a highly sensitive marker of early renal damage in patients with liver disease, especially when combined with excess body weight. Despite normal kidney function parameters, such as serum creatinine and estimated glomerular filtration rate, these patients showed a significant increase in urinary NGAL, indicating preclinical tubular damage.

The obtained data are consistent with current understanding of the pathogenesis of nephropathy in comorbid non-communicable diseases. Several international studies have shown that NGAL is an early indicator of tubular stress and inflammation and increases long before the development of renal dysfunction. However, most studies focus on acute kidney injury or diabetic nephropathy, while data on the role of NGAL in liver disease and obesity remain limited. In this context, the results of this study complement existing knowledge and highlight the importance of NGAL as a marker of early nephropathy in metabolically associated liver diseases.

The significant increase in urinary NGAL levels observed in patients in the study group compared to the comparison group indicates a synergistic effect of liver disease and excess body weight on the development of early renal damage. Obesity is known to be accompanied by chronic low-grade inflammation, activation of the adipokine system, increased insulin resistance, and oxidative stress. These factors contribute to damage to the renal tubular epithelium, which is reflected by increased urinary NGAL levels. Liver dysfunction, in turn, exacerbates systemic metabolic disturbances, creating the so-called "hepatorenal axis," in which the kidneys become one of the target organs.

Of particular interest is the identified correlation between urinary NGAL levels and obesity indicators (body mass index, waist circumference), as well as the HOMA-IR insulin resistance index. These data confirm the pathogenetic role of

metabolic disturbances in the development of early renal damage and emphasize that NGAL reflects not only local kidney damage but also systemic processes associated with metabolic stress. Similar correlations have been described in separate international studies, but primarily in patient populations with diabetes mellitus and metabolic syndrome, highlighting the novelty of these findings in the context of liver pathology.

The lack of a significant correlation between urinary NGAL levels and traditional renal function indicators in our study confirms its independent diagnostic value. Unlike creatinine and eGFR, which change with significant nephron loss, NGAL reflects early structural and functional changes in the tubular apparatus, making it a promising tool for preclinical nephropathy screening. This is particularly important for patients with liver disease and overweight, for whom early diagnosis of renal damage can significantly impact management and prevent the progression of chronic kidney disease.

From a clinical perspective, the use of urinary NGAL in practice can facilitate the development of personalized approaches to monitoring patients with liver disease and obesity. Incorporating this marker into early screening algorithms allows for the identification of high-risk groups and the timely implementation of metabolic disorders, lifestyle modifications, and renal protective measures aimed at slowing the progression of kidney damage.

However, this study has several limitations. The single-center design and relatively limited sample size may impact the generalizability of the results. Furthermore, the study did not include dynamic assessment of NGAL levels, limiting the ability to analyze its prognostic significance. Given the identified patterns, multicenter prospective studies that include dynamic observation and assess the impact of therapeutic interventions on NGAL levels and nephropathy progression appear promising.

Thus, the results of the study confirm the diagnostic value of urinary NGAL as an early marker of nephropathy in patients with liver pathology and overweight and justify the feasibility of its further study and implementation in clinical practice.

Conclusions

1. In patients with liver disease and overweight, signs of early renal damage were detected with preserved traditional indicators of renal function (serum creatinine, estimated glomerular filtration rate).

2. The level of urinary neutrophil gelatinase-associated lipocalin (NGAL) in patients with liver disease and excess body weight was significantly higher compared to patients without excess body weight and practically healthy individuals, indicating the presence of preclinical tubular kidney damage.

3. A positive correlation was found between the level of urinary NGAL and obesity indicators (body mass index, waist circumference), as well as the insulin resistance index (HOMA-IR), which confirms the pathogenetic role of metabolic disorders in the development of early nephropathy.

4. The lack of a reliable association between urinary NGAL levels and traditional indicators of renal function highlights its independent and higher diagnostic value for identifying early stages of renal damage.

5. Urinary NGAL can be considered as an informative and promising marker for early screening of nephropathy in patients with liver pathology and overweight and can be recommended for inclusion in algorithms for early diagnosis and prevention of chronic kidney disease in this category of patients.

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**STOCHASTIC MODEL FOR FORECASTING ATMOSPHERIC
DROUGHT IN UZBEKISTAN
USING REGRESSION ON CHARACTERISTIC ROOTS**

Abstract. *This paper presents a one-month lead-time predictive model of atmospheric drought developed at the Scientific Research Hydrometeorological Institute. The model is based on a dynamic-stochastic approach to constructing a regression predictive equation. From the set of existing methods for constructing regression equations, the method based on the characteristic roots (eigenvalues) of the correlation matrix, including the predictand column and predictor columns (extended matrix) was applied.*

The standardized drought index SPI serves as the predictand, while the predictors are the average monthly precipitation for the 3 months preceding the forecast month, the average monthly value of variations in solar activity (Wolf numbers) and the average monthly value of the Southern Oscillation index for the month preceding the forecast.

The predictors were selected based on mutual correlation and applied time series analyses between the aridity index SPI and the indicated heliogeophysical values. The performed estimates of the investigated dependence of the aridity index SPI on the state of solar activity, the influence of El Niño (La Niña) and precipitation preceding the forecast date showed their high correlation.

Estimates of the accuracy of the SPI forecast with a monthly advance lead time for the territory of Uzbekistan, performed on an independent sample, were quite high, which was the basis for the introduction of this model into the operational work of the hydrometeorological service of Uzbekistan (Uzhydromet).

Keywords: *precipitation, Wolf numbers, Southern oscillation index, standardized aridity index SPI, correlation function, causality function, proper numbers, eigenvectors.*

Introduction

Atmospheric drought is a natural phenomenon characterized by abnormally low amount of precipitation and elevated temperatures [Khromov, Mamontova, 1974], manifested in various geographical regions across the globe, with an extremely uneven spatial distribution. The demand for the forecast of atmospheric drought is driven by the significant economic damage it inflicts, the considerable social consequences, and the frequent escalation into humanitarian disasters.

When developing a predictive model based on the construction of a regression equation, the key factors for its accuracy are, firstly, the stability of the resulting equation when transitioning to data on an independent sample and the optimal selection of predictors. The predictors included in the regression equation are determined primarily from physical considerations responsible for the dynamics of the predictand, supported by a statistical analysis of the dependence of the latter on the selected set of predictors.

It is important to choose a method for constructing a regression equation, in particular, when constructing multiple regression, which often yields low results on independent samples.

In this paper, the construction of a regression model is based on the use of the method of characteristic roots (eigenvalues) of the inverse correlation matrix of the predictand and predictors [Vuchkov, Boyadzhieva, Solakov, 1987; Draper, Smith, 1986].

The data used and the rationale for the selected predictors

The data used in this study comprises observed precipitation data from the Uzhydromet meteorological network for the period 1966-2023, covering 12 regional centers and the city of Tashkent. The average monthly precipitation values for each month of the year were derived from these data. The standardized index of aridity SPI [Lloyd-Hughes, Saunders, 2002], recommended by the World Meteorological Organization (WMO), as one of the most informative indices of the state of aridity (humidity) of the atmosphere [WMO, 2016] was calculated based on these data. The specified index in the developed model serves as the predictand. During the same period, the monthly average values of the Wolf numbers were entered into the generated database, which are freely available on the website (<http://www.kosmofizika.ru/spravka/spots.htm>) characterizing the dynamics of variations in solar activity. Additionally, average monthly values of the Southern Oscillation index (SOI), which are also freely available on the website <https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/data.csv>, were incorporated. The latter, along with precipitation data for the 3 months preceding the forecast period, are used as predictors in the model, but with a monthly delay, i.e. the month preceding the forecast month is selected from the database.

The Wolf Number (W) characterize the state of solar activity and is calculated as:

$$W = k(f + 10g), \quad (1)$$

where f - is the number of observed spots, g - is the number of observed groups of spots, and k - is a normalization coefficient.

Studies [Pokrovskaya, 1969, 1973; Pokrovskaya, Mandel, 1974] have established a significant influence of the year's position within the 11-year solar activity cycle on drought occurrence. However, the impact of solar activity variations on atmospheric conditions, particularly drought (wetness), varies across different geographic regions of the planet, even to the extent of a change in the sign of influence.

For instance, spring-summer droughts in the European territory, according to the catalog of N.G. Kamenkova [Pokrovskaya, 1969], occur on the ascending branch of solar activity, while droughts in Central Asia, taken from the catalog of A.S. Uteshev [Uteshev, 1965, 1972], are grouped on the descending branch of solar activity. For Central Asia, the ratio of droughts on the ascending branch to those on the descending branch is 1:11 in percentage terms. This relationship is clearly illustrated in Figure 1 by the cross-correlation function and the causality function [Arushanov, Korotaev, 1994; Arushanov, 2023] between the Wolf numbers and the *SPI* index as functions of time lag. In selecting predictors for constructing the regression equation, a crucial fact is that the causality function remains within the domain of normal causality for the entire range of time lags, meaning solar activity variations unequivocally influence drought variability in the specified region. Furthermore, the negative values of the cross-correlation function in the time lag range of ± 3 years confirm the inverse relationship between solar activity variations and the processes of drought formation.

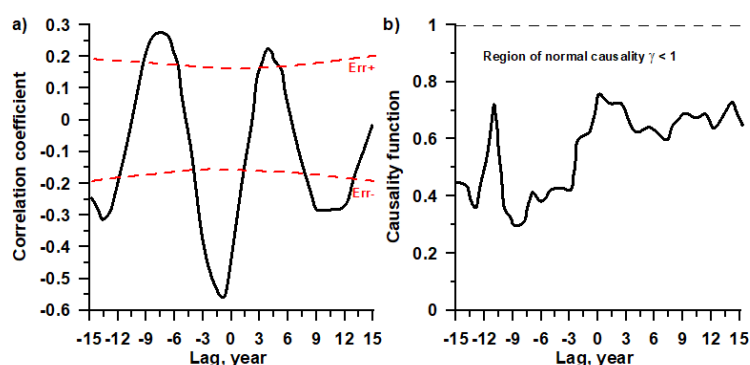


Fig. 1. Correlation function (a) and causality function (b) between Wolf numbers W and the aridity index SPI , as a function of time lag.

The Southern Oscillation index (SOI). The climate system is characterized by large-scale self-oscillatory processes, such as the Southern oscillation (redistribution of air masses in the low latitudes of the Southern Hemisphere between the Indian and Pacific Oceans - ENSO) and ocean fluctuations – El Niño (warm phase) and La Niña (cold phase).

A quantitative characteristic of the ENSO is the Southern Oscillation Index (*SOI*), introduced by G. Walker in 1924 [Walker, 1924]. The southern oscillation is an atmospheric component of air currents and represents fluctuations in air pressure

near the surface layer of the atmosphere between the waters of the eastern and western parts of the Pacific Ocean. The SOI is calculated based on the difference in surface air pressure between the area of Tahiti Island (French Polynesia) and Darwin (Australia), and is determined by the following relationships [Walker, 1924]:

$$SOI = \frac{P_T - P_D}{\sigma_{TD}},$$

$$P_T = \frac{P_T^{sur} - \bar{P}_T}{\sigma_T}, \quad P_D = \frac{P_D^{sur} - \bar{P}_D}{\sigma_D},$$

$$\sigma_T = \sqrt{\frac{\sum_{i=1}^N (P_{Ti}^{sur} - \bar{P}_T)^2}{N}}; \quad \sigma_D = \sqrt{\frac{\sum_{i=1}^N (P_{Di}^{sur} - \bar{P}_D)^2}{N}}; \quad \sigma_{TD} = \sqrt{\frac{\sum_{i=1}^N (P_{Ti}^{sur} - P_{Di}^{sur})^2}{N}}. \quad (2)$$

In (2), P_T^{sur} - is surface pressure at Tahiti point, P_D^{sur} - is surface pressure at Darwin point, $\bar{P}_T, \bar{P}_D$ - is average surface pressures over the base period in the corresponding points.

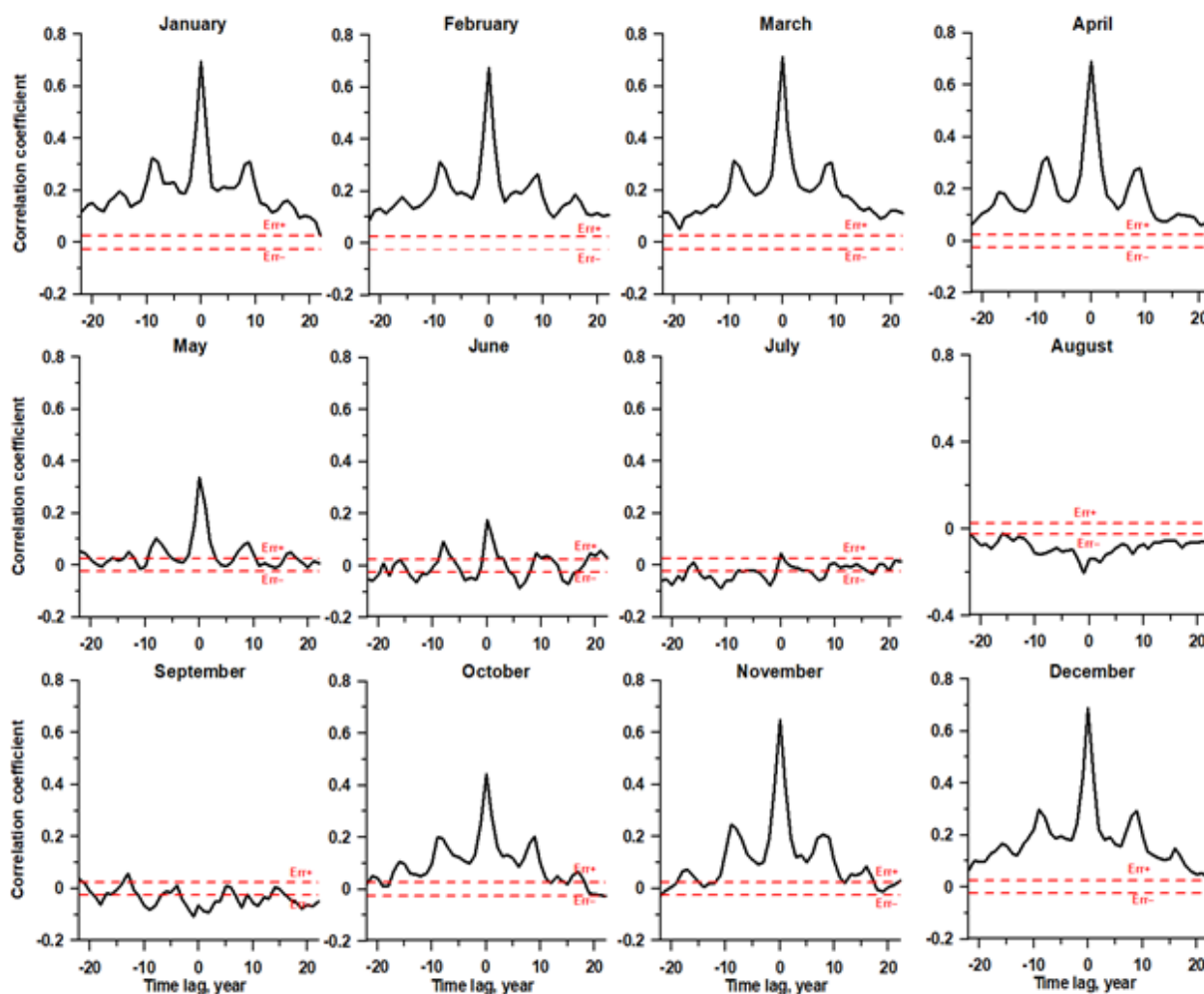


Fig. 2. Correlation functions between *SPI* and *SOI* as a function of time lag.

Figure 2 shows the cross-correlation functions between SPI and SOI for each month of the year in Uzbekistan. The influence of ENSO on atmospheric processes that stimulate aridity in the territory of Uzbekistan varies: it is less pronounced from June to September, and most significant during the cold period of the year.

1. Methods of analysis and construction of the regression equation

Construction of a predictive regression equation based on characteristic roots. The regression procedure on characteristic roots was developed by R. Webster, G. Hans and R. Mason [Webster, Guns, Mason] and independently of them by D. Hawkins [Hawkins, 1973]. This method is described in detail in [Arushanov, 2009; Vuchkov, Boyadzhieva, Solakov, 1987; Draper, Smith, 1986]. Following, for example, [Arushanov, 2009], we present an algorithm that implements the regression construction procedure on characteristic roots (eigenvalues).

The time series of predictors $F_i(t_j)$, $i=1, 2, \dots, 5$, $j=1, 2, \dots, N$ (precipitation for the three months preceding the forecast, Southern Oscillation index, and Wolf numbers) and predictand $Z_i(t_j)$ (SPI index) are standardized:

$$X_i(t_j) = \frac{F_i(t_j) - \bar{F}_i}{\sigma_{iF}}, Y_i(t_j) = \frac{Z_i(t_j) - \bar{Z}_i}{\sigma_{iZ}}, \quad (3)$$

where $\sigma_{iF} = \sqrt{\frac{1}{N} \sum_{j=1}^N (F_i(t_j) - \bar{F}_i)^2}$, $\sigma_{iZ} = \sqrt{\frac{1}{N} \sum_{j=1}^N (Z_i(t_j) - \bar{Z}_i)^2}$ is the mean square deviations; the top line is averaging. An extended matrix A of size $N \times (i+1)$ is constructed:

$$A = (Y, X) = \begin{pmatrix} Y_{11} & X_{11} & X_{21} & \dots & X_{i1} \\ Y_{12} & X_{12} & X_{22} & \dots & X_{i2} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ Y_{1N} & X_{1N} & X_{2N} & \dots & X_{iN} \end{pmatrix} \quad (4)$$

Having the matrix (4), the correlation matrix $R = (A^T A)^{-1}$ is calculated by the measure $(i+1) \times (i+1)$. The matrix R is a symmetric matrix with 1 diagonal:

$$R = \begin{pmatrix} 1 & R_{11} & R_{21} & \dots & R_{i1} \\ & 1 & R_{22} & \dots & R_{i2} \\ & & \vdots & \vdots & \vdots \\ & & & \dots & 1 \end{pmatrix} \quad (5)$$

The next step is to calculate the eigenvalues and eigenvectors of the correlation matrix (5) and arrange the eigenvectors in accordance with the

decreasing magnitude of the eigenvalues. The estimates of the regression coefficients a_j are based on the formula:

$$a_j = -\frac{c \sum_{m=1}^k v_{om} v_{jm}}{\lambda_m}, \quad j = 1, 2, \dots, k \quad (6)$$

where v_{om} - is the 1st eigenvector, v_m - are the subsequent eigenvectors arranged in descending order of eigenvalues λ_m , and c - is determined from the following expression:

$$c = \left(\sum_{m=1}^k (v_{om}^2) \lambda_m \right)^{-1} \times \sigma_z.$$

2. Numerical experiments

To conduct numerical experiments for one-month-ahead atmospheric drought forecasting, a database was used, consisting predictors: average monthly precipitation, the SOI, Wolf numbers and the predictand - calculated values of the SPI aridity index. The training sample period for all predictors and predictand was 50 years, and the independent (test) sample was 10 years. Forecasts using the model were calculated for 12 regional centers and Tashkent city.

As quantitative estimates of the accuracy of the forecast, the following were used:

➤ standard error: $\sigma_{for} = \frac{1}{N} \sum_{i=1}^N (SPI_{akt} - SPI_{for})^2 \quad (7)$

➤ maximum absolute error: $A_{max} = \max |SPI_{akt} - SPI_{for}| \quad (8)$

➤ sign agreement: $\rho = \frac{n_+ - n_-}{n}. \quad (9)$

In (7), (8) SPI_{akt} - is the actual value of the aridity index; SPI_{for} - is the prognostic value of the aridity index. In (9) n_+ - is the number of SPI values with matched signs, n_- - is the number of SPI values with non-matched signs, n - is the total number of cases.

Table 1 summarizes the quantitative assessment of the accuracy of one-month lead-time forecasts for the average monthly SPI, averaged across 13 locations according to formulas (7) - (9).

As follows from the estimates presented in the table, on average, the level of justification of the forecast for the parameter of atmospheric aridity with a month's advance is more than 80%, which is approaching the verification level of short-term forecasts, which currently holds the highest accuracy.

Average scores on all points (summary table)

Forecast month	Estimated parameter			
	$ \Delta_{max} $	ρ	$R_{\phi n}$	σ_{np}
January	1,152	0,886	0,771	0,383
February	1,085	0,954	0,818	0,246
March	0,741	0,980	0,881	0,154
April	1,588	0,913	0,787	0,376
May	2,091	0,812	0,703	0,556
June	2,038	0,692	0,664	0,579
July	1,768	0,793	0,661	0,471
August	1,399	0,791	0,736	0,367
September	1,414	0,771	0,736	0,413
October	2,184	0,665	0,629	0,644
November	1,803	0,852	0,742	0,543
December	1,859	0,874	0,654	0,585
Average	1,593	0,832	0,732	0,443

Conclusions

Overall, it can be stated that the presented assessments of the model, taking into account the monthly forecast lead time, can be considered sufficiently high, which made it possible to introduce this predictive model of atmospheric aridity into the operational work of the hydrometeorological service of Uzbekistan.

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KEY DRIVERS AND CHALLENGES IN IMPLEMENTING THE DIGITAL PRODUCT PASSPORT

Abstract: *The article examines the digital product passport (DPP) as a strategic digital infrastructure for enterprises under modern digital and circular economy conditions, and provides a systematic analysis of the internal and external factors driving its implementation, as well as the main barriers and risks. Based on the analysis of the European Union's regulatory and legal documents, as well as consulting and industry reports, the paper highlights the impact of DPP on digitalization, operational efficiency, competitive advantage, corporate reputation, and circular economy objectives. At the same time, it classifies key barriers such as problems of data interoperability and standardization, digitalization costs, shortages of technical and managerial skills, concerns related to data collection and security, and resistance to organizational change. The research findings show that DPP should be viewed as a core mechanism for transitioning to sustainability, transparency, and innovative business models, while its successful implementation requires the development of standardization, strengthening human capacity, and enhancing cooperation among stakeholders.*

Keywords: *digital product passport (DPP), circular economy, digital identification, sustainability, digital transformation, Industry 4.0, blockchain, supply chain transparency.*

Introduction

The digital product passport (DPP) is one of the key and distinctive tools in the European Union's sustainable development agenda to ensure the transition to a circular and climate-neutral economy. For this reason, it is envisaged as an integral part of the *Circular Economy Action Plan* (CEAP) and the *European Green Deal* initiative. The DPP approach implies a shift away from the traditional linear economic model toward a circular model in which every product is designed with a minimal environmental footprint and, at the end of its use phase, is conceived so that each component used in its production can be recovered.

CEAP notes that over the next 40 years, the consumption of materials such as fossil fuels, metals, and minerals is expected to double, while the volume of annual waste is projected to increase by 70 percent by 2050. Up to 80 percent of a product's environmental impact is determined at the design stage. However, the traditional linear model does not provide producers with incentives to make products suitable for reuse¹.

¹ Digital Product Passports: A Complete Guide. (2024, Agosto 23). <https://root.sustainability.com/blogs/digitalproduct-passport/>

Thus, the DPP is designed to bridge this gap by enabling the collection and sharing of precise data throughout the entire lifecycle of a product, supporting the monitoring and optimization of its sustainability. In a period of rapid change driven by digital transformation, the digital product passport is regarded as one of the key instruments. With the help of the DPP, technological and operational data on the entire lifecycle of a product are continuously tracked and consolidated into a single digital unit. Through integration with supply chain traceability systems, the DPP provides full visibility over the product's origin and characteristics, makes operational processes more transparent, and contributes to the formation of a responsible supply chain.

Literature review

In international research, the digital product passport (DPP) is interpreted as a central infrastructural element of digital transformation and the circular economy. Studies by Cikis Studio emphasize that the DPP, by integrating material and product flows into a single digital environment, helps to build a modern and competitive supply chain, optimize operational processes, and enable rapid adaptation to market changes².

Analyses by Deloitte, meanwhile, consider the introduction of the DPP as a strategic source of competitive advantage for companies: it not only strengthens corporate image and brand trust, but also helps attract customer segments that prioritize transparency and sustainability, and opens up new growth opportunities by facilitating access to market segments regulated or incentivized by sustainability standards. Thus, foreign sources assess the DPP as a comprehensive digital mechanism that unites transparency, sustainability, and competitiveness³.

Methodology

To analyze the drivers and barriers to implementing the digital product passport, a systematic literature review and content analysis were employed. Scientific articles, European Union documents, and reports from organizations such as Deloitte, McKinsey, GS1, and Cikis Studio were compared. Based on the obtained information, internal and external factors were grouped conceptually, and the impact of the DPP on digitalization, sustainability, and competitiveness, as well as the main implementation risks, were briefly synthesized.

Analysis and results

Strengthening cooperation between enterprises within the supply chain is one of the important dimensions of the DPP. Another advantage of the DPP is that it enhances transparency by providing accurate and verifiable information on the materials and production processes used by different actors. This, in turn, reduces uncertainties in resource use. Thanks to the detailed traceability it ensures,

² Digital product passport: Cos'è e perchè implementarlo. (s.d.). [urly.it/3141n2](https://www.cikisstudio.com/it/3141n2)

³ Digital Product Passports are just around the corner | Deloitte UK. (s.d.). <https://www.deloitte.com/uk/en/services/riskadvisory/perspectives/digital-product-passports-are-just-around-the-corner.html>

companies can optimize end-of-life product management, making it easier to channel products into recycling and material re-use.

The DPP is not merely a data collection system, but a catalyst that promotes corporate sustainability. Access to detailed information enables companies to continuously monitor the environmental impact of their products and to take measures to reduce greenhouse gas emissions and the use of non-renewable resources. With the help of the DPP, firms can calculate the carbon footprint for each product and implement corrective actions aimed at improving the energy efficiency of production processes. Such analysis also facilitates compliance with EU sustainability regulations, such as the European Green Deal and the Circular Economy Action Plan, which require responsible resource use and emission reduction.

In the context of globalization and an increasingly interconnected economy, the role of the DPP becomes even more strategically important. The ability to track products in detail and maintain reliable, verifiable information about them is crucial for ensuring the quality and safety of goods circulating at the international level. For example, in sectors such as electronics or textiles, where supply chains are highly complex, the DPP helps ensure that products meet the quality and sustainability standards required by different markets.

The DPP is integrated with Industry 4.0 technologies such as blockchain and decentralized identifiers (DID), which ensures data security and operational efficiency. When applied to supply chains, blockchain makes it possible to create tamper-proof chains of certificates in which product information can be verified and exchanged among supply chain participants. This system not only reduces the likelihood of fraud, but also guarantees the integrity and immutability of data over time. Owing to these characteristics, the DPP proves to be an indispensable tool for ensuring sustainability, transparency, and competitiveness for companies operating in an Industry 4.0 environment.

The figure 1 illustrates how a garment is linked to its DPP. The QR code on the product label is scanned with a smartphone, giving the consumer access to detailed information on the product's origin, composition, production process, and environmental indicators.



Figure 1. QR-enabled access to DPP.

In recent years, due to new environmental requirements that make sustainable operations mandatory, sustainability has become a strategic priority for businesses. Europe is leading this transformation and, through the Circular Economy Action Plan, is encouraging companies to introduce digital product passports to increase product transparency and sustainability.

The Eco-design for Sustainable Products Regulation (ESPR) is a key pillar of this regulatory framework. While other directives merely recommended the introduction of digital product passports, the ESPR makes the DPP mandatory for certain categories of products. Therefore, for companies dealing with regulated products, the digital product passport becomes a critical instrument for complying with regulatory requirements. By providing structured data, companies not only meet legal obligations, but also position themselves as responsible and competitive brands.

The introduction of the digital product passport is determined by a set of strategic factors that demonstrate how important this system is for enterprises and organizations. These factors represent the main motivations for implementing this digital tool aimed at promoting transparency, sustainability, and innovation. They can be grouped into two broad categories:

1. Internal factors – related to in-company processes and objectives, including improving operational efficiency, enhancing internal management, and building competitive advantage.

2. External factors – stemming from regulatory requirements, consumer expectations, and market trends.

Identifying and understanding these factors in depth is crucial for designing a successful transition strategy toward the DPP. By taking into account internal and external needs and pressures, organizations can develop strategies that not only meet regulatory requirements but also generate significant economic and environmental benefits. This, in turn, allows enterprises to remain competitive and profitable in a rapidly evolving global economy. An expanded analysis of these factors makes it possible to view the DPP as a strong catalyst for long-term innovation and growth.

The digital product passport is one of the main pillars of digital transformation for companies. By implementing the DPP, enterprises can simplify information management throughout the entire supply chain, increase operational efficiency, and enhance transparency. The DPP creates a unified and standardized database of information on materials, processes, and products, to which different supply chain participants can gain access. At the same time, it reduces errors and system interruptions and helps integrate new technologies such as artificial intelligence and predictive analytics into the organization.

Companies that implement the DPP position themselves as actors committed to sustainability, which today has become a more important factor in consumer purchasing decisions than ever before. As the importance of sustainable practices grows – especially in product selection – the DPP serves as a key source of competitive differentiation. It not only strengthens corporate image but also builds trust among customer segments that prioritize transparency and sustainability. In

addition, the DPP facilitates access to market segments that are regulated or incentivized on the basis of sustainability standards, thereby expanding growth opportunities in strategic sectors. In markets where sustainability has become a primary selection criterion, the DPP remains a strategic tool for attracting new customer groups and strengthening the loyalty of existing customers.

Introducing the DPP demonstrates a company's strong commitment to sustainability and transparency and significantly improves its brand image. This tool provides tangible evidence of corporate social responsibility. Such an approach is increasingly valued not only by consumers but also by investors and other stakeholders. The use of DPP increases transparency and trust among strategic partners and customers, contributing to a positive perception of the company within the industry. Moreover, firms that implement DPP can obtain various sustainability certificates and awards, further enhancing their visibility and attractiveness in the marketplace. A strengthened image can, in the long term, turn into a sustainable competitive advantage, positively affecting brand value and customer loyalty.

EU documents such as the European Green Deal are accelerating the transition toward a sustainable economic model. These regulations require firms to comply with increasingly stringent standards and are turning the digital product passport into a necessary tool for ensuring regulatory compliance and anticipating future requirements. At the same time, the DPP provides a significant competitive advantage in a rapidly changing market environment. Companies that follow sustainability standards present themselves as forward-looking and sustainability-oriented actors and thus become particularly attractive to environmentally conscious consumers and investors. The DPP simplifies the integration of sustainability requirements into operational processes and creates a clear information system for tracking and fulfilling environmental obligations.

Growing consumer demand for clear and understandable information on product origin, composition, and sustainability is one of the main external drivers of DPP implementation. Sectors such as fashion and electronics are especially affected by this trend. Consumers increasingly prefer brands that provide transparency and regard it as one of the main criteria in their purchasing decisions. The DPP enables companies to present detailed information on the entire life cycle of a product, including its environmental footprint. Such transparency strengthens customer loyalty and helps brands stand out in highly competitive markets. By implementing DPP, companies can build trust, create more personalized and engaging consumer experiences, and align themselves with broader sustainability goals.

The digital product passport plays a central role in the transition to a circular economy by promoting recycling, re-use, and repairability. According to the European Circular Economy Platform, the introduction of DPP improves end-of-life product management, reduces disposal costs, and optimizes the use of raw materials. This approach directly contributes to emission reductions.

By providing detailed information on materials and components, the DPP enables stakeholders to consciously choose the most appropriate ways to re-use or

recycle products. It also supports the development of innovative business models such as “product-as-a-service”, in which companies retain ownership of materials and ensure their efficient recovery. Such alignment with circular economy principles not only benefits the environment but also enhances resource efficiency and opens new market opportunities, helping enterprises succeed in a sustainability-oriented economy.

The factors driving the implementation of DPP show that the system’s innovation and improvement potential covers various dimensions of business and market development. Companies that actively adopt DPP not only adapt to sustainability requirements but also consolidate their position as leaders in innovation, transparency, and circular economy practices. In the current context of intensifying environmental and social challenges, DPP acts as a “bridging link” for future business models, enabling greener and more resource-efficient approaches in certain industries, revisiting production cycles, and contributing to a more sustainable and resilient global economy.

At the implementation stage, the DPP as a strategic tool faces a number of initial challenges. These barriers are linked to both internal and external factors, and their combined impact significantly complicates the process of adopting the DPP (Figure 2). In the internal context, enterprises may encounter obstacles related to their level of preparedness to adopt the solution, as well as the adequacy of technical infrastructure and available resources. On the external side, relationships with suppliers, legal and regulatory requirements, and customer resistance emerge as key constraining factors. Effectively addressing these issues is essential for the gradual and full integration of the DPP into the business environment and for aligning it with future sustainability objectives, new regulations, and market expectations. Overcoming these barriers not only supports compliance with formal requirements, but also helps transform enterprises into exemplars of transparency and innovation in a globally competitive landscape.

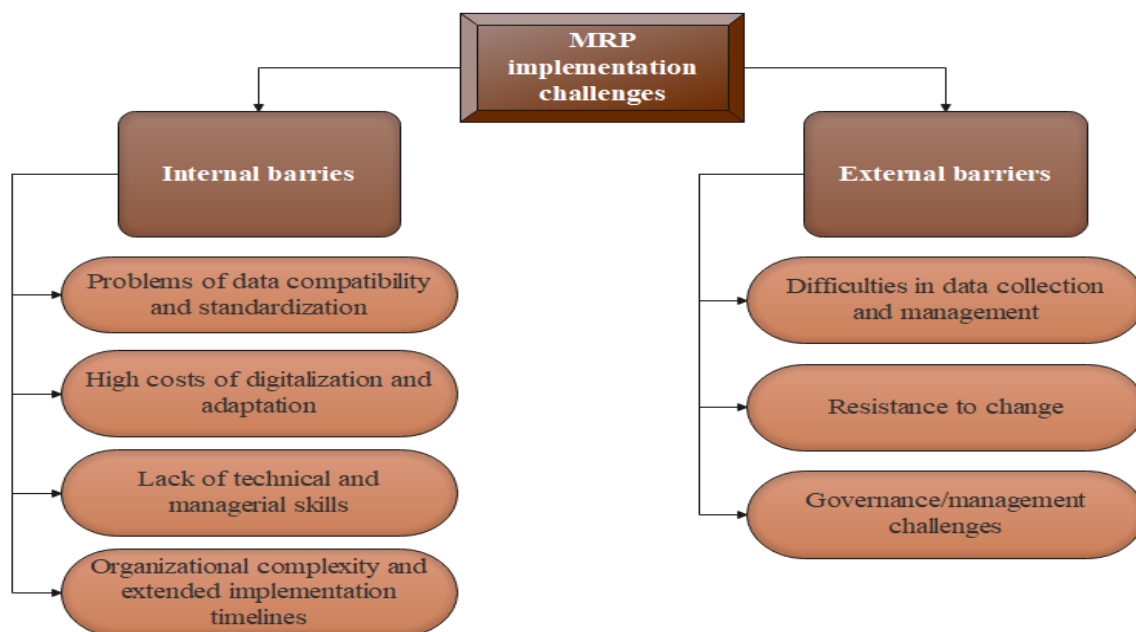


Figure 2. Challenges in implementing the digital product passport.

The lack of unified international standards seriously limits large-scale implementation of the DPP. Organizations face difficulties in ensuring data compatibility between different systems and industries. This challenge requires significant investment in standardization initiatives, including the development of protocols that harmonize data formats and communication interfaces. The EU's Digital Transformation Framework shows that the absence of agreement on data standards complicates cross-border operations and restricts collaboration along supply chains. If this gap is not closed, companies risk creating fragmented and poorly connected systems, which ultimately reduces the effectiveness of the DPP.

Transitioning to the DPP requires investment in advanced digital tools such as blockchain, IoT, and traceability systems. These technologies involve costs for software, hardware, and qualified personnel, which can become a substantial financial burden, especially for small and medium-sized enterprises. The need to integrate new systems and adapt existing infrastructure further increases economic pressure on companies. Finding a balance between long-term benefits and short-term costs is a serious challenge, particularly in sectors with narrow profit margins.

Effective implementation of the DPP is highly dependent on the availability of staff with sufficient expertise in data management, IT systems, and supply chain coordination. However, many organizations report skill gaps precisely in these areas. This shortcoming limits their ability to manage complex digital systems and fully exploit the potential of the DPP. Training programmes and capacity-building initiatives are needed, but they require both time and resources, which further complicates the process. Bridging this gap demands attention not only to technical training but also to organizational change management.

Integrating the DPP requires broad organizational change, including stronger internal coordination, redesign of business processes, expanded cross-departmental collaboration, and staff training. For companies with global or deeply networked

supply chains, such adaptation can require considerable time and resources. Prolonged implementation periods may lead to strategic misalignment and a loss of pace and motivation in the project. According to the World Economic Forum, many companies underestimate the complexity of such transformation processes, which results in delays and suboptimal execution⁴.

The extensive data required by the DPP – detailed information on raw materials, components, and production processes – is challenging to collect and manage on a unified platform. Gathering accurate and complete data from suppliers around the world is particularly difficult when working with supply chains located in developing countries. Research by GS1 shows that upstream suppliers are often insufficiently transparent, which raises concerns about the completeness and accuracy of the data⁵.

Internal resistance – including employee scepticism and reluctance to share confidential product information – is one of the major barriers to DPP implementation. Concerns about data security, protection of intellectual property, and the potential misuse of shared information intensify this resistance. Building a culture of openness, demonstrating the strategic value of the DPP with practical examples, and clearly explaining its benefits to stakeholders are crucial to overcoming these issues. Otherwise, the implementation process may be prolonged and stakeholder engagement may decline.

Conclusion

These challenges associated with implementing the DPP clearly reflect the complexity of transitioning to a more transparent and sustainable operational environment. Enterprises must address skill shortages, internal resistance to change, and issues of interoperability and data collection gradually and systematically. If these barriers are ignored, the potential benefits of the DPP across the entire value chain will not be fully realized. Conversely, overcoming them through targeted training, standardization, and active engagement with stakeholders will allow companies not only to adapt to new requirements and standards, but also to become leading actors that reshape the market in the direction of sustainability and innovation.

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KICHIK ZAHIRALI GAZ KONDENSATI KONLARINI GAZ KONDENSATI BO'YICHA TADQIQ ETISH TEXNOLOGIYASI

***Annotatsiya:** O'zbekistondagi mavjud bo'lgan kichik zahirali gaz kondensati konlarini gaz kondensati bo'yicha tadqiq etish hozirgi vaqtda dolzarb bo'lib hisoblanadi. O'zbekistondagi mavjud gigant va katta zahirali konlar so'nish bosqichiga yetib kelganligi sababli, kichik zahirali gaz kondensati konlarini o'zlashtirish hozirgi kunning asosiy talabi hisoblanadi. Konlarni gaz-kondensatlikka o'rganish gaz va kondensat zaxiralarini hisoblash, konlarni qazish va jihozlashni loyihalashtirish hamda kondensatni qayta ishlash uchun boshlang'ich bo'lgan parametrlar va ko'rsatkichlarni aniqlash maqsadida amalga oshiriladi.*

***Kalit so'zlar:** kichik zahirali gaz kondensati konlari, konlarni qazish, tadqiq qilish, debit, quduqlar, konlar, qatlamlar, jinslar, kollektor, quduq tubi, gazogidrodinamik tadqiqotlar, mahsuldor qatlamlar, gaz, kondensat, deformatsiya, g'ovaklilik.*

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TECHNOLOGY OF RESEARCH OF GAS CONDENSATE FIELDS WITH SMALL RESERVES

***Abstract:** The study of gas condensate fields with small reserves in Uzbekistan is currently relevant. Since the existing giant and large reserves in Uzbekistan have reached the stage of depletion, the development of gas condensate fields with small reserves is the main requirement of the present day. The study of fields for gas condensate is carried out in order to calculate gas and condensate reserves, design field drilling and equipment, and determine the initial parameters and indicators for condensate processing.*

***Keywords:** small-reserve gas condensate fields, field exploration, flow, wells, fields, layers, rocks, collector, well bottom, gas-hydrodynamic studies, productive layers, gas, condensate, deformation, porosity.*

Hozirgi vaqtda gaz-kondensat tizimining parametrlarini aniqlash bir necha usulda amalga oshirilmoqda. «VNIIGaz» tomonidan ishlab chiqilgan va

yo'riqnoma sifatida tavsiya etilgan quduqlarni gaz kondensatligiga tekshirish metodikasi eng keng tarqaldi.

Shu paytgacha ishlab chiqilgan gaz kondensatligini tadqiq qilish usullari va amaldagi yo'riqnomalar quyidagi shartlarda sifatli axborot olish imkonini bermayapti. Kollektorlik xossalari past bo'lgan konlarda gaz kondensati tavsifini aniqlash, bu esa qatlama sezilarli depressiyalarni, bosim va debitning barqarorlashuvining uzoq davrlarini hamda suyuqlikning quduq tubidan chiqarilishi yomonlashuvini keltirib chiqaradi.

Kichik termostatlanadigan separatsiya qurilmasi bilan birgalikda kon ishlarida mavjud yer usti qurilmalaridan foydalaniladi.

Quduq qazib olishda korroziya va gidrat hosil bo'lish ingibitorlari mavjud bo'lganda gaz kondensatining xususiyatlarini aniqlanadi. Atrof muhitni muhofaza qilish va tabiiy resurslardan, shuningdek tadqiqot ishlariga mablag'lardan oqilona foydalanish maqsadida gaz kondensati bo'yicha tekshirish muddatini qisqartirish zarur.

Gaz kondensatligini tekshirishning barcha usullari bosim va debitni tezda barqarorlashtiradigan nisbatan yuqori debitli quduqlar uchun maqbuldir. Ushbu usullarning printsiplial farqi gaz kondensati bo'yicha sanoat tadqiqotlarida gaz kondensat aralashmasi fazalariga bo'linadigan miqdordan iborat.

Eng ko'p qo'llaniladigan VPIIGaz metodikasi quduqni bir, ikki kunlik shamollatishdan so'ng sanoat separatorlaridagi butun oqimni fazalarga ajratishni talab qiladi, bu esa suyuqlikni quduqdan chiqarishni barqarorlashtirish va quduqdan gazni qisman ajratib olishda olinadigan natijalar sifatiga ta'sir etuvchi quvurning kesimi bo'yicha fazalarning notekis taqsimlanishiga yo'l qo'ymaslik imkonini beradi. Keyinchalik samarali va aniq usullarning yo'qligi, ushbu uskunaning murakkabligi va noqulayligiga qaramay, ushbu texnikadan foydalanishga majbur qiladi.

Shu bois gazkondensatlikni tekshirishning boshqa usullarini izlash asosan tadqiqot qiluvchi apparatlarining soddaroq konstruksiyalarini talab qiladigan usullarni ishlab chiqishga qaratilgan edi. Kondensat yo'qotilishi bilan bog'liq masalalar, kuchsiz gaz kondensat tizimlari, uzoq vaqt barqarorlashadigan past mahsuldor qatlamlar, ingibitorlar mavjudligi va boshqalarni tadqiq etish bugungi kunda ham hal etilmagan. Buning sababi - gaz kondensatligini tekshirishning yangi usullarini qidirishda yer osti gaz gidrodinamikasi, fazaviy o'zgarishlarga ega ikki fazali aralashmalarning quvur gidravlikasi va gaz kondensatli tizimlarni o'rganish kabi sohalar bilan qat'iy bog'liqlikning yo'qligi.

Gaz kondensati tadqiqotining barcha usullari zahirida quvurning kesimi bo'yicha fazalarning notekis taqsimlanishi yotadi.

Usullardan biri, oqimning kichik qismini yig'ish joyidan oldin aralashtirgich o'rnatilgan bo'lsa, kesim bo'ylab fazalarning notekis taqsimlanishini bartaraf etish mumkinligini nazarda tutadi.

Shunda oqimning bir xilligini ta'minlaydigan aralashtirgichdan keyin sanoat separatoridagi barcha oqimni fazalarga bo'lish va kichik termostatsiyalanadigan qurilmada gaz kondensatligini tadqiq qilishning zarurati yo'q.

SredAzNII-Gaz tomonidan taklif etilgan gazkondensat bo'yicha tadqiqot qilish metodikasi uchyoqlar kesishmasidagi oqimning suyuq fazasi kondensatining tarkibi (shtuserdan oldin va keyin) ularning tindirgichlaridagi kondensatlar bilan tavsiflanishiga asoslanadi. Kondensatning ikki fazali oqimdagi shtusergacha solishtirma miqdorini aniqlash uchun ikkita bir jinsli suyuqliklarni aralashtirish formulasidan foydalanish mumkin.

Ushbu metodikadan foydalanish uchun quduqlardan tashlanadigan tizmada o'rtasida shtuser o'rnatiladigan ikkita uchyoq o'rnatish zarur. Shtuserdan oldin kapillyar tizma uchun kichik termostatsiyalanadigan separatsiya qurilmasiga ajratish nazarda tutilgan bo'lishi kerak. Shtuserdan keyin uchyoq orqasida kritik oqim diafragmali o'lchagich (DIKT) o'rnatiladi. Barqaror kondensatning solishtirma miqdori shtusergacha va undan keyin uchyoq tindirgichlaridagi kondensatning o'lchangan zichligi hamda kichik termostatsiyalanadigan separatsiya qurilmasidan keyin barqaror kondensatning solishtirma miqdori va uning zichligi bo'yicha hisoblanadi. Ushbu metodika quyidagi omillar tufayli keng qo'llanilmayapti:

Aralashmaning solishtirma miqdorining shtusergacha va kichik termostatsiyalanadigan qurilmalargacha uchyoqlarda olinadigan kondensatlar miqdori yig'indisiga tengligi to'g'risidagi termodinamik shart qabul qilinishi mumkin emas, chunki qatlamli aralashmaning bir bosqichda kondensatsiyalanishidan olinadigan kondensatning miqdori har doim ikki bosqichdan ko'proq kondensatlanganidan ko'p bo'ladi. Shtuserdan oldin va keyin va kichik termostatlanadigan qurilmada zichlikni aniqlashda yo'l qo'yiladigan xatolar jiddiy xatolarga olib kelishi mumkin.

Kondensatlarning shtusergacha va undan keyingi namunalari o'lchash uzellaridagi harorat o'rtasidagi farq tufayli tarkibi bo'yicha farq qiladi.

Yuqorida sanab o'tilgan usullardan keyinchalik batafsil ko'rib chiqiladigan butun oqimni fazalarga bo'lish metodikasi bundan mustasno, aralashmani qo'llash usuli eng maqbuldir. Kondensatlarning shtusergacha va undan keyingi namunalari o'lchash uzellaridagi harorat o'rtasidagi farq tufayli tarkibi bo'yicha farq qiladi.

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O'ZBEKISTON TEMIR YO'LLARIDA INVESTITSIYA ZAXIRALARI BOSHQARUVI HAMDA INVESTITSION RIVOJLANISH IMKONIYATLARINI O'RGANISH

Annotatsiya: *Ushbu tadqiqotda transport sohasi avtomobil, temir yo'l, havo va suv transportlari bo'yicha o'rganiladi. Ularning har birining o'rni, yuk tashish imkoniyatlari, hajmi, xizmat ko'rsatish infrastrukturallari hamda tabiiy-geografik, iqtisodiy-ijtimoiy omillari tahlil qilinadi. Xususan, temir yo'l transporti mamlakatimizda o'ziga xos tarix va an'anaga ega transport sohasi sifatida taraqqiy etib kelmoqda.*

Kalit so'zlar: *transport, temir yo'l transporti, transport geografiyasi, yuk tashish imkoniyatlari, transport infratuzilmasi, iqtisodiy-ijtimoiy omillar.*

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STUDY OF INVESTMENT RESERVES MANAGEMENT AND INVESTMENT DEVELOPMENT OPPORTUNITIES IN UZBEKISTAN RAILWAYS

Abstract: *In this study, the transport sector is examined across road, railway, air, and water transport. The role of each mode, their cargo transportation capabilities and volumes, service infrastructures, as well as natural-geographical and socio-economic factors are analyzed. In particular, railway transport has been developing in our country as a transport sector with its own unique history and tradition.*

Keywords: *transport, railway transport, transport geography, cargo transportation capabilities, transport infrastructure, socio-economic factors.*

KIRISH

Investitsiyalar har qanday mamlakat iqtisodiyotini rivojlantirishda muhim o'rin egallaydi. Bozor iqtisodiyoti sharoitida mamlakat iqtisodiyotiga xorijiy investitsiyalarning jalb etish va dunyo bozorida o'z mavqeiga ega bo'lishini ta'minlashda muhim ahamiyat kasb etadi. "2023 yilda dunyo bo'ylab to'g'ridan-

to'g'ri xorijiy investitsiyalar 2 foizga kamayib, 1,3 trln. dollarni tashkil etdi, eng past rivojlanayotgan mamlakatlarda moliyaviy oqimlar esa biroz oshdi. Bu haqda Birlashgan Millatlar Tashkilotining savdo va taraqqiyot idorasi (UN Trade and development) tomonidan e'lon qilingan xalqaro investitsiyalar bo'yicha yangi hisobotda aytilgan"². Ushbu tendensiya mamlakatlarning investitsion salohiyati zaiflashuvi bilan bog'liq bo'lib, ayni paytda ular investitsion faoliyatni barqarorlik ko'rsatkichlari orqali boshqarish, erkin iqtisodiy zonalar faoliyatini kengaytirish va resurs salohiyatidan samarali foydalanish asosida qulay investitsion muhit yaratish asosiy vazifalardan bo'lib kelmoqda.

Jahon miqyosida temir yo'l transportining rivojlanishidagi zamonaviy tendensiyalar sanoatning sarmoyaviy jozibadorligi iqtisodiyotning real sektori faoliyatining asosiy ko'rsatkichlarining, birinchi navbatda, ishlab chiqarish va qurilish bilan bog'liq bo'lgan sharoitda shakllanadi. Davom etayotgan tarkibiy o'zgarishlar pul oqimlarining yirik infratuzilma loyihalariga yo'naltirilishi bilan tavsiflanadi, ularning amalga oshirilishi alohida mintaqaviy subyektlarning ham, butun mamlakatning ham ijtimoiy-iqtisodiy rivojlanishi uchun strategik ahamiyatga ega. Shu munosabat bilan milliy iqtisodiyot taraqqiyotining strategik omili sifatida temir yo'l transportining moddiy-texnik bazasini yangilash va modernizatsiya qilishni kengaytirish jarayonlarini maqsadli iqtisodiy tartibga solish va tarmoq investitsiya siyosatini rivojlantirish bo'yicha ilmiy tadqiqot ishlari olib borilmoqda.

O'zbekistonda o'zaro manfaatli tashqi iqtisodiy munosabatlarni yo'lga qo'yilishi va rivojlangan mamlakatlar tajribasidan foydalangan holda doimiy ravishda chet el sarmoyalarini jalb etish inobatga olingan. Shuning uchun ham O'zbekiston Prezidenti Shavkat Mirziyoyev "O'zbekiston qulay va zamonaviy transport tizimlarini yaratishga intilmoqda. Xususan, temir yo'l sohasida tub islohotlar olib borilmoqda. "Xitoy-Qirg'iziston-O'zbekiston" hamda "O'zbekiston-Afg'oniston-Pokiston" xalqaro temir yo'llarini qurish bo'yicha strategik loyihalar mintaqadagi geoiqtisodiy vaziyatni butunlay o'zgartirib, Markaziy Osiyoni Shimol va Janub, Sharq va G'arb bilan bog'laydigan global tranzit markaziga aylantiradi" degan vazifalarni belgilab berilgan. Buning natijasida barcha tarmoqlar va hududlarda investitsiya muhiti yaxshilanadi va to'g'ridan-to'g'ri xorijiy investitsiyalarni jalb etish va o'zlashtirish yanada oshadi.

O'zbekiston Respublikasi Prezidentining 2018 yildagi 16 iyul PQ-3857-son "Xalqaro moliya institutlari va xorijiy hukumat moliya tashkilotlari ishtirokidagi loyihalarni tayyorlash va amalga oshirish samaradorligini yanada oshirish chora-tadbirlari to'g'risida" qarori, 2019 yildagi 25 dekabr O'RQ-598-son, "Investitsiyalar va investitsiya faoliyati to'g'risida" O'zbekiston Respublikasining Qonuni, 2022 yildagi 30 dekabr PQ-465-son "2023 - 2025 yillarda O'zbekiston Respublikasining ijtimoiy va ishlab chiqarish infratuzilmasini rivojlantirish chora-tadbirlari to'g'risida" qarori, 2022 yildagi 25 iyul PQ -332-son "Investitsiyaviy va infratuzilmaviy loyihalarning loyihaoldi, davlat xaridiga doir tender bo'yicha xarid

qilish hujjatlari va texnik topshiriqlar hamda shartnomalarni ekspertizadan o'tkazish tartibini yanada takomillashtirish chora-tadbirlari to'g'risida" qarori, 2005 yildagi 11 aprel PF-3594- son "To'g'ridan-to'g'ri xususiy xorijiy investitsiyalarni jalb etishni rag'batlantirish borasidagi qo'shimcha chora-tadbirlar to'g'risida" farmoni shuningdek xorijiy investitsiya jalb qilinishi mazkur mamlakatlarning yuksak darajada taraqqiy etishida hamda boshqa me'yoriy-huquqiy hujjatlarda belgilangan vazifalarni amalga oshirish xamda korxonalarda mavjud investitsiyalarni zaxiralash borasida mazkur dissertatsiya tadqiqoti muayyan darajada xizmat qiladi.

METODOLOGIYA

Investitsiyalar iqtisodiyot fanining eng muhim kategoriyalaridan biri bo'lgani uchun ham ilmiy va tahliliy adabiyotlarda turli jihatdan yondashib o'tkazilgan tadqiqotlar juda ko'p. Iqtisodiyot bo'yicha Nobel mukofoti laureatlari: Robert Solou, Tyalling Kupmans, Pol Samuelson, Kennet Errou, Piter Daymond, Robert Lukas, Pol Romerlar o'z tadqiqotlarida barqaror iqtisodiy o'sishning tashqi omillari, kapitalning umumiy zaxirasi va bilimlar (ingl. knowledge spillover) natijasi, qaytimi evaziga barqaror iqtisodiy o'sish imkoniyatlarini ko'rsatib berganlar.

Ularni eng avvalo ikki katta guruhga: mikro va makro darajadagi talqiqotlarga bo'lish mumkin. Investitsiyalarni turli jihatdan tadqiq etilgan ilmiy va amaliy ishlar rang-barang. Iqtisodiy fikrlar evolyusiyasi jarayonida uning turli jihatlariga e'tibor berilishi natijasida institusional muhit o'zgarib, muvofiq ravishda mukammallashib boradi. Fransuz iqtisodchisi Per Masse investitsiya samaradorligini aniqlash masalalarini o'rganishga diqqat qaratib, investitsion loyihalarni baholashda ikki mezon NPV (Net Profit Value) diskontlangan foyda summasi va IRR - foydaning ichki normasini taqqoslash asosida NPV ko'rsatkichiga ustunlik beradi va undan qator taniqli iqtisodchilar investitsiyalarni baholashda foydalanishganini ko'rsatadi. Kapital qo'yilmalar turli variantlarini ularning diskontlangan umumiy foyda qiymatiga qarab tartibga solish jarayonini I.Fisher, J.M.Keyns, J.R.Xiks, P.Samuelsonlarning ilmiy ishlaridan foydalanilgan holda o'rganilgan. Boshqa mualliflar Byom Baverk, Vikzell, G.Akerman, F.X. Nayt, K.E.Boulding, F.A.Xayek ishida samaradorlikni ichki mezonlari foydalanilgan, deya, o'z kitobida jamoat manfaatlarini hisobga olish zaruratidan kelib chiqib, diskontlangan foyda summasi (NPV) mezonini afzal ko'rganini ta'kidlaydi ³.

M.A.Shneps-Shneppenning ilmiy izlanishi investitsiyalarning samaradorligini baholash usullarini o'rganishga bag'ishlangan bo'lib, u raqamli iqtisodiyot milliy dasturini ishlab chiqish bilan bog'liq holda investitsiyalar samaradorligini o'lchash yondashuvini yaratishni maqsad qilgan. Bu metod investitsiyaning kelajakdagi pul oqimlarining hozirgi qiymatini hisoblash orqali uning foydaliligini baholaydi.

Agar NPV musbat bo'lsa, investitsiya foydali hisoblanadi. IRR (Internal Rate of Return) bilan taqqoslash asosida ikki metodni baholaydi. Jahon iqtisodiy adabiyotiga asoslanib, Shneps-Shneppen frantsuz iqtisodchisi Per Massening NPV mezonining IRRdan ustunligi haqidagi tavsiyalarining asossizligini ko'rsatadi.

"Investitsiyalar - bu foyda (daromad) olish maqsadida tadbirkorlik faoliyatiga yo'naltirilgan, investorning o'z yoki qarzga olingan kapitalini sarflash jarayonidir"

Bu ta'rifda investitsiyalarning asosiy maqsadi foyda olishga qaratilganligi va kapitalning qanday yo'naltirilishi haqida gapiriladi⁴.

G'arb manbalarida investitsiyalarni aniqlashda bir nechta asosiy yondashuvlar mavjud. Ba'zi mualliflar investitsiyalarni kelajakdagi daromad olish maqsadida hozirgi vaqtda ma'lum bir qiymatdan voz kechish sifatida ta'riflaydilar. Boshqa tomondan, investitsiyalar ostida uzoq muddatli investitsiyalar va qarzga olingan kapitalni o'z ichiga olgan xarajatlar to'plami tushuniladi. M.Gitman va

L. Jonkaning fundamental ishlarida investitsiyalar, kapital qiymatini saqlash yoki oshirishni ta'minlash va (yoki) ijobiy daromad olishni maqsad qilgan kapitalni joylashtirish usuli sifatida ko'rib chiqiladi⁵.

Bizning fikrimizcha, bir qator mualliflarning ta'riflari investitsiyalarni bir martalik sarf-xarajatlar yoki daromad olish maqsadida amalga oshirilgan bir martalik avans sifatida belgilaydi. Biroq, daromad investitsiya faoliyati jarayonida bosqichma-bosqich olinadi, ya'ni u darhol emas, balki investitsiya resurslari kapital aylanmasining barcha bosqichlaridan o'tgach paydo bo'ladi. Bu jarayon davomida investitsiya resurslari ishlab chiqarish va iqtisodiy faoliyatning turli bosqichlarida foydalaniladi.

Ko'pgina ta'riflar investitsiyalar uzoq muddatli bo'lishini ta'kidlaydi. Albatta, ba'zi investitsiya shakllari (masalan, kapital qo'yilmalar, aktsiyalarga investitsiyalar va boshqalar) uzoq muddatli hisoblanadi. Biroq, investitsiyalar qisqa muddatli ham bo'lishi mumkin, masalan, obligatsiyalarga qisqa muddatli moliyaviy investitsiyalar yoki muomala muddati bir yilgacha bo'lgan depozit sertifikatlar kabi vositalar. Shunday qilib, investitsiyalarning muddatiga qarab ularning turli shakllari mavjud.

Taniqli iqtisodchi olimlardan U.Sharp ham investitsiya faoliyatini fond bozori orqali moliyalashtirish mexanizmiga alohida e'tibor qaratadi. Uning fikriga ko'ra, qimmatli qog'ozlarning daromadliligi va riskliligi o'rtasidagi to'g'ridan-to'g'ri aloqaga ega bo'lgan oqilona strategiya investitsion faoliyatni moliyalashtirishning asosi hisoblanadi. Moliyaviy vositachilar (tijorat banklari, jamg'arma va kredit uyushmalari, kredit ittifoqlari, sug'urta kompaniyalari, o'zaro yordam fondlari, pensiya fondlari) esa, korporatsiyalarni fond bozoridan qo'shimcha mablag'lar jalb qilish imkoniyatini bilvosita ta'minlaydi⁶.

Y.Mirkinning fond bozori orqali investitsion faoliyatni moliyalashtirish mexanizmi haqidagi fikri alohida ilmiy va amaliy ahamiyatga ega. Uning ta'kidlashicha, fond bozori investitsion jarayonlarni moliyalashtirishda muhim rol o'ynaydi va bu mexanizm iqtisodiy tizimning samarali ishlashini ta'minlashda katta ahamiyat kasb etadi.

Buning boisi shundaki, ko'pchilik MDH mamlakatlarida korporativ aksiya va obligatsiyalarga qilinadigan investitsiyalarning risk darajasi yuqoriligi va investorlar ishonchining pastligi fond bozorining rivojlanishiga to'sqinlik qilayotgan asosiy sabablar ekanligi qator ilmiy izlanishlarda o'z ifodasini topgan. U.Sharpning investitsion faoliyatni moliyalashtirishda moliyaviy vositachilarning roli xususidagi fikriga muvofiq, ular investitsion faoliyatni moliyalashtirishning faol subyektlaridan biri hisoblanadi.

Nobel mukofoti sovrindori, iqtisodiyot bo'yicha mutaxassis U.F. Sharp o'zining eng mashhur "Investitsiya" darsligida investitsiyalarni "kelgusida (ehtimoliy, lekin nomuayyan) qiymat olish maqsadida hozirgi vaqtda ma'lum bir qiymatdan voz kechish" deb ta'riflaydi. U "investitsiyalash" atamasini esa "kelajakda foyda olish uchun bugun ortiqcha puldan ajralish" deb tushuntiradi va shuni ta'kidlashicha, investitsiyalash jarayoni real yoki moliyaviy aktivlarga amalga oshirilishi mumkin⁷.

Shved iqtisodchi olimi Klos Eklundning fikriga ko'ra, "investitsiya — bu kelajakda ko'proq iste'mol qilish imkoniyatiga ega bo'lish uchun ertangi kunga qoldirilgan narsa. Investitsiyaning bir qismi hozir iste'mol qilinmay, zahiraga saqlanadigan iste'mol buyumlari sifatida bo'ladi, qolgan qismi esa ishlab chiqarishni kengaytirishga yo'naltirilgan resurslar hisoblanadi"⁸.

Y.S.Melkumov ishlab chiqarish va tadbirkorlikni rivojlantirishda foyda olish maqsadida investitsiyalarni moliyalashtirishda moliyaviy, mulkiy va intellektual qo'yilmalardan samarali foydalanishni tahlil qilgan. S.V.Valdaytsev va P.P.Vorobev tomonidan chop etilgan darslikda ijtimoiy sohani investitsiyalashda moliyalashtirish manbalari tahlil qilinadi. Ijtimoiy daromad olish jarayonlariga sarflangan pul mablag'lari kelajakda yanada yuqoriroq daromad yoki ijtimoiy samara topishdan iborat degan xulosaga kelinadi⁹.

Akademik S.G'ulomovning ta'rificha: "investitsiya deb har bir investorning ixtiyoridagi moliyaviy, moddiy va aqliy boyliklarini birlamchi iqtisodiy samara olish maqsadida biror bir investitsion obyektga sarflashiga aytiladi"¹⁰.

M.Q.Pardayevning ta'rifiga ko'ra "investitsiya deganda mulkdorning (investorning) pul mablag'i, qimmatbaho qog'ozlari, texnikasi va texnologiyasi, mashina va jihozlarini, mulkka egalik huquqi, intellektual mulki kabilarni ijtimoiy va iqtisodiy jihatdan foyda olish maqsadida tadbirkor faoliyatiga qo'yish tushuniladi". Ushbu ta'riflar bizningcha, investitsiyalar xususida qonunimizda keltirilgan ko'rsatmalarni kengaytirilganiga mos keladi. Diqqatga sazovor yana bir xulosa, D.G'. G'ozibekovning fikriga ko'ra "Investitsiyalar aniq va noaniq, lekin ehtimoli bor risklar ostida kapitalni muayyan vaqtga bog'lash bo'lib, uning hozirgi qiymatini saqlash, kapitallashtirish va jamg'arish maqsadiga qaratiladi"¹¹.

Yana bir xulosa, Sh.Sh.Shodmonovning fikriga ko'ra ta'rif, "investitsiyalar — asosiy va aylanma kapitalni qayta tiklash va ko'paytirishga, ishlab chiqarish quvvatlarini kengaytirishga qilingan sarflarning pul shaklidagi ko'rinishidir".

NATIJALAR

Bugungi kunda O'zbekiston temir yo'l tarmog'ining umumiy uzunligi 7 395,1 km, shu jumladan:
asosiy yo'llar 5 239,3 km;
stantsiya yo'llari 1 769,8 km;
shahobcha yo'llari – 386,0 km
maksimal tezligi 160 km / soatgacha - 731,9 km; maksimal tezligi 250 km / soatgacha - 243,5 km.

Signal tizimlari bilan jihozlangan uchastkalarining umumiy uzunligi 4 757 km. ulardan;

Elektrlashtirilgan uchastkalarining umumiy uzunligi 3 528,1 km. Avtomatik blokirovka qilish tizimi tomonidan bo'limlarning umumiy uzunligi 1 302,2 km.

Temir yo'l transporti asosiy transport turlaridan biri bo'lib, uzoq masofalarga yuk va yo'lovchilarni tashishni ta'minlaydi. Biroq, o'nlab yillar davomida ushbu transport turi o'zining texnologiyalari va innovatsiyalariga oid o'zgarishlar amalga oshirmadi. Hozirgi vaqtda yangi texnologiyalarning rivojlanishi va ortib borayotgan ehtiyojlar tufayli temir yo'l transporti o'zgarishlar va modernizatsiya to'lqinini boshdan kechirmoqda. Dunyo miqyosida temir yo'l transportiga bo'lgan ehtiyoj tez sur'atlar bilan ortib bormoqda. Hozirgi tendentsiyalar shuni ko'rsatadiki, 2050 yilga kelib yo'lovchi va yuk tashish faoliyati ikki baravardan ko'proq oshadi.

Biroq, temir yo'lning kelajagi va uning kelajakdagi transport talablariga javob berish qobiliyati rivojlanayotgan texnologiyalarni qabul qilish, moslashtirish, amalga oshirish va birlashtirish qobiliyatidadir. So'nggi yillarda butun dunyo bo'ylab temir yo'l tizimlari muhandislik loyihalarini modernizatsiya qilish, aqlli raqamli temir yo'l uskunalarini samarali boshqarish, yo'lovchi va yuk tashish talabining tez o'sishi, individual transport xizmatlari va keng tarqalgan transport xavfsizligi kabi muammolarga duch keldi. Temir yo'llarda aqlli raqamli transformatsiyaga o'tish katta muammolarga samarali javob bo'ldi va shu bilan temir yo'l rivojlanishining muqarrar global tendentsiyasiga aylandi.

Kuchli, mustahkam va xavfsiz axborot arxitekturasini va raqamli aktivlarni boshqarish modeli maqsadli manfaatdor tomonlar uchun zarur ma'lumotlar mavjudligini va foydalanish imkoniyatini ta'minlaydigan innovatsion yechimlarni ishlab chiqishning muhim shartidir. Ko'pgina innovatsiyalar sinovdan o'tgan va temir yo'l uchun tasdiqlangan afzalliklari bilan namoyish etilgan, ammo yangi texnologiyalarni amalga oshirish haqiqiy o'zgarishlarga yoki mavjud texnik kontsepsiyalarni yaxshilashga olib kelmaydi.

Buning sabablaridan biri shundaki, qoidalar qat'iy bo'lgan va texnik xizmat ko'rsatish rejasi va faoliyati turli xil hujjatlarda tartibga solingan va talablar bir-biriga mos keladigan sanoatda o'zgarishlarni amalga oshirish yoki yangi texnologiyalarni joriy etish qiyin. Innovatsion yechimlarning amaldagi qoidalarga mos kelishini ta'minlash uchun tizimli tekshiruv yo'qligi texnik xizmat ko'rsatishda innovatsiyalarni amalga oshirishda tizimli yondashuvlarga ehtiyojligini oshiradi.

Texnologik transformatsiya va raqamlashtirish nafaqat texnik tizimlarga, jumladan, temir yoʻl infratuzilmasi va harakat tarkibiga, balki qoidalar, tashkilotlar, jarayonlar va shaxslarga ham taʼsir qiladi. Ushbu muammolarni hal qilish uchun temir yoʻl sanoati ushbu muammolarni aniqlashi va temir yoʻlda innovatsiyalarni muvaffaqiyatli amalga oshirish va mavjud konfiguratsiyani raqamlashtirilgan temir yoʻl tizimiga silliq oʻzgartirish imkonini beradigan siyosat, strategiya va jarayonlarni aniqlashi kerak.

Temir yoʻl transportining kelajagini oʻzgartiradigan asosiy texnologiyalardan biri bu avtomatlashtirishdir. Sunʼiy intellekt va boshqaruv tizimlari yordamida poyezdlar mashinist ishtirokisiz avtonom harakatlana oladi. Bu transport xavfsizligi va samaradorligini oshiradi, shuningdek, xodimlar xarajatlarini kamaytiradi. Bundan tashqari, avtomatlashtirish temir yoʻl liniyalarining oʻtkazish qobiliyatini oshiradi va sayohat vaqtini qisqartiradi.

Biroq, avtomatlashtirish temir yoʻl transportining kelajagini oʻzgartiradigan yagona yangilik emas. Yangi texnologiyalar va innovatsiyalar temir yoʻl transportini xavfsizroq, samaraliroq va ekologik toza qilishga yordam beradi. Biroq, bugʻoyalarning barchasini hayotga tatbiq etish hukumatlar, kompaniyalar va ilmiy muassasalar oʻrtasida katta mablagʻ va hamkorlikni talab qiladi.

Muallifning asosiy fikri temir yoʻl tarmogʻiga xalqaro investitsiyalarni jalb qilish uchun quyidagi yangi texnologiyalar va innovatsion yechimlar ishlab chiqishi muhim hisoblanadi.

Yaʼni: 1. Ekologik toza energiya manbalari - kelajakda temir yoʻl transporti butunlay ekologik toza energiya manbalariga oʻtishi mumkin. Quyosh panellari, shamol turbinalari va boshqa qayta tiklanadigan energiya manbalaridan foydalanish karbonat angidrid chiqindilarini kamaytiradi va temir yoʻl transportini yanada ekologik toza qiladi.

2. Atrof-muhit texnologiyalari - zamonaviy temir yoʻl transportining muhim vazifalaridan biri atrof-muhitga salbiy taʼsirni kamaytirishdir. Bunga erishish uchun dizel yonilgʻisi oʻrniga elektr uzatgichdan foydalanish, poyezdlarning energiya samaradorligini oshirish va energiya infratuzilmasini qayta tiklanadigan energiya manbalariga oʻtkazish kabi ekologik texnologiyalar ishlab chiqilib hamda joriy etilmoqda.

Shuningdek, poyezdlarning ogʻirligini kamaytiradigan va havo qarshiligini kamaytiradigan innovatsion materiallar ishlab chiqilmoqda, bu esa energiya sarfini kamaytirishga va zararli moddalar chiqindilarining kamayishiga olib keladi.

Temir yoʻl transporti koʻplab mamlakatlar iqtisodiyotining muhim tarmoqlaridan biridir. Biroq, uning ishlashi tabiiy yoqilgʻidan foydalanish bilan uzviy bogʻliq boʻlib, bu atrof-muhit va inson salomatligiga salbiy taʼsir koʻrsatadi.

Shu bois, keyingi yillarda temir yoʻllarda ekologik toza energiya manbalariga oʻtishga tobora koʻproq eʼtibor qaratilmoqda, jumladan quyosh energiyasi.

Quyosh panellari avtomobillar va stantsiyalarga oʻrnatilishi va yorugʻlik, kondisioner tizimlari va boshqa elektr qurilmalarini elektr energiyasi bilan taʼminlash uchun ishlatilishi mumkin.

Bu bizga qazib olinadigan yonilgʻilarni isteʼmol qilishni kamaytirish va

atmosfera zararli moddalar chiqindilarini kamaytirish imkonini beradi.

Intellectual raqamli transformatsiya xalqaro raqobatdosh ustunliklarni yaratish va rivojlanish imkoniyatlarini kengaytirishning muhim vositasidir. Raqamli va intellectual texnologiyalarning temir yo'l biznesi bilan chuqur integratsiyalashuvi innovatsiyalarning tezlashtirilgan yutuqlari, chuqur kirib borishi va keng qo'llanilishi davriga kirdi. Raqamli va aqlli texnologiyalar dastlabki bosqichlardan e'tibor va ommaboplikning kuchayishi davriga, so'ngra qiziqishning pasayishi bosqichiga, so'ngra qayta tiklanish va pirovardida yetuk bosqichga o'tadigan uzluksiz iterativ (qadamma-qadam) evolyutsiyaning to'lqinga o'xshash naqshini kuzatib boradi.

Hozirgi va kelajakdagi davrda jahon temir yo'l qurilishi hali ham keng ko'lamni saqlab qoladi. Muhandislik qurilishi loyihalarini raqamli va intellectual vositalar yordamida modernizatsiya qilish va keng miqyosda rivojlantirish zarur. Loyihalash, qurish va ekspluatatsiya qilish kabi butun hayot aylanish jarayonini va boshqaruv jarayonini kompleks optimallashtirish temir yo'l qurilishi samaradorligini, loyiha sifatini, qurilish xavfsizligini, energiyani tejash va atrof-muhitni muhofaza qilish

darajasini yaxshilashga yordam beradi. Intellectual qurilish sohasida raqamli egizak va model-ma'lumotlar integratsiyasi kabi texnologiyalar hamkorlikdagi dizayn, raqamli ishlab chiqarish, aqlli muhandislik va yig'ish qurilishining butun hayot aylanishi uchun texnik qo'llanilishini yanada chuqurlashtirishi mumkin.

Temir yo'l liniyalarining o'tkazuvchanlik qobiliyatini oshirish, tashish jarayoniga doir texnologiyalarni takomillashtirish, yuqori tezlikda harakatlanishga va yuk tashish uchun mo'ljallangan temir yo'l liniyalarini bir-biridan alohida ajratish (yakka), ishlab chiqarish jarayonlarining energiya samaradorligini oshirish va resurslarni tejaydigan texnologiyalarni joriy etishni nazarda tutuvchi temir yo'l infratuzilmasini modernizatsiya qilish va rivojlantirish dasturini ishlab chiqish va amalga oshirish mavjud muammolarga samarali yechim bo'lishi mumkin.

Bugungi kundagi muallifning yangiligi temir yo'l sohasidagi katta muammolardan biri bo'lib kelayotgan - bu davlatlar o'rtasidagi temir yo'l (treklar) kengligi o'lchamlari farqliligidir. Temir yo'l transportining tarixiy rivojlanishi har bir mamlakatda faqat milliy manfaatlarni hisobga olgan holda rivojlandi va boshqa mamlakatlar temir yo'l yo'nalishlarining o'ziga xos xususiyatlarini hisobga olmadi hamda dunyo bo'ylab temir yo'llar 600 dan 1676 mm gacha bo'ldi. Shu sababli, hozirda G'arbiy Yevropa davlatlarining aksariyatida temir yo'l kengligi - 1435 mm, Ispaniyada - 1668 mm, Portugaliyada - 1665 mm, Finlyandiyada - 1524 mm, MDH davlatlari o'rtasida esa - 1520 mm.

Ispaniya va Frantsiya o'rtasida xalqaro temir yo'l yo'lovchi tashishni rivojlantirish zarurligini hisobga olgan holda, Ispaniyaning Talgo kompaniyasi 1965 yilda temir yo'l g'ildiraklarini avtomatik ravishda boshqa o'lchovga o'tkazish uchun yangi tizimni ishlab chiqish bo'yicha g'oyalar ilgari surishgan.

Muallifning fikricha, rivojlanayotgan mamlakatlar o'rtasidagi temir yo'l kengligi, ya'ni o'lchovi farq qiladi. Bu temir yo'l transporti uchun dolzarbdir

muammolardan bo'lib kelmoqda, chunki bu harakatlanuvchi tarkibni o'zgartirish yoki chegarada yuklarni qayta yuklash zaruriyatiga olib keladi. Bu muammoni hal qilishga yordam beradigan ba'zi yechimlar mavjud:

1. Yo'l kengligini avtomatik ravishda o'zgartira oladigan poyezdlar: mamlakatlar chegarasidagi maxsus infratuzilmada (o'tish yo'llari) kengligi avtomatik ravishda o'zgarishi mumkin bo'lgan g'ildirak juftlari bo'lgan poyezdlar mavjud. Bu yuklarni qayta yuklash yoki lokomotivlarni almashtirish zaruratini oldini oladi.

2. Konteynerlarning yagona standartlarini joriy etish: konteynerlarning yagona standartlarini joriy etish va ularni barcha mamlakatlar uchun birlashtirish yuklarning bir turdagi o'lhagichdan ikkinchisiga o'tishini osonlashtirishi mumkin. Konteynerlar turli yo'l kengliklarida turli platformalar o'rtasida osongina harakatlanishi mumkin.

3. Xalqaro shartnomalar orqali muvofiqlashtirish: muammoni yanada global darajada hal qilish uchun mamlakatlar o'lchov kengligini standartlashtirish yoki chegaralardagi ko'p shpal infratuzilmasiga sarmoya kiritish bo'yicha xalqaro shartnomalar tuzish.

Xozirgi kunda vagon aravalarini chegara punklari orqali to'xtovsiz o'tish imkoniyatlari yo'q. Shu muammoni xal etish uchun katta resurs va xarajatlar talabqiladi. Shu sababli, maxsus harakatlanuvchi yo'l qurilmalarida harakatni to'xtatmasdan yo'l kengligini o'zgartirishga qodir bo'lgan "yo'l kengligiga moslashuvchi temir yo'l g'ildirak juftlarini" ishlab chiqish dolzarb masalalardan biri bo'lib kelmoqda.

Ushbu muammoni hal etish uchun:

- dunyo temir yo'llarida "yo'l kengligiga moslashuvchi temir yo'l g'ildirak juftlar"ning ishlash istiqbollarini o'rganish;
- zarur texnik hujjatlarni ishlab chiqish va raqamli 3D modelni yaratish;
- 3D raqamli modelni tayyorlash printerda chop etish uchun g'ildiraklar to'plami va trolleybusning maketini olish uchun raqamli modelni tayyorlash.

3D printerda chop etish uchun yo'l kengligiga moslashuvchi temir yo'l g'ildirak juftlar modelini olish uchun raqamli modelni tayyorlash Ma'lumot uchun: dunyodagi birinchi mamlakatlar shu muammoni yechish uchun katta ishlar boshlashgan lekin xozirgi kungacha xech qaysi davlat o'zining yechimini bermagan. Ayni paytda Rossiya, Ispaniya, Germaniya, Yaponiya, Bolgariya va Polshada harakatlanuvchi tarkibni bir yo'ldan ikkinchisiga o'tkazishning turli tizimlarini ishlab chiqish va sinovdan o'tkazish bo'yicha ishlar olib borilmoqda.

Bugungi kunda "Talgo" tashkiloti moslanuvchi temir yo'l g'ildirak juftlari bo'yicha ilg'or yutuqlarga erishgan. Ular tomonidan ishlab chiqilgan texnologiyalar turli yo'l kengliklariga moslashuvchi poyezdlar harakatini ta'minlashda katta samaradorlik va tezlikni oshirishga yordam beradi. Bu innovatsion yechimlar temir yo'l transportida xalqaro yo'nalishlarni yaxshilash va logistika jarayonlarini optimallashtirishga hissa qo'shmoqda. "Talgo" tashkiloti tizimining ishlashi temir

yoʻl vagonlari harakatlanayotganda amalga oshiriladigan alohida gʻildirak bloklarini majburiy almashtirishga asoslangan. Har bir birlik tormoz diskleri boʻlgan gʻildirak, qisqa oʻq va konusli rulmanlardan iborat.



1- rasm. 3D modeli yoʻl kengligiga moslashuvchi temir yoʻl gʻildirak juftligi

1-rasmda tangentsial eksenel qulfga ega boʻlgan toymasin gʻildiraklar toʻplamining dizayni koʻrsatilgan, shu jumladan oʻq, oʻqqa harakatlanuvchi tarzda oʻrnatilgan ikkita standart yengil qattiq rul gʻildiragi va gʻildiraklarni eksenel harakatdan va burilishdan ushlab turadigan ikkita qulf.

Amaldagi shinasiz gʻildirak, qulflash elementlarining yuk koʻtarish qobiliyatini oshirish, qulfning yengil ogʻirligi, harakatlanuvchi qismlarni yuqori darajada markazlashtirish va qulfni mahkamlashning ishonchliligi poyezdlar harakatlanayotganda tangentsial eksenel qulfli toymasin gʻildirak juftlarini ishlatishga imkon beradi yuqori tezlikda.

Tangentsial eksenel qulfning kinematik diagrammasi bir darajadagi harakatchanlikka ega boʻlgan spiral tishli harakatlanuvchi birikmadir.

Harakatlanishning nol darajasiga erishish uchun toʻgʻridan-toʻgʻri tishli qoʻsh shpalli ulanishga ega boʻlgan qulflash muftasi ishlatiladi.

U sezilarli dinamik yuklarni koʻtarishga qodir boʻlgan katta aloqa maydoniga ega boʻlgan quvvat qismlarining involyut shpalli ulanishidan foydalanadi. Oʻzbekistonda yoʻl kengligiga moslashuvchi gʻildiraklardan foydalanish, temir yoʻl transporti va logistika sohasida bir qator ijobiy oʻzgarishlarni amalga oshirishi mumkin. Bu texnologiyani joriy qilish natijasida mamlakatdagi tashish jarayonlari yanada samarali, tejamkor va iqtisodiy tomondan foydalanish imkoniyatlari paydo boʻladi. Buning bilan birga, qoʻshimcha xarajatlarning kamayishi va jahon logistika tizimiga integratsiyalashish imkoniyatlari kengayishi kutilmoqda.

Oʻzbekistonda yoʻl kengligiga moslashuvchi gʻildiraklarning foydasi koʻrib chiqamiz. Buning uchun:

Samaradorlikning oshishi uchun Oʻzbekiston jahon transport logistikasiga integratsiyalashishga intilmoqda, ayniqsa, juda koʻp tranzit yoʻnalishlariga ega boʻlgan Markaziy Osiyo mamlakatlari orasida. Yoʻl kengligiga moslashuvchi gʻildiraklar bilan, tovarlarni qayta yuklash va saqlash jarayonlarini osonlashtirish mumkin. Bu, oʻz navbatida, transport vaqtini qisqartirib, tashish jarayonining samaradorligini oshiradi. Qoʻshimcha xarajatlarning kamayishi esa Oʻzbekistonda, jumladan, “Shimoliy tranzit yoʻli” orqali Yevropa va Osiyo orasida yuk tashish aktivlashgan. Yoʻl kengligiga moslashuvchi gʻildiraklar orqali qayta yuklash va terminallardagi operatsion arayonlarni optimallashtirish, qoʻshimcha

xarajatlarni kamaytirishga imkon beradi. Agar bu texnologiya keng joriy etilsa, transport vositalarini qayta tanlash, omborlarda va terminallarda saqlash uchun kerak bo'lgan ishchilar sonini kamaytirish mumkin.

Infrastrukturani optimallashtirishda O'zbekistonda temir yo'l infratuzilmasini modernizatsiya qilish va yangi standartlarga moslashtirish jarayoni davom etmoqda. Yo'l kengligiga moslashuvchi g'ildiraklar esa, mamlakatning turli xil temir yo'l tarmoqlari va yo'nalishlari orasida samarali intizom va integratsiyani ta'minlaydi. Bu, o'z navbatida, mamlakatning logistika infratuzilmasini modernizatsiya qilishni tezlashtiradi.

O'zbekistonda iqtisodiy ishlab chiqarishni rivojlanishning asosiy yo'nalishlaridan biri — logistika va transportizatsiya sohasidagi texnologiyalarning integratsiyasini rivojlantirishidir. Moslashuvchi g'ildiraklar orqali, mamlakatdagi logistika va tashish operatsiyalari yuqori samaradorlikka erishish uchun yangi imkoniyatlarga ega bo'ladi. Shuningdek, bu innovatsiyalar mahalliy ishlab chiqarishning yuqori rivojlanishini ta'minlashi mumkin.

Statistik ma'lumotlar va istiqbolda ko'rib chiqadigan bo'lsak, Markaziy Osiyoda transport va logistika sektori: O'zbekiston, Tojikiston, Qirg'iziston, Qozog'iston va Turkmaniston orasida 2020 yilda yuk tashish hajmi 12% ga oshdi. Hozirgi kunda,

O'zbekistonning tranzit logistikasiga investitsiyalar qo'yilishi samarasida, yuk tashish hajmi yanada o'sishi kutilmoqda. Jumladan, O'zbekistonda tranzit logistikani rivojlantirish uchun 2023 yilda 5 milliard dollarlik investitsiya kerak.

O'zbekistonning temir yo'l infratuzilmasi: O'zbekistonda 2022 yilda temir yo'l tashishining umumiy hajmi 20 million tonnani tashkil etdi. Bu raqam har yili o'sib bormoqda, va agar yo'l kengligiga moslashuvchi g'ildiraklar tizimi amaliyotga joriy etilsa, bu ko'rsatkich 15-20% ga oshishi mumkin.

XULOSA

Temir yo'llar infratuzilmasining taraqqiyoti va iqtisodiy samaradorligini oshirish uchun investitsion boshqaruv asosida quyidagi tadbirlarni nazoratini amalga oshirish kerak. Umumiy strategik maqsadlar va iqtisodiy rejalarni belgilab olish lozim. Loyihalarning qo'llash samaradorligini aniqlash, qarzlarni, xarajatlarni va foydani tahlil qilish. Loyihalarni amalga oshirish va boshqarish uchun samarali metodologiyalardan o'rganish. Investitsiyalarni qo'llab-quvvatlovchi huquqiy va normativ bazani mustahkamlash zamonaviy xalqaro standartlarni joriy etish kerak bo'ladi. Investitsiya strategiyasini amalga oshirish mexanizmining asosiy maqsadi uzoq muddatli istiqbolda iqtisodiy o'sishning barqaror sur'atlarini ta'minlash va manfaatdor tomonlar manfaatlarini qondirishga qaratilgan investitsiya strategiyasini amalga oshirish jarayonini tashkil etish va amalga oshirishdan iborat.

Bizning yondashuvimizga ko'ra investitsiyalarni jalb qilish uchun zaxira kapitalini shakllantirish lozim. Lekin uni mavjud formulalar asosida hisoblash mumkin bo'lmagan holatda o'zimizning mualliflik yondashuvimizni taklif qilamiz. Xususan, yuqorida keltirilgan jadvaldagi 10 ta mavjud ko'rsatkichlar asosida zaxira kapitalining koeffitsientini ishlab chiqamiz. Yuqorida keltirilgan koeffitsientlarning ko'paytmasining o'rtacha geometrik ko'rsatkichini topish asosida zaxira kapitalining

koeffitsientini aniqlash mumkin. Ishda taklif qilingan korxonada investitsiya loyihasining maqbul variantini tahlil qilish va tanlash uchun ko'p darajali tizimini amaliyotga joriy qilinishi natijasida mualliflik yondahuvi asosida shakllantirilgan zaxira kapitalining koeffitsienti 2024 yilda 2023 yilga nisbatan 0,007 punktga yoki 0,7 foizga o'sganligini ko'rish mumkin.

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CENTRAL ASIAN JADIDS' VIEWS ON WOMEN'S FREEDOM AND THEIR ROLE IN MODERN GENDER POLICY

Annotation. *The Jadids are a reformist intellectual movement that formed in the late 19th - early 20th centuries in the territory of the Russian Empire, encompassing a significant part of Central Asia. The main task of the Jadids was to renew society through enlightenment, modernize education, and criticize dogmatism and traditionalism. Their views affected not only education and politics but also the social status of women, which became an important component of their reform project.*

Modern research emphasizes that the Jadids considered the issue of women's status as an important element of the region's national and cultural renewal (Djuraeva, 2024).

Keywords: *Jadidism, women's liberation, gender equality, Central Asia, women's education, enlightenment, social activism, modern gender policy*

Introduction. *1. Historical and cultural context of the Jadids' view on women.* In the traditional society of Central Asia in the 19th-20th centuries, women were largely limited to family sphere: household duties, isolation from public life, lack of access to education. It was in such conditions that Jadid intellectuals began to reinterpret the role of women, linking their status with broader issues of societal modernization.

Historians emphasize that the Jadids saw in the restriction of women's rights and social opportunities not only a cultural and social problem but also an obstacle to national progress. They linked the rejection of traditional restrictions and the promotion of women's rights to the development of society as a whole (Pulatov K.A., "Gender Equality and Secularism...").

2. Education as the key to women's freedom. One of the central directions of the Jadids' activities concerned reforms in the field of education. They actively advocated for women's equal access to education, considering education the main means of overcoming women's social isolation. The Jadids founded schools that provided education for girls and boys on equal grounds - this was a revolutionary step breaking through previous cultural limitations (EJHEA; Jadidism and gender roles).

In the Jadid press and literature, ideas were expressed that education is the basis for the formation of a woman's full-fledged personality, her participation in

social and intellectual life. Through enlightenment, the Jadids sought to prepare women for active participation in the region's modernization processes (Zebo Otabek qizi; *The Image of Women and Their Role...*).

3. *Woman as an agent of social modernization.* The Jadid literature and cultural products of that time presented women not only as keepers of the hearth but also as active participants in social life: teachers, writers, and educators. Analysis of the works of key Jadid writers (for example, Abdurauf Fitrat, Abdulla Avloniy, Chulpon) shows that in the literary context, women were portrayed as bearers of moral strength and the image of the new society (Safarmo Rakhimjonova, *"Representation of the Female Image..."*).

Such texts created ideological grounds for reinterpreting the role of women in society: women become coordinators of family values and, at the same time, participants in enlightenment and social modernization.

4. *From Jadid ideas to modern gender policy.* Modern political processes in Central Asia - especially in the Republic of Uzbekistan - are paying serious attention to gender equality issues, women's active participation in economic and political life. It is observed that many of the approaches that the Jadids promoted more than a hundred years ago - education, equal rights, participation in public life - have been reflected in modern gender strategies (Djuraeva, Nilufar D. *Issues of Women's Rights...*).

The modern gender policy of Central Asia combines international principles of equality, taking into account the region's specific socio-cultural dynamics: expanding access to education and economic opportunities for women, strengthening the legislative framework for gender equality, and promoting women in professional and managerial spheres.

5. *The image of the Jadid as a symbol of progress.* In a historical retrospective, the Jadid women's movement (including the participation of reformist women themselves) is presented not only as a struggle for basic rights but also as a symbol of the new era. Jadid women became promoters of enlightenment, modernization, and reform ideals, which subsequently influenced the formation of cultural norms and social ideas about women's role in society (Iroda Shodiyeva, *Women's Jadid Movement*).

Conclusion. The Central Asian Jadid movement played a key role in redefining women's position in traditional society, promoting ideas of freedom, education, equality, and participation in social life. Their reformist views on women's freedom became the foundation for the further development of the region's modern gender policy. Although the immediate successes of the Jadids were limited by the historical circumstances of the colonial and Soviet past, their ideas continue to influence discussions about equality and the role of women in society.

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DEVELOPING MODERN EDUCATIONAL PARADIGMS BASED ON ENLIGHTENMENT IDEAS: INTEGRATION OF HISTORICAL HERITAGE AND PEDAGOGICAL INNOVATIONS

Annotation. *This article analyzes the development of modern educational paradigms based on the ideas of enlightenment (Jadidism). The study examines the pedagogical legacy of the Jadids, their innovative approaches in the education system, and their application to 21st-century educational processes. Additionally, it analyzes the concept of integrating historical pedagogical experience with modern student-centered education, competency-based approaches, and digital technologies. The research findings demonstrate the scientific and practical potential for developing contemporary pedagogical innovations grounded in the Jadid heritage.*

Keywords: *Enlightenment, Jadids, pedagogical innovation, modern education, student-centered education, competency-based approach, digital learning, pedagogical heritage.*

Introduction. The Enlightenment movement emerged in the territory of Central Asia, in particular Uzbekistan, in the 19th - early 20th centuries, aimed at the scientific and educational development of society. The Jadids made a great contribution to raising the level of knowledge of the younger generation, forming their personal and social consciousness by introducing new methods and pedagogical approaches into the education system.

Modern educational paradigms are developing on the basis of a student-centered approach, competency-based learning, interactive methods, and digital technologies. From this point of view, the harmonization of the Jadid pedagogical heritage with the pedagogical innovations of the 21st century is a relevant scientific and practical problem.

Methods and Results. The study employed historical-pedagogical analysis, comparative methods, analysis of digital resources, and a humanitarian approach. Jadid press publications, school documents, and articles were analyzed as historical sources to determine their pedagogical approaches. Simultaneously, a comparative analysis was conducted with modern pedagogical methods, including STEAM, flipped classroom, and digital learning. Interactive and digital innovations were also examined to identify opportunities for applying historical pedagogical experiences to modern educational processes.

The analysis results revealed that the Jadid pedagogical heritage encompasses fundamental pedagogical principles such as student-centered learning, personal development, knowledge provision based on information and critical thinking, and encouragement of independent thinking and scientific inquiry. From an integration perspective with modern educational paradigms, the student-centered approach and competency-based education principles are a natural continuation of Jadid pedagogy. Furthermore, the study identified possibilities for developing personal cognitive potential through STEAM and digital educational tools, as well as implementing the Jadids' innovative approaches through interactive and project-based methods.

Practically, it is recommended to apply historical pedagogical experiences in modern lessons through modules, analyze Jadid texts on digital learning platforms, individualize learning activities, and combine historical and modern pedagogical methods to foster student creativity.

Conclusion. If the pedagogical heritage of the Jadids is harmonized with modern educational paradigms, the possibility of developing students' independent thinking, social and personal potential increases. The integration of historical experience and modern innovations gives new dynamics to the pedagogical process and makes the educational process more effective. At the same time, digital education and interactive methods are effective means of implementing Jadid ideas in the conditions of the 21st century.

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ASSESSMENT OF RAPID SEQUENCE INTUBATION SKILLS IN INTENSIVE CARE UNIT PHYSICIANS USING SIMULATION

Abstract. *Background: Rapid sequence intubation (RSI) is a critical airway management technique in intensive care units (ICUs). Despite its importance, standardized assessment tools for experienced ICU physicians remain limited.*

Objective: To evaluate the effectiveness of a multidisciplinary simulation-based RSI training program utilizing a structured checklist to improve technical and nontechnical performance.

Methods: A prospective observational study was conducted involving 20 ICU physicians. Participants underwent high-fidelity in situ simulation training focused on checklist-guided RSI. Performance was assessed before training, immediately after training, and four weeks later in real clinical settings.

Results: Mean RSI performance scores improved significantly from baseline (98 ± 15) to post-training (132 ± 12 ; $P < 0.001$) and were retained at four-week follow-up (129 ± 13 ; $P < 0.001$ vs baseline). Improvements were noted in both technical and nontechnical domains, particularly among physicians with less than five years of ICU experience.

Conclusion: Simulation-based RSI training using a structured checklist significantly enhances airway management performance and teamwork among ICU physicians, with sustained skill retention.

Keywords: *Rapid sequence intubation, simulation-based training, ICU, airway management, checklist, nontechnical skills.*

Introduction. Rapid sequence intubation (RSI) is an essential airway management technique in critical care medicine, designed to facilitate rapid endotracheal intubation while minimizing aspiration risk. In the intensive care unit (ICU), patients frequently present with hemodynamic instability, hypoxemia, or altered mental status, making RSI a high-risk but life-saving intervention.

Traditional RSI training relies largely on clinical exposure, which may be inconsistent due to variable case volume, duty-hour limitations, and patient safety concerns. Simulation-based education has therefore emerged as a powerful alternative, enabling deliberate practice of high-risk procedures in a controlled and safe environment.

Previous studies have demonstrated that simulation improves intubation success rates, procedural confidence, and knowledge retention, particularly among trainees. However, limited data exist regarding standardized simulation-based

assessment frameworks tailored specifically for experienced ICU physicians. Moreover, many assessments focus predominantly on technical proficiency, neglecting nontechnical skills such as communication, leadership, and crisis resource management.

This study evaluates a novel multidisciplinary simulation-based RSI training program incorporating a structured checklist to assess and improve both technical and nontechnical performance among ICU physicians. We hypothesized that focused simulation training would lead to measurable and sustained improvements in airway management performance and teamwork.

Methods. This prospective observational study was conducted from January to June 2025 at the Simulation Center of the Republican Scientific and Practical Medical Center of Anesthesiology and Resuscitation, Tashkent, Uzbekistan. Ethical approval was obtained from the Institutional Review Board (IRB No. 2025-012), and written informed consent was obtained from all participants.

Twenty ICU physicians were recruited via convenience sampling. Inclusion criteria comprised at least two years of ICU experience and prior exposure to rapid sequence intubation (RSI) procedures. Exclusion criteria included participation in similar simulation training within the preceding six months or inability to complete follow-up assessments. Participant characteristics were as follows: mean age 38 years (range 28–52), 12 males and 8 females, with a mean ICU experience of 6.5 ± 3.2 years.

High-fidelity simulation scenarios were conducted using Laerdal SimMan 3G mannequins, incorporating difficult airway anatomy, hemodynamic instability, and complex team dynamics. Each simulation session lasted 45 minutes and included a structured pre-briefing, scenario enactment, and debriefing using the PEARLS framework.

Results. A 32-item RSI checklist was developed through a modified Delphi process involving six experts in critical care and simulation education. The checklist comprised 20 technical parameters (e.g., preoxygenation, medication administration, tube confirmation) and 12 nontechnical parameters (e.g., leadership, communication, role clarity), with each item weighted from 1 to 5 points, yielding a maximum score of 150. Inter-rater reliability was high (Cohen's $\kappa = 0.85$).

Participants' performance was assessed at three time points: baseline (pre-training simulation), immediately post-training, and four weeks later during real clinical RSI procedures, with patient consent obtained when feasible. Data were analyzed using SPSS version 27. Paired t-tests compared pre- and post-training scores, and a P value < 0.05 was considered statistically significant. Results are reported with 95% confidence intervals (CI).

All 20 participants completed the study. Baseline mean performance score was 98 ± 15 (95% CI: 91–105), reflecting moderate proficiency with identifiable gaps in nontechnical skills. Immediate post-training assessment demonstrated a significant improvement, with a mean score of 132 ± 12 (95% CI: 126–138; $P < 0.001$). At four-week follow-up, performance remained elevated with a mean score

of 129 ± 13 (95% CI: 122–136; $P < 0.001$ versus baseline; $P = 0.42$ versus post-training), indicating sustained skill retention.

Subgroup analysis revealed that physicians with less than five years of ICU experience showed greater improvement (mean increase: 38 points) compared to those with more than five years of experience (mean increase: 28 points; $P = 0.03$). Notable improvements were observed in both technical and nontechnical domains, particularly in communication, role clarity, and anticipatory task execution. No adverse events occurred during simulation or subsequent clinical evaluations.

Discussion. This study demonstrates that structured simulation-based training significantly improves RSI performance among ICU physicians. Unlike traditional approaches that emphasize procedural mechanics alone, our checklist-based framework integrated nontechnical skills critical to effective airway management.

The sustained improvement observed at four-week follow-up suggests successful transfer of simulation-acquired skills into real clinical practice. Enhanced role clarity and shared mental models likely contributed to reduced cognitive load on intubating physicians and improved overall team performance.

Participants reported increased awareness of anticipatory actions, such as early preparation of post-intubation equipment and monitoring, highlighting the value of multidisciplinary engagement. While physicians demonstrated less pronounced changes in role perception, this likely reflects their pre-existing familiarity with RSI leadership responsibilities.

Limitations include the single-center design and modest sample size, which may limit generalizability. Future studies should assess long-term patient-centered outcomes, including first-pass success rates, complication rates, and time-based efficiency metrics using video review of real-life intubations.

Conclusion. Simulation-based RSI training utilizing a structured checklist is an effective, safe, and sustainable method for improving airway management skills among ICU physicians. Incorporation of such programs into continuing medical education may enhance patient safety and team performance in critical care settings.

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ALGORITHMS FOR MANAGING UNEXPECTED EVENTS IN PEDIATRIC RESUSCITATION

Annotation. *This article analyzes modern algorithms aimed at the effective management of unforeseen and life-threatening conditions that may arise in the process of pediatric resuscitation. Emergency situations such as airway obstruction, sudden hemodynamic instability, arrhythmias, adverse drug reactions, and technical errors during cardiopulmonary resuscitation in children are common and require prompt, systematic decision-making. The article highlights the algorithmic approaches used to identify, assess, and eliminate these conditions, their clinical effectiveness, and practical significance. The possibility of standardizing the actions of medical personnel, reducing errors, and increasing survival rates in pediatric resuscitation through the introduction of algorithms into clinical practice will also be discussed. The research results have important scientific and practical significance for specialists working in the field of pediatric emergency medical care and resuscitation.*

Keywords: *pediatric resuscitation, cardiopulmonary resuscitation, emergency situations, clinical algorithms, emergency medical care, pediatric intensive care, vital signs, intensive care management* Introduction

Introduction. Unexpected emergencies in pediatric intensive care units (PICUs) represent critical moments that demand rapid and well-informed clinical decision-making. Due to the limited physiological reserves in children, even minor delays or errors in management can result in severe complications or fatal outcomes. Unlike adults, pediatric patients are more vulnerable to rapid deterioration, making the timely identification and structured response to emergencies essential. As such, standardized resuscitation and emergency management algorithms have become indispensable tools in modern pediatric critical care.

These algorithms not only help clinicians navigate complex clinical situations with greater confidence but also enhance communication and coordination among multidisciplinary teams. By providing a systematic approach to the recognition, assessment, and management of life-threatening conditions, these guidelines contribute significantly to improving patient safety and outcomes.

This article aims to review and analyze the most widely adopted clinical algorithms used in the management of unexpected critical events in pediatric resuscitation. It highlights their importance, discusses implementation strategies,

and underscores the need for continuous training and protocol adherence in ensuring effective pediatric emergency care.

1. Unexpected Events in Pediatric Resuscitation

In pediatric intensive and emergency care settings, clinicians frequently encounter a range of acute and life-threatening conditions that require immediate intervention. These unexpected events, if not promptly and appropriately managed, can rapidly progress to severe morbidity or mortality due to the unique physiological vulnerabilities of pediatric patients. The most common and critical emergencies encountered in pediatric resuscitation include:

Cardiopulmonary Arrest (CPA): The sudden cessation of both spontaneous cardiac activity and effective respiration. This represents the most urgent form of pediatric emergency, necessitating immediate initiation of basic and advanced life support measures to restore circulation and oxygenation.

Severe Cardiac Arrhythmias: Life-threatening arrhythmias such as supraventricular tachycardia (SVT), ventricular tachycardia (VT), and ventricular fibrillation (VF) are less common in children than adults but can be rapidly fatal if not identified and treated promptly. These disturbances in cardiac rhythm may result from congenital heart disease, electrolyte imbalances, or as a consequence of underlying systemic illness.

Anaphylactic Shock: A severe, rapid-onset hypersensitivity reaction characterized by hypotension, airway obstruction, and multisystem involvement. Prompt administration of intramuscular epinephrine and supportive measures is critical to prevent cardiovascular collapse.

Septic Shock: A systemic inflammatory response to infection that leads to circulatory, cellular, and metabolic abnormalities. Pediatric septic shock often presents subtly and may quickly evolve into a state of hypotension and multiorgan dysfunction, requiring aggressive fluid resuscitation and antimicrobial therapy.

Acute Respiratory Failure: This condition arises when the respiratory system fails to maintain adequate gas exchange. Causes in pediatric populations include bronchiolitis, pneumonia, asthma exacerbation, and neuromuscular disorders. Early airway management and ventilatory support are essential components of treatment.

Hypoglycemia and Hyperglycemia: Metabolic emergencies such as low or high blood glucose levels can lead to seizures, altered mental status, and hemodynamic instability. These require rapid correction to prevent irreversible neurological injury or death.

Hemorrhage or Traumatic Injuries: Significant blood loss or traumatic events, including blunt or penetrating trauma, are major causes of pediatric emergency admissions. Rapid assessment, hemorrhage control, and surgical intervention are often necessary in these cases.

Each of these clinical scenarios requires a structured and timely approach to ensure optimal outcomes. The use of validated pediatric resuscitation algorithms plays a pivotal role in guiding healthcare providers through diagnostic and therapeutic decision-making processes during such emergencies.

2. Basic and Advanced Life Support Algorithms in Pediatric Resuscitation

Effective pediatric resuscitation requires the application of structured protocols to manage cardiopulmonary emergencies. Basic Life Support (BLS) and Advanced Life Support (ALS) algorithms provide a standardized approach that improves outcomes by ensuring timely and evidence-based interventions.

2.1. Pediatric Basic Life Support (BLS)

Pediatric BLS is designed to maintain airway patency, support breathing, and restore circulation in critically ill or unresponsive children. The sequence follows the CAB approach (Circulation, Airway, Breathing) and includes the following steps:

C – Circulation: Assess for signs of circulation by checking the carotid or brachial pulse within 10 seconds. If no pulse is detected or if the pulse is less than 60 beats per minute with signs of poor perfusion, initiate chest compressions.

A – Airway: Open the airway using the head-tilt/chin-lift technique, or jaw-thrust maneuver if spinal injury is suspected.

B – Breathing: Provide two rescue breaths using a bag-valve mask or mouth-to-mouth ventilation. Ensure adequate chest rise with each breath, avoiding excessive ventilation.

C – Chest Compressions: Deliver high-quality chest compressions at a ratio of 15 compressions to 2 breaths when two rescuers are present. The compression rate should be 100–120 per minute, and the depth should be approximately one-third the anterior-posterior diameter of the chest.

Reassess the patient's condition, including pulse and breathing, every 2 minutes to determine the need for continued resuscitative efforts or transition to ALS.

2.2. Pediatric Advanced Life Support (ALS)

Pediatric ALS builds upon the foundation of BLS and incorporates advanced interventions including drug administration, advanced airway management, and cardiac monitoring. The key components include:

Defibrillation: If indicated (e.g., ventricular fibrillation or pulseless ventricular tachycardia), deliver an initial energy dose of 2 joules/kg, escalating to 4 joules/kg for subsequent shocks if needed.

Pharmacologic Interventions: Epinephrine: Administer 0.01 mg/kg (0.1 mL/kg of 1:10,000 concentration) intravenously or intraosseously every 3–5 minutes during cardiac arrest.

Amiodarone: For refractory arrhythmias, administer 5 mg/kg IV/IO bolus, which may be repeated up to two times for persistent ventricular arrhythmias.

Advanced Airway Management: Secure the airway with an endotracheal tube (ETT) or laryngeal mask airway (LMA) as clinically indicated. Confirm tube placement via end-tidal CO₂ monitoring and auscultation.

Physiologic Monitoring: Continuously monitor:

- Arterial blood gases (ABG)
- Serum glucose to detect hypo/hyperglycemia
- Electrolyte levels, particularly potassium, calcium, and sodium, to address any imbalances that may contribute to the patient's condition.

The integration of BLS and ALS protocols is essential for the successful management of pediatric emergencies. Ongoing training, adherence to updated guidelines, and prompt recognition of clinical deterioration significantly enhance survival and neurological outcomes in critically ill pediatric patients.

3. Specific Algorithms for Critical Pediatric Emergencies

In addition to standard resuscitation protocols, certain pediatric emergencies require specialized management algorithms tailored to the underlying pathophysiology. Prompt recognition and targeted intervention in these conditions are crucial to prevent rapid clinical deterioration.

3.1. Anaphylactic Reaction

Anaphylaxis is a severe, life-threatening systemic hypersensitivity reaction that requires immediate treatment to prevent airway obstruction, cardiovascular collapse, and death. The recommended algorithm includes:

Epinephrine: Administer 0.01 mg/kg intramuscularly (IM) every 5 to 15 minutes as needed, preferably into the anterolateral thigh. This is the first-line and most critical intervention.

Oxygen Therapy: Administer high-flow oxygen to maintain adequate oxygenation, particularly in patients with respiratory compromise.

Fluid Resuscitation: Administer 20 mL/kg of isotonic saline (e.g., 0.9% NaCl) as an intravenous bolus to counteract distributive shock and hypotension.

Adjunct Medications: H1-antihistamines (e.g., diphenhydramine) to relieve urticaria and pruritus.

Corticosteroids (e.g., methylprednisolone) to reduce protracted or biphasic reactions, although their onset of action is delayed.

3.2. Septic Shock

Septic shock in children is characterized by inadequate tissue perfusion due to infection-induced circulatory and cellular/metabolic dysfunction. The goal is to restore perfusion and prevent organ failure within the first hour of recognition:

Fluid Resuscitation: Administer 20 mL/kg boluses of isotonic crystalloid solution (e.g., 0.9% NaCl), repeated up to a cumulative total of 60 mL/kg as needed based on perfusion and hemodynamic response.

Antibiotic Therapy: Broad-spectrum intravenous antibiotics should be administered within the first hour of sepsis recognition to improve survival outcomes.

Inotropic Support: If signs of shock persist despite adequate fluid resuscitation, initiate vasoactive agents such as:

Consider early intubation and mechanical ventilation in cases of respiratory failure or severe shock refractory to fluid and inotropic support.

3.3. Glycemic Emergencies

Metabolic disturbances such as hypoglycemia and hyperglycemia are common in critically ill pediatric patients and require urgent correction to avoid neurological damage or metabolic decompensation.

Hypoglycemia: Defined as blood glucose < 60 mg/dL (or < 2.6 mmol/L). Administer 2 mL/kg of 10% dextrose (D10W) intravenously as a bolus. Reassess glucose levels frequently and provide maintenance glucose infusion thereafter.

Hyperglycemia: Commonly seen in diabetic ketoacidosis (DKA) or stress-related states. Initiate intravenous insulin infusion at 0.05–0.1 units/kg/hour, and monitor blood glucose levels hourly.

Concurrently, ensure careful fluid and electrolyte management, particularly potassium, as insulin therapy can lead to hypokalemia.

These condition-specific algorithms complement standard pediatric resuscitation protocols by addressing the unique etiologies and pathophysiological mechanisms involved in different critical care scenarios. Strict adherence to evidence-based guidelines is essential to optimize clinical outcomes.

4. Teamwork and Simulation in Resuscitation

Effective resuscitation in pediatric critical care extends beyond individual clinical skills; it is fundamentally dependent on coordinated teamwork, efficient communication, and strong leadership. Multidisciplinary collaboration is essential to manage high-stakes emergencies where rapid, synchronized actions can be the difference between life and death.

Clear role delineation, closed-loop communication, and real-time task delegation significantly improve the efficiency and safety of resuscitation efforts. The presence of a designated team leader—responsible for overseeing clinical interventions, maintaining situational awareness, and making time-sensitive decisions—has been shown to enhance team performance and patient outcomes.

Simulation-based training plays a critical role in preparing healthcare providers for pediatric resuscitation scenarios. High-fidelity simulation allows clinicians to practice rare and complex emergencies in a controlled, risk-free environment. These sessions not only reinforce adherence to standardized algorithms such as Pediatric Advanced Life Support (PALS) but also help identify latent safety threats, improve team dynamics, and build confidence among participants.

Regular interprofessional simulation exercises serve as a cornerstone for continuous education, ensuring that both physicians and nurses maintain competence and readiness. Debriefing following simulations offers valuable opportunities for reflective learning and system-level quality improvement.

By integrating structured simulation programs into clinical education, healthcare institutions can foster a culture of preparedness, collaboration, and resilience—key components of high-quality pediatric resuscitative care.

Conclusion. The effective and timely management of unexpected events in pediatric resuscitation requires strict adherence to standardized, evidence-based algorithms. These structured protocols serve as critical tools in guiding clinical decision-making during high-pressure scenarios and are essential for reducing variability in care and improving patient outcomes.

It is imperative that all healthcare professionals involved in pediatric critical care possess a thorough understanding of these algorithms and are proficient in their

practical application. Regular training, including simulation exercises, enhances skill retention and promotes rapid, coordinated responses during actual emergencies.

Moreover, the integration of a scientific, protocol-driven approach with strong interdisciplinary teamwork forms the cornerstone of successful resuscitation. A collaborative, well-prepared team—guided by established clinical guidelines—significantly increases the likelihood of survival and favorable neurologic outcomes in pediatric patients facing life-threatening conditions.

In summary, continual education, algorithmic consistency, and cohesive team dynamics are fundamental to achieving excellence in pediatric resuscitative care.

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RESEARCH ON IMPROVING THE EFFICIENCY OF OIL AND GAS WELL DRILLING PROCESSES

Abstract: *This article reviews the comprehensive results of the interaction of technical indicators of efficiency based on modern research on improving the efficiency of drilling processes for oil and gas wells. After examining the main technical parameters for assessing the efficiency of drilling for oil and gas wells, modern research is reviewed, based on technological solutions that allow accelerating drilling without increasing risks in drilling processes. Special attention is also paid to the importance of digital control systems for controlling drilling processes, selecting drilling equipment and optimizing operating modes.*

Keywords: *Drilling efficiency, well design, drilling technologies, operation, drilling equipment, drilling monitoring, geological surveys.*

Introduction

The efficiency of oil and gas well drilling processes in mining enterprises has become one of the central topics of the modern petrochemical industry, as modern technologies based on technical systems are increasingly used in the industry. Every year, drilling projects move into deeper, more complex formations, where geological uncertainty, high-pressure zones and changing rock properties create additional challenges for engineers. In such conditions, the question is no longer how to drill a well, but how to drill it efficiently: faster, safer and at a predictable cost. This change in priorities has prompted researchers and industry experts to reconsider traditional drilling practices and look for more flexible, technology-based approaches. Many factors affect effective drilling. Some of them - for example, the type of bit, the characteristics of the drilling fluid or the selected well drilling compound - are technical decisions made at the design stage. Others, such as geomechanical surprises, equipment failures or unstable structures, occur directly during operations and require rapid response measures. The interaction of these elements creates a dynamic environment in which successful results depend on how well the drilling team can correctly assess the situation, interpret real-time data and

make immediate corrections. In recent years, the integration of digital tools has significantly changed the way drilling performance is managed. Real-time monitoring systems, automated control units and advanced logistics technologies allow engineers to detect anomalies early and reduce downtime. These innovations provide access not only to operational parameters, but also to predictive analytics based on machine learning models and big data sets. As a result, drilling operations are gradually moving from reactive decision-making to proactive planning. However, technology alone does not guarantee efficiency. Organizational discipline, proper planning and skilled personnel are equally important. Most delays are caused not by equipment limitations, but by coordination problems, misinterpretation of well signals or inconsistent communication between the surface team and remote monitoring centers. Therefore, effective drilling should be understood as a balance between the right tools, skilled professionals and a well-structured workflow. The purpose of this study is to examine the key factors that determine drilling efficiency, assess the issues that commonly reduce efficiency, and discuss strategies that can help achieve consistent, predictable results even in challenging geological conditions. Particular attention is paid to the relationship between operating parameters, dead time, and drilling technology selection. By examining these aspects together, the study aims to demonstrate that drilling efficiency is not a single technical objective, but a multidimensional concept that requires a comprehensive approach. This perspective will allow both engineers and managers to better understand how to optimize operations and reduce costs without compromising safety or well integrity. When it comes to drilling oil and gas wells, efficiency is usually associated with two concepts - speed and cost. However, in practice, everything is much broader. Engineers use a whole set of parameters that allow them to assess how well the process is going and where potential losses are hidden. These indicators serve as a kind of benchmark: they help to compare different wells, monitor the dynamics and identify obstacles that require correction. One of the main parameters is the mechanical drilling rate. It shows how many meters the string can travel per hour or day and is determined not only by the characteristics of the well, but also by the physical properties of the rock, the flushing system and the correctness of the selected loading mode. Increasing ROP is one of the most correct ways to speed up the construction of a well, but it should be remembered that extreme modes can lead to accidents or rapid wear of the drill bit. Therefore, engineers try to find the optimal combination of speed and stability. The coefficient of technical utilization of drilling equipment occupies a special place. It reflects how fully the equipment is used and how stable the operations are. Long downtimes of the equipment, frequent repairs or poor organization of processes usually indicate low efficiency, even if the actual drilling speed looks good. Another criterion is the drilling cost per meter of excavation. This indicator is very dependent on the area, depth and complexity of the geology, but in any case it allows you to objectively assess how justified the costs are. Sometimes the speed can be high, but if very expensive tools are used to achieve this, the overall effect is questionable. Therefore, companies try to find a balance between price and result.

These can include indicators such as the number of bit changes, the time spent on lowering and lifting operations, the stability of the parameters of the flushing fluid, the accuracy of telemetry, the percentage of plan execution, and even the level of automation of processes. All of them help to form a holistic picture of how efficiently drilling operations are proceeding. Drilling efficiency is rarely determined by one or two parameters. Usually, it is a set of conditions, decisions, and actions that speed up or slow down the process. In real field conditions, a small detail - the wrong choice of mixture density, excessive tool reduction, and the wrong choice of drill bit - can change the entire pace of work. Therefore, understanding the factors affecting efficiency is of particular importance for both engineers and project managers. Geology is the basis that determines the nature of the entire process. Strongly abrasive rocks, layer changes, high formation pressure, fractures, or unstable zones can significantly slow down drilling. Sometimes even experienced specialists are forced to reduce the load modes to avoid complications. In soft rocks, on the contrary, with proper adjustment, it is possible to achieve high drilling speeds. The weight of the drill, the revolutions of the rotor or drill motor, the flushing parameters - all this makes up the drilling "mode". The correct balance between load and speed allows you to achieve maximum rock erosion. If the modes are selected incorrectly, there is a risk of clogging of the spiral column, overheating under the influence of heat, or damage to the casing. Today, many parameters are controlled automatically, but the human factor still plays a key role. Drilling fluid is not just a liquid that circulates in the well. It performs several functions at once: it cools the drill, removes cuttings, stabilizes the well walls, and prevents the formation of gas-oil-water formations. Even an experienced team cannot maintain efficiency if the equipment is operating unstable. Problems with pumps, impellers, solution cleaning systems or telemetry lead to downtime, which immediately increases unproductive time. Regular maintenance, preventive inspections and quality training of personnel significantly reduce the likelihood of unplanned downtime. Modern automatic control systems help stabilize regimes and respond to anomalies faster than humans. Vibration analysis programs, failure prediction models, digital twins of wells - all this reduces the likelihood of errors and increases the predictability of work. The more automated the processes, the less random changes and downtime. The development of the oil and gas industry in recent decades has fundamentally changed the approach to drilling. If earlier the main means of accelerating work was the selection of drills and increasing loads, today the main focus is on smart technologies, automation and a clear understanding of geological conditions. Such solutions allow not only to increase drilling speed, but also to make the process more predictable, safe and economical. Today, many companies use software complexes that analyze hundreds of parameters in real time and suggest optimal loading modes, rotations, fluid consumption and drilling pressure. Modern drilling fluids contain additives that regulate their rheology, lubricity, wall stability, prevent clay hydration and reduce abrasive effects. Such solutions increase the stability of the column, reduce circulation losses and improve mud flow. If the solution is chosen correctly, the well is drilled faster and with fewer

complications. Remote control centers allow specialists to monitor well parameters hundreds of kilometers from the drilling site, analyze trends, predict risks and make recommendations in real time. This reduces the burden on the local team and allows for quick decision-making based on large amounts of data. Such integration of knowledge significantly improves the quality of drilling process management.

Conclusion

Today, the efficiency of drilling oil and gas wells is formed by a combination of technology, organization and the ability to adapt to constantly changing geological conditions. Modern efficiency is achieved through the balanced integration of advanced tools, intelligent monitoring systems, well-developed drilling programs and a highly skilled team that can make informed decisions in real time. One of the main conclusions that can be drawn from analyzing the drilling process is that efficiency is not the result of a single action, but a chain of interconnected stages. Improving the performance of the well assembly, reducing ineffective time, optimizing drilling solutions and using numerical analysis - all this leads to a cumulative effect that ultimately determines the cost and duration of well construction.

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OZIQLANISH TURIGA QARAB CHAQALOQLARDA ICHAK MIKROFLORASINING O'ZGARISHI

Annotatsiya: Chaqaloqlik davri inson ichak mikroflorasining shakllanishi uchun eng muhim bosqichlardan biri hisoblanadi. Bu davrda inson mikroflorasining tarkibi va funksional imkoniyatlari organizmning immun tizimini rivojlanishi, metabolizm va keyingi hayotdagi turli kasalliklarga moyillikni belgilab beradi. Asosan chaqaloqlar ichak mikroflorasining shakllanishida oziqlanish turning (ona suti va suniy ovqatlanish) bu oziqlar ta'sirida mikroflorada yuzaga keladigan chuqur o'zgarishlar, ularning biologik mexanizmlari va uzoq muddatli klinik ahamiyati tahlil qilingan. *Bifidobacterium* va *bacteroides* kabi dominant bakteriya turlari, sut oligoxaridlaring (HMOlar) mikroflora shakllanishidagi ahamiyati yoritilgan. Molekulyar-genetik usullardan foydalangan holda ichak disbiyozining patogenetik mexanizmlari, immun disfunktsiyalar va metabolitik buzilishlar o'rtasidagi bog'liqlik muhokama qilingan. Erta yoshdagi bolalarda sog'lom mikroflorani shakllantirishning fundamental ahamiyatini takidlaydi va davolash strategiyalarini optimallashtirishda oziqlanish omilini hisobga olish zarurligiga asoslanadi.

Kalit so'zlar: Chaqaloqlik davri, ichak mikroflorasi, ona suti, suniy ovqatlanish, dizbioz, sut oligoxaridlari (HMOlar), *Bifidobacterium*, *bacteroides*, 16SrRNA sekvensiyalash, immune tizimi, metabolizm.

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INFANT GUT MICROBIOTA: PROFOUND CHANGES DRIVEN BY FEEDING TYPE

Annotation: Infancy represents one of the most crucial stages for the development of the human gut microbiota. During this period, the composition and

*functional capabilities of the microbiota determine the development of the organism's immune system, metabolism, and predisposition to various diseases later in life. This article comprehensively analyzes the pivotal role of feeding type (breastfeeding vs. formula feeding) in shaping the infant gut microbiota, the profound changes in the microbiota induced by these nutritional factors, their underlying biological mechanisms, and their long-term clinical significance. The importance of dominant bacterial species such as *Bifidobacterium* and *Bacteroides*, as well as human milk oligosaccharides (HMOs), in microbiota development is highlighted. The interrelationship between the pathogenetic mechanisms of gut dysbiosis, immune dysfunctions, and metabolic disturbances is discussed using molecular-genetic methods. The article emphasizes the fundamental importance of establishing a healthy microbiota in early childhood and substantiates the necessity of considering the nutritional factor in optimizing treatment strategies.*

Keywords: *Infancy, gut microbiota, breast milk, formula feeding, dysbiosis, human milk oligosaccharides (HMOs), Bifidobacterium, Bacteroides, 16S rRNA sequencing, immune system, metabolism.*

Introduction: a person is a set of billions of microorganisms that exist in the body - microbiota, which plays an important role in maintaining health and pathogenesis of diseases. The infancy period, especially the first 1,000 days of life, is a period in which the formation, maturation and stabilization of intestinal microdonation are of particular importance [1]. During this time, the specificity and diversity of the composition of microbial communities in the intestine directly affects the development of the body's immune system, digestive processes, metabolic functions, and even the shallowing of the central nervous system [2]. The formation of intestinal microflora in infancy is influenced by a number of factors, including the method of birth (natural or caesarean section), gestational age, genetic predisposition, antibiotic therapy of the mother and baby, the environment and, most importantly, the type of nutrition [3, 4]. In particular, the unique role of breast milk in the optimal formation of infant intestinal microflora is one of the main objects of modern medical and microbiological research [5]. The composition of breast milk is not just a nutrient value, but a rich source of immunoglobulins, protective factors such as lactoferrin, lysozyme, as well as human milk oligosaccharides (HMOs) [6]. HMOs perform a specific prebiotic function, selectively stimulating intestinal growth of certain beneficial bacterial species, notably Bifidobacterium [7]. Artificial nutrition, an alternative to breast milk nutrition, is widely used for a number of reasons. However, artificial milk formulas, although their composition is maximally approximated to breast milk, lack important biologically active components such as HMOs and living bacteria in breast milk [8]. As a result, infants who have switched to artificial feeding experience profound and drastic changes in the intestinal microflora compared to infants who have been fed breast milk. These changes are evident in microbial diversity, the proportion of dominant species, and the metabolite activity of microbial communities [9]. Our goal is to analyze the deep

changes of the intestinal microflora of the intestines in relation to the type of nutrition on the basis of scientific literature, to highlight the molecular and biological mechanisms of these changes, and to discuss their long-term clinical significance for infant health. The role of modern molecular-genetic methods in determining these differences was considered Ham.

Purpose of the work: study of the condition of intestinal microbiocenosis of babies with natural and artificial nutrition

Materials and methods: infants have intestinal microflora according to changes related to the type of nutrition. From the 7th family polyclinic of Samarkand, 20 natural and artificially fed babies were selected, and their feces were examined in the bacteriological laboratories of the Department of Microbiology, Virology and immunology of the Samarkand medical multidisciplinary clinic.

Literature review:

The reviewed scientific sources were carefully studied in order to assess the structural and functional changes of the intestinal microflora of infants depending on the type of feeding, the biological mechanisms causing these changes, and the long-term effects of these changes on children's health. The importance of *Bifidobacterium* and *Bacteroides* species, the selective effect of HMOs, and the consequences of intestinal dysbiosis are taken into account. In microbiological analysis, modern molecular-genetic methods are widely used in the analysis of infant intestinal microflora.

1. 16S ribosomal RNA gene sequencing: This method allows determining the taxonomic composition of microorganisms through amplification and sequencing of specific regions of the bacterial 16S ribosomal RNA gene. Using this method, even non-cultivable bacteria can be identified. [10]

2. Shotgun metagenomics: This includes sequencing the complete DNA of all microorganisms in the microflora. This method allows analyzing not only microbial species but also their genetic potential and metabolic functions. [11] 3. Metabolomics: By measuring metabolites in infant stool samples, it serves to directly assess the functional activity of the microflora. [12]

Results. In March 2025, bacteriological examination of stool samples from 20 infants under 1 year of age, both breastfed and artificially fed, from Samarkand city Family Polyclinic No. 7 was conducted, and the following results were obtained. Of the infants, 12 (60%) were girls and 8 (40%) were boys. Among them, 85% of infants were breastfed, and 15% were artificially fed (Nestogen, NAN, Nuppi Gold). In bacteriological examination, 15 indicators were identified. In 8 infants, grade I dysbiosis was detected, that is, a relative decrease in normal microorganisms; among conditionally pathogenic microorganisms *Klebsiella spp.* was identified in 2 infants; among pathogenic microorganisms *S. aureus* was detected in 8 infants; and among strict anaerobic microorganisms *Clostridium spp.* was identified in 2 infants.

Discussion: Breast milk (in a healthy mother) is considered the most optimal biological nutrition. Breast milk consists of various components and is adapted to the immature gastrointestinal tract mucosa and plays an important role in the

formation of the nervous system, immune system, endocrine system, and other organ systems. Breast milk contains vitamins, minerals, and important components, namely nucleotides and DNA. This is not present in any artificial formula. During artificial feeding, within a certain time period, an atypical “bifidoflora” is formed with anaerobes other than bifidobacteria and facultative anaerobic bacteria. In other scientific studies, the amount of bifidobacteria in infants born in large urban maternity hospitals was consistently detected, which was not related to whether they were breastfed or artificially fed. It has been suggested that to improve the condition of the gastrointestinal tract and to form intestinal colonization, at least 1×10^9 colony-forming units (live microorganisms—probiotics) should be present. These bacteria have several functions, improving intestinal immunological protection and preventing penetration through the intestinal wall by pathogens. The intestinal microbiota of infants is a complex ecosystem consisting of many bacterial strains, species, and genera. This large cell mass performs many unique functions. This affects the physiology of the large intestine and systemic physiology. Its main functions include nutritional, metabolic, immunological, and protective functions.

Conclusion. Deep changes in the intestinal microflora of infants depending on the type of feeding are of fundamental importance for human health. Breastfeeding forms a healthy microbiota characterized by *Bifidobacterium* dominance, strengthens the immune system, and reduces the risk of various diseases later. Artificial feeding often leads to intestinal dysbiosis, and understanding changes in the intestinal microflora and managing them effectively, in particular through breastfeeding and, when necessary, through HMO-enriched formulas, is important in improving infant health. Grade I dysbiosis was detected in 40% of infants, and Grade II dysbiosis in 60% of infants.

In breastfed infants, the state of intestinal microflora was contaminated with the pathogenic microorganism *S. aureus* (40%), which indicates that breast milk is not sterile.

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INCREASING WASTEWATER TREATMENT EFFICIENCY USING HYDROBIONTS

Abstract: *This article is focused on wastewater treatment using hydrobionts and was conducted in the Bukhara water supply. As a result, in order to ensure the activity of microorganisms in the treatment plant and increase the efficiency of high purification, it was achieved to ensure that the oxygen content in the aeration tank was not lower than 4.6 mg/l and the IL index was not lower than 150 mg/l. It was recommended to use the treated wastewater for irrigation of technical crops and ornamental plants.*

Keywords: *wastewater, hydrobionts, treatment, seriobacteria, Infusoria.*

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GIDROBIONTLAR FOYDALANISHDA OQINA SUVLARNI TOZALASH SAMARALIGINI OSHIRISH

Annotatsiya: *Ushbu maqola oqava suvlarni gidrobiontlar yordamida tozalashga qaratilgan bo'lib, Buxoro suv ta'minotida olib borilgan. Natijada tozalash inshootlarida mikroorganizmlarning faolligini ta'minlash va yuqori tozalash samaradorligini oshirish maqsadida aerotankdagi kislorod miqdori 4,6 mg/l dan, IL indeksi esa 150 mg/l dan past bo'lmashligiga erishildi. Tozalangan oqava suvlardan texnik ekinlar va manzarali o'simliklarni sug'orishda foydalanish tavsiya etildi.*

Kalit so'zlar: *oqava suvlar, gidrobiontlar, tozalash, seriobakteriyalar, infuzoriyalar.*

Today, the results of global climate change are having a dramatic impact on the climate of Uzbekistan. In particular, the drying up of the Aral Sea in the span of a generation (over 60 years) and the emergence of the Aral Desert on its territory of 5 million hectares are creating complex socio-economic and ecological problems in the oasis. Such complex processes are reflected in the ecosystems of the Bukhara region. High temperatures, drought, desertification are leading to a shortage of drinking and irrigation water from year to year. The treatment and reuse of generated technical and domestic wastewater are factors that mitigate the problems

that have arisen. For this reason, the Bukhara city wastewater treatment plant was selected as an object for conducting scientific and practical work, monitoring, sampling, conducting chemical and biological analyzes, and conducting test experiments.

The Bukhara City "Wastewater Treatment Plant" belonging to the "Bukhara Water Supply" Limited Liability Company was commissioned in 1972 and the initial treatment was mechanical. The facility consisted of a building of iron barriers (rings), sand traps, primary clarifiers and biological artificial ponds (biopruds), through which wastewater was treated and discharged into the Sakovich ditch. In 1984, the design capacity was 100 thousand / m, additional primary clarifiers, aerotanks, an air pumping station, secondary clarifiers, sludge collection areas, and chlorination buildings were built and commissioned in 1985. However, the volume of wastewater entering the treatment plant reached 45-50 thousand / m due to the wastewater of the Bukhara Textile Combine. The composition of the wastewater was strongly alkaline, acidic, microorganisms died in the aeration tank and the IL index was 50-60 mg / l, and the overall efficiency of the facility was 30-40%. In accordance with the Resolution of the President of the Republic of Uzbekistan No. PQ-1216 dated October 29, 2009 "On measures to implement the project "Reconstruction of treatment facilities and sewage systems in the cities of Bukhara and Samarkand", in 2014-2016, the 1st phase of reconstruction work was carried out at the facility. The building of the chanbaraklar, sand traps, primary clarifiers, aeration tanks, secondary clarifiers, were reconstructed, and 6 air pumping stations were re-equipped with modern equipment.

The processes of wastewater treatment from suspended solids continue in the primary clarifier. The primary clarifiers consist of 4 radial clarifiers with a capacity of 25 thousand m, 2 of which are working and 2 are in reserve. The primary clarifiers consist of settling the suspended impurities in the wastewater for 2 hours in accordance with the wastewater treatment time (regulation). In the facility, wastewater is cleaned of 65-70% of suspended solids under the influence of centrifugal force during the rotation of special buckets and falls into the aerator, into which air is supplied under strong pressure. The amount of dissolved oxygen in the water is brought to 4-6 mg. As a result, biodiversity (bacteria, soda animals, amoeba, crayfish, infusoria) develops in the water. [3,6]

While the average ammonium content in wastewater was 77.8 kg/m³ per hour in spring, this indicator increased to 84.8 kg/m³ in summer. Similarly, nitrites in wastewater also have a seasonal character, with their content in spring being 4.5 kg/m³, in summer 4.5 kg/m³, in autumn an average of 4.1 kg/m³ and in winter 1.3 kg/m³, while nitrates range from 3.8 to 2.3 kg/m³ from spring to winter. The amount of phosphates was recorded in the range of 4.6-7.7 kg/m³. The maximum indicator of the amount of suspended solids in wastewater is 389.2 kg/m³ (in summer) and the minimum is 353.8 kg/m³ (in winter). The composition and amount of mineral salts was recorded at 249.2-287.8 kg/m.

In order for the ammonium salts and nitrogen nitrites contained in the wastewater to be completely decomposed into nitrate ions in the aeration tank, the

active clay index in the aeration tank should be 200-250mg/l and the dissolved oxygen content in the water should be 4-6 mg/l, and its active participation in the purification process should achieve the complete decomposition of organic substances contained in the wastewater. The second important factor is the ratio of air pumped into the aeration tank, which is 4-4 m to 1 m of air. The duration of complete purification of wastewater in the aeration tank is 10-12 hours.

As a result of the experiment, it was noted that the organic matter content of wastewater in the aeration tank is primarily determined by the activity and quantity of bacteria. According to A.G. Rodina (1965), the decomposition of organic pollutants in wastewater by bacteria occurs in a logarithmic graphic phase, and in the remaining stages, the bacteria pass into the zoogel (turbid) phase. It is possible to observe the diversity of the composition of microorganisms during the decomposition period with the participation of aerobic bacteria participating in the nitrification process of wastewater. Microorganisms are based on the use of organic matter in wastewater as food for their vital activity. With the acceleration of the nitrification process in wastewater, that is, with the increase in the amount of dissolved oxygen in water (4-6 mg / l), ammonium salts, nitrogen dioxide into nitrates, representatives of the kolvratka began to dominate in the active composition of the active layer, replacing sedentary and free-swimming infusoria. Among these, several species of Brachionus, Microcolidia, Asplanchnia, and Keratella were found to be among the dominant species, as reflected in the analyses and tests conducted.

The fully treated wastewater was passed through bioponds, neutralized, and tested in several stages for 48 hours using the zooplankton representative

Daphnia longispina Mull. In the experiment, it was noted that 85-90% of the test experiments conducted using 5-7-day-old nauplii (larvae) of *Daphnia* survived.

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ARCHIVAL EVIDENCE OF FRENCH SCHOLARSHIP IN COLONIAL TURKESTAN: THE CASE OF JOSEPH ANTOINE CASTAGNÉ

Abstract: *This article examines archival evidence related to the scientific activities of the French scholar Joseph Antoine Castagné in the territory of present-day Uzbekistan during the late nineteenth and early twentieth centuries. Based on official documents preserved in the National Archives of Uzbekistan, the study highlights Castagné's role in archaeological, ethnographic, speleological, and geographical research conducted under the Turkestan Governor-Generalship.*

Keywords: *Joseph Antoine Castagné, archival sources, Turkestan, colonial scholarship, Imperial Russian Geographical Society, archaeology, ethnography, speleology, regional studies.*

In the second half of the nineteenth century and the early twentieth century, scientific research conducted in Central Asia, including the territory of present-day Uzbekistan, was carried out under historically complex political and social conditions. This period was closely connected with the colonial policy of the Russian Empire, and scientific investigations often served the strategic, administrative, and military interests of the empire. In particular, geographical, ethnographic, archaeological, and statistical studies were aimed at gaining a deeper understanding of colonial territories and facilitating their governance and control. Nevertheless, interpreting the scientific heritage of this period solely as a product of colonial policy does not fully correspond to historical reality.

Indeed, among the researchers who worked in Turkestan during the Russian imperial period were scholars who prioritized the interests of science and sought to record their observations and collected data as objectively, systematically, and in accordance with scholarly standards as possible. They attempted to maintain a relatively independent academic position while studying the history, culture, customs, social life, and natural environment of local populations. This circumstance necessitates a deeper source-based examination of the scientific research of that period and its reassessment in accordance with the requirements of modern historiography.

One such researcher was the French scholar Joseph Antoine Castagné, who left a significant mark on the study of Turkestan through his multifaceted scientific activity. Castagné conducted research in archaeology, ethnography, speleology, linguistics, numismatics, and geography, and his works represent important source material for understanding the historical and cultural landscape of Central Asia. In particular, his expeditions, collected evidence, and prepared scientific reports made

a substantial contribution to the development of Turkestan regional studies, historical-ethnographic research, and museology.

Joseph Antoine Castagné was born in 1875 in the small French town of Gaylac and died in 1958 in Montpellier. Although he was born and died in France, the most active and productive twenty years of his life were spent in the territory of the Russian Empire. It was during this period that Castagné formed his scholarly worldview, conducted extensive research, and gained recognition within the scientific community.

After obtaining a diploma granting him the right to teach French in secondary schools, Castagné arrived in Russia in the spring of 1899. In February 1901, having successfully passed an examination before the pedagogical council of the Vladikavkaz Gymnasium, he was appointed as a teacher of French. Alongside his teaching career, he deepened his interest in scholarly research and established contacts with various scientific societies.

In 1904, Castagné made his first journey to Turkestan, which became a turning point in his subsequent scholarly activity. He developed a particular interest in the region's historical monuments, natural conditions, and the lifestyle of the local population. From 1909 onward, he worked as a curator at a museum under the patronage of the Orenburg Scientific Archival Commission, a position that allowed him direct access to archival documents, historical artifacts, and scientific collections.

In 1912, at his own request, Castagné was granted permission to transfer his professional activity to Tashkent, and on September 28, 1913, he accepted Russian citizenship. In Tashkent, while working as a French language teacher and class supervisor at a secondary specialized educational institution, he significantly expanded his scientific research in the territory of Turkestan. From this period onward, his archaeological, ethnographic, and speleological expeditions acquired a systematic character, and he actively cooperated with the Turkestan Branch of the Imperial Russian Geographical Society and the Turkestan Circle of Archaeology Enthusiasts.

In this respect, Joseph Antoine Castagné's scientific activity in Turkestan represents not only the personal scholarly pursuits of an individual researcher, but also an important historical phenomenon reflecting the complex, multi-layered, and often contradictory nature of scientific processes in the colonial period. Studying his activity on the basis of archival sources is of great importance for reconstructing a more accurate picture of scientific research conducted in Turkestan at the turn of the nineteenth and twentieth centuries. The study of Joseph Antoine Castagné's activity during the period of the Turkestan Governor-Generalship and his scientific research in the territory of present-day Uzbekistan has been addressed rather narrowly in historiography.

Within the framework of the present study, priority was given to official archival documents from 1913–1917 preserved in the National Archives of Uzbekistan. These documents are exceptionally rich in both volume and content, directly reflecting Castagné's scientific, organizational, and administrative activity

in Turkestan. The majority of the archival materials are connected with the activities of the Turkestan Branch of the Imperial Russian Geographical Society and the Turkestan Circle of Archaeology Enthusiasts, which played a central role in supporting Castagné's research.

Particularly significant among these sources are the official certificates issued in Castagné's name by the Turkestan Branch of the Imperial Russian Geographical Society. These documents indicate his scholarly status, official authority, and recognition as a full member of the society. They granted him the right to conduct research, organize expeditions, communicate with local administrative bodies, and use necessary technical equipment throughout the territory of Turkestan. This confirms that his activity was not incidental but coordinated and supervised by imperial scientific institutions.

A substantial portion of the archival material consists of Castagné's expedition plans and documents related to the preparation of scientific journeys. These plans clearly define research directions, geographical areas, scientific objectives, and expected outcomes, demonstrating a high level of methodological rigor and systematic organization. In particular, the integration of speleological, ethnographic, archaeological, and geographical research indicates Castagné's comprehensive scientific approach.

The archives also contain Castagné's official applications and correspondence addressed to the leadership of the Turkestan Branch of the Imperial Russian Geographical Society. These materials shed light on the organizational aspects of his work, including issues related to logistical support, transportation, scientific equipment, and auxiliary personnel. They reveal Castagné not only as a researcher but also as an organizer and leader of scientific expeditions.

Of particular importance are Castagné's technical requests, which list contemporary scientific instruments such as geodetic devices, cameras, barometers, and maps. These documents demonstrate his emphasis on empirical accuracy and modern research methods, providing further evidence of the scientific rigor of his work. Minutes of meetings and council decisions of the Turkestan Branch of the Imperial Russian Geographical Society and the Turkestan Circle of Archaeology Enthusiasts are also valuable sources for examining the institutional aspects of Castagné's activity. Through these materials, it is possible to trace how his initiatives were discussed, approved, or rejected, as well as to assess his standing and reputation within the scientific community of Turkestan.

In general, the analysis of existing literature and, especially, archival sources indicates that Castagné's activity in Turkestan has not yet been studied in a comprehensive and systematic manner. Most existing works are descriptive in nature and do not sufficiently examine his specific expeditions, administrative interactions, or the source-based foundations of his scholarly legacy. Therefore, the present research, based on documents from the National Archives of Uzbekistan, contributes to a reassessment of Castagné's activity using new facts and sources and to clarifying his true role in the history of Turkestan regional studies.

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NON-EQUIVALENT VOCABULARY AS AN INTEGRAL PART OF CULTURE

Annotation. *The given article is dedicated to study Uzbek non-equivalent lexical units in linguocultural and cultural aspects, as well as interaction of language and culture, analyses of which is the most important branches in modern linguistics.*

Key words: *linguoculture, Uzbek non-equivalent lexical units, realia, English mass media in Uzbekistan.*

Introduction. At present, the relationship between language and culture is becoming increasingly important. The study of the issue of the interconnection between language and cultural phenomena is, in many cases, related to the concept of culture, which belongs to the category of complex, multifaceted, and diverse social phenomena. Language, as a linguoculturological phenomenon, embodies cultural wealth, and the development of any national culture is simultaneously linked to the specific character of a particular language. At the same time, language is capable of representing an entire worldview; it encompasses a multifaceted culture and a multilayered society from a lexical-semantic perspective.

Research materials and methods. Today, there are hundreds of definitions that attempt to clarify the concept of culture, and as E. M. Vereshchagin and V. G. Kostomarov have noted, language and culture are closely intertwined. “No one should doubt,” the scholars wrote, “that the semantic scope of a language derives from the national worldview. At the same time, language itself can, in turn, influence culture. Thus, language cannot exist apart from culture, and culture cannot exist outside of language.” [1].

There exists an intrinsic cooperation between language and culture. In this regard, Wilhelm von Humboldt writes that the results of the process of cultural development depend more on examining the influence of language on culture than on studying the influence of culture on language. Based on this idea, in the 1990s, a distinct field of social science—linguoculturology—emerged, bringing together the ideas of scholars such as W. von Humboldt, E. Sapir, B. L. Whorf, J. L. Weisgerber, A. Wierzbicka, Yu. S. Stepanov, V. V. Vorobyev, and V. I. Karasik.

I. Zinovieva and E. E. Yurkov, who have expressed views on linguoculturology, define it as follows: “We consider linguoculturology to be a philological science that studies the various ways speakers of a given language perceive the world. In this process, attention is given to the linguistic activity that reflects the speakers’ worldview: the meanings of the units being analyzed, their

shades, connotations, and associations, as well as the study of discourse units that help explain them in their entirety.” [2].

According to the view of Sh. Mahmaraimova serving various national-ethnic communities, language accumulates certain elements of their development. In the vocabulary of every language, background knowledge specific to a given ethnic community is formed. Today, great attention is being paid to studying issues such as the national-cultural features of language use and linguocultural concepts. [3]

. According to Sh. Usmonova: “Differences between languages are usually based on differences between cultures. These distinctions are noticeable in the lexical and phraseological layers of a language; therefore, the nominative units of a language are, in most cases, connected with extralinguistic factors”. [4]

The scholar also adds the following explanation to this description: “In any language or dialect, there are words that cannot be translated into another language with a single equivalent. That is, some lexical units in the source language do not occur in the lexical system of the target language and have no counterparts. Such words are called non-equivalent (Lat. *aequus* — equal, equivalent + *valens* — value) vocabulary.”

In the development of modern linguistics, primary attention is devoted to the national-cultural characteristics of language and the linguocultural aspects of society. This process can also be observed in the texts of mass media.

At present, society has gained vast and rapid access to information through countless mass media outlets. Regardless of how information is received, it is always expressed through linguistic means. The influence of mass media on its audience is connected with its national characteristics.

This article examines the linguoculturological aspect of Uzbek vocabulary in the English-language press published in Uzbekistan.

When discussing the relationship between linguistic behavior and the Uzbek mentality, it should be emphasized that this section is based on the principles of linguoculturology, which studies communicative processes in the media and the connection between the linguistic expressions used within them and the mentality of the people.

Every nation uses its language in its own way. Language, besides conveying information, is also a means of communication in naming objects. Due to this function, it reflects national identity.

Words and expressions that reflect the national distinctiveness of Uzbek culture are highly important in clearly demonstrating the connection between the speech behavior of the people and their mentality. The linguistic forms referred to as “non-equivalent vocabulary” are proper names and terms that may be known to speakers of other languages, but possess strong national characteristics: nationally colored toponyms, lexical units specific to each language that denote objects and phenomena, and others. When discussing non-equivalent vocabulary, it is generally understood that such words cannot be fully translated. This, in turn, raises the question of how this vocabulary can be conveyed in another language.

The national character within the semantic structure of a language unit is the product of the influence of extra linguistic factors on the development of a people's cultural and historical characteristics. Each language unit consists of a specific number of components that indicate national-cultural meaning. The first to address national-cultural components was the Russian linguist N. G. Komlev (in his works, this component was called "cultural-historical," while the term "national-cultural component" appeared later and belongs to A. S. Mamontov). [5] In his view, a word contains, in addition to information about an object, a certain social background that enters into association with that word. Primarily, this includes everyday vocabulary related to clothing (garments, footwear, headwear, etc.). Studying such units makes it possible to identify the features of how speakers of different languages perceive and reflect the world. Therefore, this research determines how ethnic mentality is expressed lexically in the thematic group "clothing" in the Uzbek language through comparison.

Results and discussion

In the English-language press of our country, one can observe the use of non-equivalent vocabulary specific only to the Uzbek people, particularly words related to clothing; **adras**, **khon-atlas**, **qo'chqor shoxi**, **gulinamozshom**, **baxmal**, **beqasam**, **do'ppi**, **chopon**, **yaktak**, **mahsi**, **kovush** and etc.

For example, the use of Uzbek words related to national fabric in the English language: *"In the evening the internal part of mirror azure waves is illuminated by **adras** (Uzbek semi-silk fabric) patterns giving the construction special effect of color play."* (Uzbekistan Today. 17.09.17); *"Two-colored and black-and-white **khon-atlases**, patterns of which contain images of tree or luxuriant bush, and also motives of helical shapes as like **"qo'chqor shohi"** (horns of a ram) are of special rank"* (Uzbekistan Today. 05.02.17); *New paintings skillfully submit to the law of the conditional image and are masterly intertwined to the traditional style. **Khon-atlas** with such patterns as **"chaqrim"** (echo), **"gulinamozshom"** (a night flower) and **"shaxmatguli"** (chess pattern) are the most popular ones"* (Uzbekistan Today. 05.02.16); *"Ancient fabric **baxmal** (velvet) was made in domestic conditions till about 30thies of the 20th century"; "Another striped fabric, **beqasam**, was used by local population for sewing top clothing... "* (Эхо Истории. 18.05.09). *"Male clothing was made mostly from cotton fabric **bekasam**, whereas female clothing was made of silk, brocade, **adras**, cotton, and sateen"* (Discovery Guides. №69, 10).

Words related to the names of national headwear: *"Perhaps the most ancient traditional clothes of Uzbek women are dresses **kuylak**"* (Discovery Guides. №34. 10); *"Male population of Surkhan towns and kishlaks(village) had clothing of the same type: **chapan**(coat), **yaktak** (shirt), **do'ppi** (embroidered skull-cap), turban, hat, overshoes with itching or **mahsi** (kind of leather socks), boots, **charyk** (wooden shoes), and other auxiliary pieces of clothing".* (Discovery Guides. №33. 10); *"Contrast to other regions Uzbekistan, Surkhan women did not carry **paranja** and **chachvan**, hiding face and shape of the woman from top to toe, i.e"* (Discovery Guides. №73, 10); - *"Words related to national footwear: "Uzbek **makhsi**: history with continuation, **"Makhsi** and even **kovush** did not make an exception, they have*

been covered with ornaments of golden embroidery made in technology of zamindo 'zi" (Uzbekistan Today. 26.02.10, p.8)

Conclusion. In conclusion, we can say that the linguistic behavior of an ethnic group serves as a unique mirror of the national mentality. It clearly reflects the cultural and historical traditions of the people as well as their collective experience. It can be said that language, national mentality, lifestyle, and the culture and history of a people are inseparable parts of one whole. From the points mentioned above, we may conclude that the factors of language and culture are always closely interconnected.

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COMPARISON OF GENERAL AND SPECIFIC FEATURES IN THE PHONETIC SYSTEMS OF ARABIC AND UZBEK LANGUAGES

Abstract: *The comparative study of Arabic and Uzbek phonetics explores both universal and language-specific features of speech sounds. This research examines consonantal and vowel inventories, articulatory mechanisms, and prosodic patterns in Modern Standard Arabic (MSA) and Standard Uzbek, aiming to identify shared phonetic principles and unique language-specific characteristics. The study employs descriptive and contrastive phonetic methods, analyzing phonemic inventories and typological patterns. Results indicate that while general phonetic mechanisms are present in both languages, Arabic demonstrates emphatic consonants and vowel length distinctions absent in Uzbek, whereas Uzbek exhibits predictable stress and simpler consonant clusters. These findings contribute to theoretical phonetics and provide practical insights for second language acquisition.*

Keywords: *Arabic phonetics, Uzbek phonetics, vowel systems, consonant articulation, phonetic universals, language-specific features, prosody, comparative phonetics*

The comparative study of phonetics across genetically unrelated languages such as Arabic and Uzbek provides valuable insights into both universal phonetic principles and language-specific articulatory patterns. This study aims to identify the general phonetic mechanisms shared across languages and the particular features that distinguish Modern Standard Arabic (MSA) and Standard Uzbek. Understanding these aspects is crucial for theoretical phonetics, typological linguistics, and practical applications in second language acquisition. The methodology integrates descriptive and contrastive approaches, utilizing phonemic inventories, articulatory descriptions, and typological analysis. The results reveal that while both languages share core phonetic universals, they diverge significantly in consonantal inventories, vowel systems, prosodic organization, and phonotactic constraints. These findings illuminate the interaction between universal speech mechanisms and language-specific adaptations, offering implications for pedagogy and phonetic theory.

Phonetics, as the scientific study of speech sounds, examines articulatory, acoustic, and auditory properties of human language. Across languages, articulatory features such as place and manner of articulation, voicing, nasality, and vowel

height represent universal mechanisms underlying phonological organization⁶. In Arabic, the consonantal inventory is particularly rich, including pharyngeal, uvular, and emphatic consonants, which have no direct parallel in Uzbek. Modern Standard Arabic has 28 consonant phonemes and three short and long vowel pairs: /a a:/, /i i:/, and /u u:/, with phonemic contrasts realized through vowel length and secondary articulation⁷. The emphatic consonants /s^ʕ/, /d^ʕ/, /t^ʕ/, and /ð^ʕ/ influence the quality of adjacent vowels, demonstrating a complex interaction between segmental and suprasegmental features⁸. Diacritics in written Arabic indicate short vowels, which are often omitted in texts, requiring native competence for correct pronunciation⁹.

In contrast, Uzbek phonetics presents a smaller vowel inventory of six primary vowels, and a consonant system shaped by Turkic phonological heritage with influences from Persian, Arabic, and Russian. Standard Uzbek exhibits reduced vowel harmony compared to other Turkic languages and favors final-syllable stress, though morphological suffixation can alter stress patterns¹⁰. A distinctive feature of Uzbek phonetics is the presence of a system of 24 consonant phonemes, differentiated by place and manner of articulation, including labial, gliding, and dorsal sounds, as well as the active role of sonorants and vowels in shaping sonority¹¹. Uzbek consonants include typical Turkic plosives, fricatives, and affricates, with articulatory patterns remaining largely stable across dialects¹². Unlike Arabic, Uzbek lacks emphatic or pharyngealized consonants, and vowel length distinctions are less phonemically significant, illustrating how language-specific features can diverge from universal phonetic tendencies.

Despite these differences, Arabic and Uzbek share general phonetic principles. Both languages distinguish vowels and consonants by place and manner of articulation, voicing, and nasality. Vowels in both languages function as syllabic nuclei, while consonantal segments form the onset or coda positions within syllables¹³. Both systems exhibit systematic syllable structure rules, though the specific constraints differ. Arabic permits consonant clusters and complex syllables in certain positions, whereas Uzbek favors simpler CV or CVC structures, reflecting typological distinctions.

Prosody further highlights particular differences. Arabic stress is influenced by syllable weight and vowel length, and emphatic consonants can trigger secondary articulatory effects on stressed syllables¹⁴. In contrast, Uzbek stress is relatively predictable, typically falling on the final syllable of words or morphological stems, and vowel harmony, while historically significant, is weakly realized in modern standard speech¹⁵. These prosodic patterns demonstrate how the same universal

⁶ Ladefoged & Maddieson, 1996, pp. 12–13

⁷ Salameh & Abu-Melhim, 2015, pp. 60–61

⁸ Bani Salameh, 2015, pp. 32–33

⁹ Salameh & Abu-Melhim, 2015, pp. 62–63

¹⁰ Ergashova, 2025, pp. 98–99

¹¹ Jamolxonov, 212-213-betlar.

¹² Qarshiyeva & Hamidov, 2025, pp. 2664–2665.

¹³ Ladefoged & Maddieson, 1996, pp. 14–15.

¹⁴ Bani Salameh, 2015, pp. 34–35

¹⁵ Ergashova, 2025, pp. 100–101

mechanisms, such as syllable-based stress, can manifest differently across languages, shaped by historical evolution and language contact.

The vowel systems of Arabic and Uzbek reveal both universals and particulars. Arabic's three short and long vowel pairs provide phonemic contrasts essential for lexical and morphological distinctions, with long vowels affecting prosodic structure¹⁶. Uzbek's six vowels contrast in height and backness but do not employ length as a phonemic distinction, reflecting typological differences¹⁷. Additionally, Arabic vowels interact with adjacent emphatic consonants to produce allophonic variations, whereas Uzbek vowels maintain relatively consistent quality across phonetic contexts¹⁸. Furthermore, the distinction between Uzbek and Arabic phonetics is evident in the fact that Uzbek employs the phonological features of "labiality–non-labiality" and three degrees of tongue height in vowel articulation, which are absent in Arabic, where the phonetic system does not include such vertical and labial oppositions¹⁹.

The comparative analysis demonstrates that universal phonetic mechanisms, such as articulatory distinctions, syllable structure, and segmental organization, underpin both Arabic and Uzbek phonetics. Language-specific adaptations, including emphatic consonants, vowel length contrasts, and prosodic rules in Arabic, and stress patterns and simplified consonant clusters in Uzbek, illustrate the particular phonetic identity of each language. This interaction between universals and particulars informs typological linguistics and offers practical implications for second language teaching. For instance, understanding Arabic emphatic consonants is essential for Uzbek speakers learning Arabic, as the phonetic contrasts are absent in their native language, potentially leading to pronunciation challenges.

In conclusion, this study elucidates the relationship between general phonetic principles and language-specific features in Arabic and Uzbek. The findings confirm that while universal articulatory mechanisms provide a foundation for human speech, the specific phonetic realizations are shaped by historical, typological, and contact-driven factors. These insights are relevant for theoretical phonetics, cross-linguistic comparison, and applied linguistics, particularly in designing curricula for language learners. Future research could incorporate acoustic analysis and perceptual studies to quantify differences in vowel quality, consonantal articulation, and prosody, further refining our understanding of universals and particulars in phonetic systems.

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¹⁶ Salameh & Abu-Melhim, 2015, p. 61.

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DIGITAL GOVERNANCE AND PUBLIC SERVICE REFORM IN UZBEKISTAN

Abstract: *The implementation of governance and the overhaul of the civil service framework in Uzbekistan represent a crucial development in building contemporary public administration. Significant emphasis is placed on enhancing transparency, efficiency and responsibility of bodies by extensively integrating digital technologies into management approaches. Key reform areas include digitizing services minimizing bureaucratic obstacles and establishing a supportive atmosphere, for both citizens and business owners. At the same time, the issues of increasing the professional potential of civil servants, organizing their activities on the basis of digital competencies and introducing innovative approaches to management processes are also gaining relevance. The consistent implementation of digital governance and civil service reforms serves to build trust in society and ensure sustainable socio-economic development.*

Keywords: *Digital governance, public administration, e-government, Uzbekistan, public service reform, digital transformation, state modernization.*

Introduction: Over the few years Uzbekistan has experienced a significant change in the operation of public administration with digital governance becoming a key element of national reform. This change is deeply connected to the nations approach to modernization, institutional reform and building a more effective and transparent government. With movements highlighting the importance of digital solutions, in public administration Uzbekistan has prioritized technological advancement as a fundamental aspect of its government development plan. The objective is not merely to implement digital technologies but also to profoundly transform the interaction, between the government and its citizens. The move toward governance gained momentum post-2017 following several presidential directives and government initiatives emphasizing the reduction of bureaucracy enhanced transparency and better quality of public services. Before that time administrative procedures were mostly paper-driven, sluggish and frequently necessitated face-to-face visits, to government agencies. These methods led to inefficiencies. Diminished the overall effectiveness of delivering public services. Acknowledging these challenges the government launched reforms focused on creating a responsive and citizen-focused state system with digitalization seen as the key instrument to realize these objectives.

Digital governance in Uzbekistan covers projects, such, as building e-government systems automating government operations establishing inter-departmental information networks and implementing data-based decision-making

frameworks. The launch of the "Integrated Portal of Interactive Public Services" represented an achievement by allowing citizens to utilize government services via the internet thereby lowering administrative obstacles and enhancing service availability. Nowadays individuals are able to perform activities like business registration, utilizing services submitting applications for official papers and obtaining online alerts. All, via digital systems that keep growing in scope and capability. Beyond improving service delivery, digital transformation plays a strategic role in promoting transparency and accountability. The publication of open government data and the digitalization of internal administrative workflows help minimize corruption risks by reducing direct personal interactions between citizens and officials. Moreover, digital monitoring tools allow the government to track performance across various sectors, identify gaps in service delivery, and implement timely improvements.

Literature review

Digital governance is now acknowledged worldwide as a tool for updating public administration with researchers thoroughly studying its impact on enhancing government efficiency, openness and service provision. Heeks highlights that digital change in government involves more than adopting technology; it also demands organizational reform and skill development pointing out that tech systems frequently fail if the organization is not adequately prepared [1]. Fountain's known concept of the "technology enactment framework" contends that the results of digital governance hinge, on the ways institutions integrate technologies into the current political and administrative contexts [2]. Global studies emphasize the capacity of governance to diminish corruption and enhance transparency. Bertot, Jaeger and Grimes note that digital instruments—like open data portals and tracking mechanisms—bolster accountability by restricting discretionary authority and facilitating public supervision [3]. Likewise research by Gil-García highlights that effective e-government projects depend on information systems and collaboration between agencies allowing smooth service provision, across government entities [4]. Digital governance in developing and transitional nations has gained academic interest. Misuraca contends that digital transformation offers developing economies a chance to bypass administrative frameworks and implement novel service delivery approaches [5]. Kettl similarly emphasizes that contemporary reforms often merge efficiency with digital technologies setting new standards, for how citizens and the state engage with each other [6]. In Central Asia, Abdukhalilov and colleagues note that digitalization efforts are strongly linked to broader economic and political reforms, with countries like Kazakhstan and Uzbekistan actively integrating information technologies into public management systems [7].

Results and Discussion

Examining Uzbekistan's advancements in governance reveals that the nation has transitioned from scattered digital efforts to a more organized and unified overhaul of public administration. A prominent result of these changes is the growth of public services, which has greatly altered how citizens engage with government bodies. The deployment of digital platforms has diminished the necessity for in-

person visits, to governmental offices and lessened bureaucratic obstacles that once hindered administrative procedures. People can now perform activities online such as acquiring certificates requesting social assistance settling state fees and filing formal applications. This transition has sped up the provision of services and enhanced user satisfaction by offering more transparent processes. Another significant outcome is the increasing adoption of integrated information systems, within government agencies. In the past government departments frequently operated with databases leading to redundant and inconsistent records. The introduction of a digital framework has enabled quicker and more dependable data sharing among agencies. This enhancement has boosted the precision of records, administrative mistakes and facilitated more efficient oversight of government operations. The circulation of data has also facilitated more uniform decision-making with officials depending on current and linked information instead of paper documents. The changes have significantly influenced openness and responsibility in the sector. Online tools enabling citizens to follow service developments review spending and retrieve government data have enhanced public supervision. This has minimized chances for activities since each action within a digital framework generates a documented record. Consequently transparency is no longer a conceptual ideal but an operational feature of government functions. People currently enjoy increased insight into the decision-making processes of authorities fostering confidence, in governmental bodies. A further result of governance is the heightened implementation of data-driven management methods. Utilizing analytics and automated tools allows government bodies to assess service performance, pinpoint issues and distribute resources effectively. Fields like healthcare, education, social protection and taxation are progressively gaining from automated tracking systems that deliver real-time information. This movement towards evidence-based governance represents a departure, from conventional administrative methods that depended largely on manual supervision.

Table 1. Key Digital Governance Indicators in Uzbekistan

Indicator (2025)	Value	Notes
Total number of online public services	420+	Services available through the unified e-government portal
Percentage of public services fully digitalized	68%	Services requiring no physical visit
Citizens registered on e-government platforms	13.4 million	Active digital ID and portal users
Share of government payments made online	72%	Taxes, fees, utilities, penalties
Average processing time for digital services	11 minutes	Previously 2–3 days for many paper-based services
Number of interagency integrated databases	34	Unified registries and information systems
Internet penetration rate	89%	With 75% in rural areas

Indicator (2025)	Value	Notes
Share of rural households using e-government services	54%	Growing due to mobile app adoption
Cybersecurity incidents recorded	1,280	14% decrease compared to 2024
Government employees trained in digital skills	156,000	Completed certified ICT and e-governance courses
Number of public service centers (in-person) optimized through digitalization	112	Many procedures moved fully online
Share of documents issued electronically instead of paper	77%	Certificates, licenses, extracts
AI-assisted public services	26 services	Chatbots, automated processing, facial recognition identity checks

Although the outcomes are encouraging the review of these advancements also emphasizes persistent challenges. A key concern is the gap in access between city and countryside locations. Even though internet availability has grown numerous distant areas continue to experience connectivity restrictions or do not possess the competencies necessary to utilize online platforms effectively. This disparity can hinder the inclusivity of reforms resulting in access to governmental services. Guaranteeing that every individual gain from transformation necessitates further funding, in infrastructure and local digital education initiatives. Cybersecurity poses a significant challenge. With the government depending on digital systems for storing and handling sensitive data the threat of cyberattacks and information breaches grows more severe. Enhancing security measures upgrading data protection protocols and educating experts in risk management are crucial for preserving public confidence, in digital platforms. In the absence of cybersecurity structures even carefully planned digital reforms might be exposed to risks. Shifting to governance also demands cultural and structural shifts inside the public sector. Certain organizations are still familiar with administrative methods hindering the complete adoption of digital platforms. Opposition to change, lack of skills among staff and poor coordination between departments can restrict the success of reforms. Ongoing education, explicit direction and enhanced cooperation among agencies are essential, for ensuring systems operate efficiently and uniformly throughout every tier of government. Despite these challenges, the overall direction of digital governance reform in Uzbekistan is highly positive. The number of citizens using online services continues to grow each year, indicating increasing trust and familiarity with digital tools. Government bodies are becoming more responsive, workflows are becoming more efficient, and administrative transparency is gradually improving. These changes reflect a broader shift toward a citizen-centered public administration model, where convenience, accessibility, and accountability are prioritized.

Conclusion

To sum up Uzbekistan's path toward governance and reforming public services demonstrates a deliberate dedication, to updating state institutions boosting transparency and advancing services focused on citizens. The adoption of technologies has facilitated administrative processes and bolstered accountability and effectiveness in multiple areas. Significant efforts, such, as digitizing government services deploying e-government systems and encouraging data-based policy formulation showcase the nation's thinking stance on leveraging technology to transform the public sector. However, the success of these reforms depends on continuous investment in digital infrastructure, capacity-building among public servants, and fostering digital literacy among citizens. While significant progress has been made, challenges such as cybersecurity risks, digital divide issues, and the need for comprehensive regulatory frameworks remain pertinent. Addressing these challenges will be crucial to ensuring that digital governance initiatives achieve their intended outcomes and contribute to sustainable socio-economic development.

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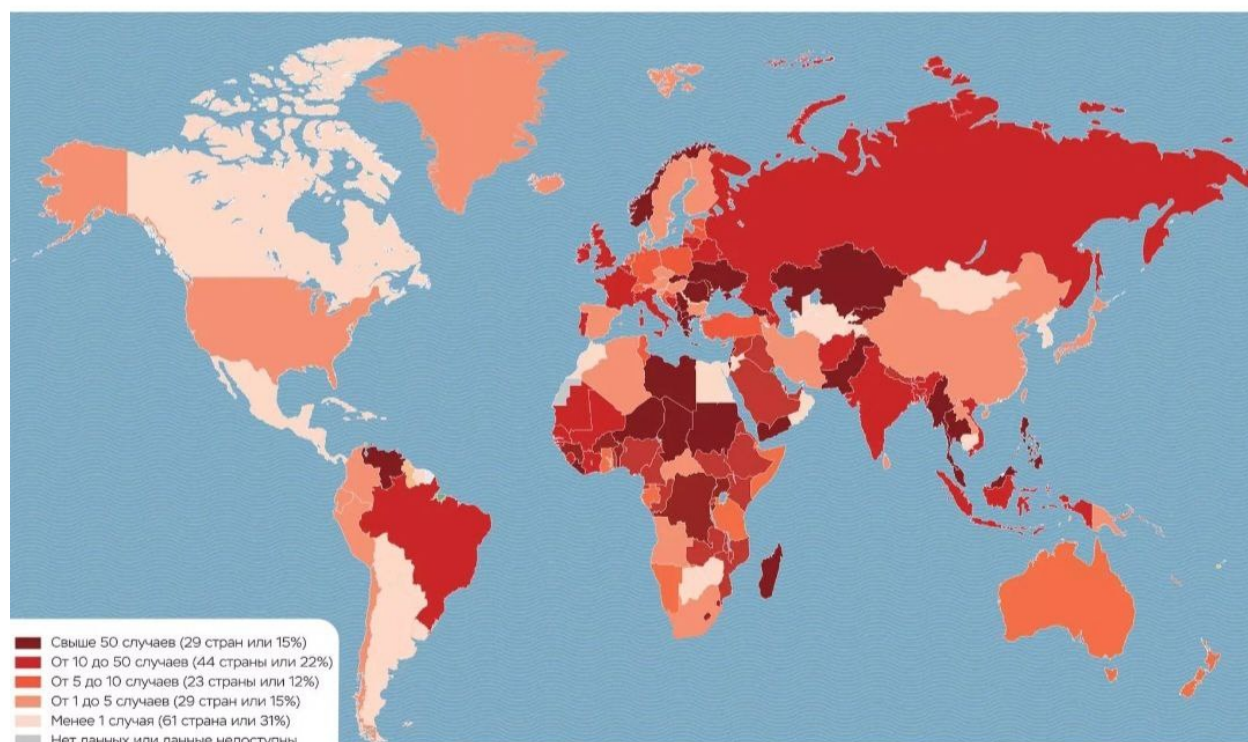
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FEATURES OF THE MANIFESTATION OF SCARLET FEVER IN ADULTS

Abstract. WHO experts believe that the incidence of measles in Europe and Uzbekistan has reached a historical maximum over the past ten years. The measles situation in the world, including in European countries, has remained unfavorable for three years now. The European Center for Disease Prevention and Control associates this frightening trend with a decline in the global vaccination rate to 78% instead of the required 90–95%.

Key words: children, exanthema, infectious erythema.

Objective. Despite the availability of a safe and affordable vaccine, measles caused an estimated 107,500 deaths globally in 2023, the majority of whom were unvaccinated or undervaccinated children under 5 years of age.



In 2023, the proportion of children who received a first dose of measles vaccine was 83%, a significant decrease from 86% in 2019.

Measles remains a common disease, particularly in parts of Africa, the Middle East, and Asia. The vast majority of measles deaths occur in low-income countries with weak healthcare infrastructure, which struggle to immunize all children.

Introduction

WHO experts believe that the incidence of measles in Europe has reached a historic high over the past ten years. The measles situation in the world, including in European countries, has remained unfavorable for three years now.

Measles is a highly contagious anthroponotic viral infection with an aspiration mechanism of transmission.

Pathogen. Characterized by febrile, intoxication, and exanthema syndromes, the presence catarrhal phenomenon, enanthema, and often occurs with primary and/or secondary complications.

Etiology-The causative agent of measles is an RNA genomic virus belonging to the paramyxovirus family. Pathogens are not persistent in the environment, but they can be kept alive for several hours in aerosols. By In terms of its epidemiology, measles is a typical droplet infection. The source of infection is sick people. The greatest danger in terms of transmission of infection is represented by patients in the catarrhal period (on average, 4 days before the appearance of the rash and until the 5th day after the appearance of the rash). The incubation period for measles is often only 10–14 days. One of the most dangerous viral infections for adults is measles, the contagiousness index (morbidity after contact with the pathogen) is 90–95%, and the disease is tolerated by adults significantly harder than children. At the onset of measles, damage to the epithelial cells of the respiratory tract dominates the development of relevant clinical manifestations. The measles virus, located in the mucous membrane of the upper respiratory tract pathways and in the nasopharyngeal mucus, is released from the body when coughing, sneezing, talking and even breathing in the form of tiny aerosol droplets. Measles symptoms do not appear immediately after infection. In classic clinical practice, the course of measles is divided into periods: incubation (from 7 to 21 days), catarrhal (the first symptoms of measles: increased body temperature, cough, runny nose) and periods of rashes, pigmentation and recovery (reconvalescence). The first manifestations of measles (prodromal stage) are nonspecific symptoms: fever, cough, runny nose, and conjunctivitis. At the end of the prodromal period, Belsky-Filatov-Koplik spots appear on the buccal mucosa, which are specific for measles. They look like gray-white grains surrounding hyperemia, located at the level of the second molars. These rash elements persist for several days, but they begin to disappear when rashes appear on the skin. Measles rashes are characterized by stages: first, the rash appears on the face, behind the ears, and on the scalp, then moves to the torso and arms, and then spreads to the legs. Morphologically, the rashes are erythematous, maculopapular.

The rash lasts up to 5 days, then fades away, leaving behind pigmentation that disappears within 2–3 weeks Simultaneously with pigmentation, pityriasis-like peeling appears, most pronounced on the face and torso.

Measles can have typical or atypical presentations. Atypical include:

1. Erased form. In this case, the disease occurs in a very mild form, without a pronounced specific clinical manifestations. Patients note a slight increase in body temperature, cold symptoms (sore throat, cough, weakness). Sometimes an erased form of the disease occurs after vaccination against measles or administration of gamma globulin.

2. Hemorrhagic form, when the disease is accompanied by multiple hemorrhages on skin, blood in urine and stool. Due to the hemorrhagic form, it often happens death due to large blood loss. With timely hospitalization and correct treatment, the prognosis for the disease is favorable.

3. Hypertoxic form, which occurs against the background of severe intoxication of the body and manifests itself at temperatures up to 40 °C and above, with symptoms of meningoencephalitis, cardiac failure and respiratory failure. Atypical manifestations are more common in adults. The course of measles in adults has its own characteristics: more pronounced intoxication syndrome (weakness, sweating, drowsiness, and lethargy); catarrhal phenomena (nasal congestion, conjunctivitis, cough, sore throat and discomfort in the throat) prevail more often dry cough and there is a violation of the phasing of rashes. Measles in adults is diagnosed based on characteristic symptoms and laboratory results. research.

According to clinical recommendations, they are used for the laboratory diagnosis of infection. serological and molecular biological methods. Blood testing is carried out by enzyme immunoassay analysis (ELISA), and to determine antibodies (IgM, IgG) to the measles virus, blood is taken on the 5th day from the beginning of rashes. The polymerase chain reaction method is used to identify and determine the type of virus. To conduct the study, material is collected (nasopharyngeal swabs, urine, cerebrospinal fluid) at 1–3 day since the rash. In some cases, special virological diagnostic methods are used (virus microscopy, immunofluorescence reaction). A general blood test for measles is characterized by a decrease in the number of leukocytes, an increase in the erythrocyte sedimentation rate. If a secondary bacterial infection occurs, then the results of the studies note neutrophilic leukocytosis. It is also recommended to perform a biochemical analysis of blood and general urine analysis: they will help determine the presence and severity of liver damage and urinary system damage. When managing a patient with measles, monitoring of clinical and biochemical parameters is mandatory. blood tests over time. If necessary, additional diagnostics are carried out - analysis of the spinal cord fluids, radiography and computed tomography of the chest, electrocardiography (ECG), consultations with an ENT doctor, neurologist and other specialists as indicated. A feature of the interaction between the measles virus and the human immune system is the development of transient secondary immunodeficiency, which implies a high risk of severe complications (bacterial and/or viral etiology), which can be destructive. More often Acute and chronic diseases of the ENT organs occur, the most common of which is otitis media, which occurs in 7–9% of patients; lesions of the digestive system (enterocolitis, diarrhea, hepatitis, pancreatitis) and urinary system (pyelonephritis, cystitis,

glomerulonephritis), as well as diseases of the central nervous system, most often occurring in the form of acute infectious and post-infectious encephalitis with a frequency of 0.01–0.02%. Complications are observed in the form of infectious pathology of the lower respiratory tract, where pneumonia occurs in 1–6% of patients and can be either viral or bacterial in etiology. Symptoms such as constant unmotivated weakness, headaches, dry cough, changes in auscultation pattern, prolonged fever and repeated rise in temperature allow us to be wary of the presence of pneumonia. Computed tomography gives an objective picture of the organs of the chest, a bacteriological examination of the sputum should also be carried out (if there is a wet cough, with proper and correct collection of biomaterial), PCR study for respiratory viruses and bacteria to clarify the etiology. Specific treatment of measles does not exist, therefore therapy for this infectious disease is aimed at alleviating the patient's condition and combating secondary infections and complications. The patient is prescribed antipyretic drugs to reduce fever, eliminate symptoms of intoxication and inflammation. For etiotropic therapy, it is recommended to use interferons (interferon-alpha) and human immunoglobulin is normal in severe forms of infection. For detoxification therapy in moderate and severe forms, electrolyte solutions are indicated; for mild cases, oral rehydration is indicated. Symptomatic therapy is aimed at relieving symptoms (decongestants, antitussives and expectorants, antipyretics, antihistamine therapy). At development of complications, therapy is carried out aimed at preventing them, including antibacterial therapy. Such groups of antimicrobial drugs as macrolides and fluoroquinolones of the III and IV generations are preferred against pneumonia caused by mycoplasma and chlamydial infections, while bacterial pneumonia (streptococcal, staphylococcal, etc.) with measles can be successfully treated with beta-lactam antibiotics. According to O. V. Tsvirkun, measles outbreaks mainly formed in hospitals (59%), in families (40%), less often (1%) at the place of residence or in orphanages, which indicates the need for more careful compliance with the rules of epidemic surveillance, timely identification and isolation of the patient, as well as careful monitoring of contacts, timely immunoprophylaxis. When isolating a patient at home, daily wet cleaning is required, if possible, the maximum limiting the patient's contact with family members, prohibiting relatives or friends from visiting the patient. All contacts are subject to medical observation until 21 days from the moment the patient is identified.

Hospitalization of patients is carried out in cases of severe disease and for epidemic indications (persons living in hostels, hotels, hostels, etc., decreed groups of persons). Sick people are hospitalized in a separate box and subject to strict bed rest. Persons hospitalized in hospital, must be discharged no earlier than 5 days after the appearance of the rash. Medical staff, Anyone in contact with a measles patient must observe all safety measures before visiting the box: be vaccinated or have a high protective antibody titer, it is mandatory to wear caps, gloves, masks and special medical clothing. After discharge from the hospital or treatment in isolation at home, patients are subject to mandatory dispensary registration at the place of attachment to the clinic for a period of 1 month. Multiplicity of mandatory. Control

examinations by a doctor are once every two weeks. Blood and urine tests are performed after 2 and 4 weeks, using, ECG and other laboratory and instrumental research methods according to indications, such as consultations with narrow specialists. After 1 month of medical supervision in the presence of good laboratory results indicators, the absence of complications, the patient is subject to removal from the dispensary register. It is well known that the most important and effective way to prevent measles is vaccination. Main and The only correct method of preventing the disease is active immunization. High quality vaccination carried out according to the terms of the National Vaccination Calendar in compliance with all standards, and regular revaccination, an increase in protective antibody titers leads to the impossibility of contracting an infection, and persons who are vaccinated once, as a rule, suffer a mild or atypical form of the disease. Vaccinated to children who have not had measles from 12 months of age. Revaccination is carried out once every 6 years before entering school. Adolescents and adults under 35 years of age are also subject to immunization against measles. sick, not vaccinated and vaccinated once, who do not have information about preventive vaccinations against measles. The duration of post-vaccination immunity is up to 8–10 years. Recommended every 10 years of vaccination for patients with low titers of protective antibodies.

It is imperative to promptly isolate the sick family member in a separate room, provide him with an individual set of dishes, bed linen and care. As a non-specific preventive measure, it is recommended to wear a medical mask in public places (metros, shops and shopping centers, prefectures, clinics), especially during the epidemic season, to maintain a healthy lifestyle, a balanced diet high in proteins and vitamins, adherence to a work and rest regime, hardening, avoiding hypothermia and drafts. Timely treatment of chronic diseases that contribute to the deterioration of the immune system and increased susceptibility to pathogenic bacteria and viruses.

Results and discussion

Anyone without immunity (either unvaccinated or vaccinated but not yet immune) is at risk of infection. Unvaccinated young children and pregnant women are at the highest risk of severe complications from measles.

In countries experiencing or recovering from natural disasters or conflicts, damage to infrastructure and health services disrupts routine immunization, while overcrowded camps used for housing increase the risk of infection. Children suffering from malnutrition or other conditions that weaken their immune systems are at the highest risk of dying from measles.

Complications most often develop in children under 5 years of age and in adults over 30. They are more common in children who are malnourished, especially due to vitamin A deficiency, or who have a weakened immune system due to HIV infection or other illnesses. Measles itself also weakens the immune system and can cause the body to "forget" how to protect itself from infections, posing an extremely serious threat to children.

Conclusion. Timely identification and isolation of patients, correct hospitalization according to clinical and epidemiological indications, competent tactics for managing the patient and contact persons will help stop the growth of morbidity and transmission infections, prevent the risk of complications and deaths, and an active vaccine prevention population with widespread immunization coverage will lead to the complete elimination of measles.

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SCARLET FEVER IN THE MODERN WORLD: CHANGES IN ITS COURSE AND DIAGNOSTIC APPROACH

Abstract. *Streptococcal infection remains one of the most pressing health problems in all countries, which is determined by the widespread prevalence of group A streptococci and the enormous socio-economic damage caused by this pathology.*

Streptococcal diseases are among the most frequently reported in the world. According to WHO, 18.1 million suffer from severe diseases caused by group A streptococci. About 1.8 million new cases are registered annually, over 500,000 people die, to this should be added over 11 million cases of streptoderma and 616 million cases of pharyngitis. Streptococcal sore throats occupy second place in the structure of acute respiratory diseases after influenza.

Key words: *fever, tonsillitis, rash, sore throat.*

Objective. Scarlet fever as the main disease of streptococcal etiology still remains a serious epidemiological and clinical problem. The incidence of scarlet fever in recent years has been low, but often manifests itself in group outbreaks in children's groups. The widespread use of antibacterial drugs has led to the fact that mild and moderate forms of the disease currently predominate. However, the importance of streptococcal infection in the formation of chronic lesions of the nasopharynx is indisputable. The risk of streptococcal allergy and the development of heart and kidney damage is significant. Severe septic complications and even death is also possible.

Introduction. Scarlet fever is an acute infectious disease, the course of which is accompanied by damage to the nasopharynx, severe intoxication of the body and the appearance of characteristic rashes. The causative agent of the disease is group A streptococcus. Transmission of infection occurs by airborne droplets or by contact.

Symptoms of the disease are fever, general intoxication of the body, sore throat, inflammation of the regional lymph nodes, raspberry color of the tongue, rash with scarlet fever.

In 1556, the Italian physician Ingrassias first distinguished the symptoms of scarlet fever from those of measles. He named the new disease scarlet fever (from the Italian word *scarlatta*, meaning "purple"). A century later, the English physician Thomas Sydenham fully described the clinical picture of the disease.

Scarlet fever is now considered a distinct infectious disease. However, until the 16th century, it wasn't distinguished from other rash diseases. In 1556, the Italian physician Ingrassias first distinguished the symptoms of scarlet fever from those of measles. He named the new disease scarlet fever (from the Italian word *scarlatto*, meaning "purple").

A century later, the English doctor Thomas Sydenham fully described the clinical picture of the disease. In the pre-bacteriological era, ideas about scarlet fever were based on the miasmatic theory. It was believed to be the result of exposure to impurities. In the 1940s, the works of the couple Dick and V.I. Ioffe demonstrated the streptococcal etiology of the disease.

The last time the clinical characteristics of scarlet fever were assessed in Russia was 15-25 years ago. Researchers decided to update the data and examine the clinical manifestations of the disease in a modern metropolis. They analyzed 295 medical records of children hospitalized in Moscow clinics between 2020 and 2022.

Results and discussion. It's especially important to recognize the onset of symptoms in children who have recovered from COVID-19. They are 8.3 times more likely to develop severe scarlet fever than others. These findings were reached by a group of scientists from Sechenov University and Moscow medical organizations, led by Nikolai Briko, Academician of the Russian Academy of Sciences and Head of the Department of Epidemiology and Evidence-Based Medicine at the Sechenov University Institute of Public Health. The results were published in the September issue of the Russian Medical Journal.

Complications from scarlet fever occur in 12 percent of children, most often in schoolchildren. They typically appear within the first week. In most cases (over 70 percent), these are otitis media. Sinusitis occurs in 14 percent of children, while bullous otitis media (with the formation of blisters that significantly impair hearing) and community-acquired pneumonia occur in 6 percent. Three percent develop an oral abscess and toxic shock syndrome (the production of a toxin that can lead to inflammation). In the second week and later, the disease can cause allergic reactions, kidney complications, and, less commonly, heart and joint complications. Children who have had COVID-19 are more likely to develop serious complications such as post-infectious cardiomyopathy (a myocardial disease in which the heart enlarges or heart failure occurs), otitis media, acute tubulointerstitial nephritis (an inflammatory kidney disease), and toxic shock syndrome, the authors of the article listed.

They also found that scarlet fever symptoms are developing and lasting longer. Now, the rash lasts an average of 6.5 days, fever 4.5 days, throat redness 8 days, tonsil plaque 6 days, and tongue plaque nearly 4 days. However, studies conducted in Voronezh from 2013 to 2015 and in St. Petersburg from 1995 to 2022 yielded significantly lower results: the rash in children resolved in an average of 4 days, fever 3.5 days, and tongue plaque began clearing on the second day.

Furthermore, symptoms that were previously rare with scarlet fever have emerged. Now, one in five hospitalized patients experiences gastrointestinal

symptoms, including vomiting, loose stools, and abdominal pain. The main symptoms, however, remain the same: a fever of 37.2-39 degrees Celsius or higher, a sore throat, and a bright red or pale pink rash on the body, consisting of small dots or papules. Weakness, loss of appetite, itching, and headaches may also occur. The average incidence rate in 2022 was 18.7 cases per 100,000 people. To prevent complications, including life-threatening ones, it's important to identify the disease as early as possible and prescribe antibiotic therapy, noted Nikolai Briko. However, since scarlet fever symptoms are similar to those of other infectious diseases, such as measles, rubella, and drug-induced dermatitis, a correct diagnosis is difficult without specialized tests. Scarlet fever is usually diagnosed when a child is already hospitalized. "Therefore, modern rapid laboratory diagnostic methods need to be more widely implemented in clinical practice, including before hospitalization," the academician believes.

Conclusion. The lifting of COVID-19 anti-epidemic restrictions in 2022 led not only to a 3.6-fold increase in scarlet fever cases among children aged 0 to 18 years compared to 2021, but also, as a consequence, to an increase in hospitalizations in Moscow. The number of children hospitalized with scarlet fever in 2022 increased 18.0-fold compared to 2020. The majority of those hospitalized (83.4%) were preschool- and school-age children, including those aged 3 to 7 years (52.9%) and 7 to 15 years (39.3%), with an average disease severity of 93.6%. Of the children examined, 53 (18.0%) had a history of COVID-19, with one in five experiencing a severe form of scarlet fever.

In today's metropolitan settings, scarlet fever presents with a typical clinical picture. The overwhelming majority of children with scarlet fever had a moderate course, with various complications occurring in 12.2%. While hospitalizations have increased, the number of patients with severe scarlet fever has decreased, while the incidence of complications has remained unchanged (12.3–12.8%). Among patients who have had COVID-19, severe scarlet fever is 8.3 times more likely to occur compared to children without a history of COVID-19.

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PEROXIDE OXIDATION IN PATIENTS WITH CHRONIC BRUCELLOSIS

Abstract: *We observed 85 patients aged 17 to 74 years. All patients used standard general, serological, biochemical and statistical methods. According to clinical forms patients were distributed as follows: primary chronic brucellosis (PChB) - 22 (25.8%) and secondary chronic brucellosis (SChB) - 63 (74.2%). The subcompensation phase was observed in 62.3% of the examined patients, the decompensation phase was detected in 37.7%.*

Keywords: *Chronic brucellosis, clinic, diagnosis, antioxidant system*

Introduction

According to WHO data, brucellosis cases are 500 million every year. According to M. Avijgan and co-authors, the number of people infected with brucellosis is 10-25 times more than those registered [1]. According to academician G.G. Onishchenko, the highest prevalence of brucellosis among 100,000 inhabitants was observed in Nepal, the United Arab Emirates, Jordan, Egypt, and Turkey [2]. The epidemiological case of brucellosis in the territory of Russia is not stable, and the incidence is 0.2-0.7 per 100 thousand of the population [3]. The incidence of brucellosis in Kyrgyzstan [4], Georgia, Azerbaijan [5], Kazakhstan [6], Uzbekistan [7], Tajikistan [8] and Turkmenistan from the Commonwealth countries is in high figures and is among 25 high-incidence countries [9]. In Uzbekistan, the incidence rate of brucellosis is 1.8 to 2.8 per 100,000 population.

In chronic active brucellosis (ChAB), patients complain of periodic body temperature rise, tremors, sweating, malaise, rapid fatigue, muscle, joints, spine pain, headaches, morning stiffness, cold stiffness of hands and feet, dyspeptic symptoms, slowing cognitive function. Clinical, laboratory and functional studies indicate changes in organs and tissues and the presence of multiple focal lesions (fibrosis), as well as lymphatic node lesions. Polyorgan insufficiency, which arises as a result of the systemic effect of brucellas on macroorganism, can lead to a deterioration in the prognosis of the disease. In ChAB, damage to various systems is observed as a result of damage to most organs and tissues [9].

Various infectious factors faollashtir free radical processes in the body. Polyorgan deficiency, which develops in ChAB, is associated with hemodynamic disorders from multiple disorders, intensification of lipid peroxidation (LPO). This requires an improvement in the treatment regimen.

The aim of our study was to improve treatment modalities in patients with SFB and to evaluate the effectiveness of phosphargin succinate preparation.

Material and methods

As an object of the study, 85 patients, aged 17-74 years old, who were treated in the Bukhara regional intensive care unit, were taken to the regional endemic centers. Of these, 64 (75,3%) are male and 21 (24,7%) are female. The distribution of patients by age according to WHO classification showed that the incidence was mainly determined by the age of full of vigour (78,5%). The average age of the patients was $36,18 \pm 1,99$ years.

In the diagnosis of patients, a clinical classification of G.P.Rudnev and N.I.Ragoza, supplemented by K.D. Jalilov, was used. Each patient who came to the hospital was diagnosed according to the results of clinical-epidemiological Anamnesis and laboratory examinations, having passed a clinical examination, an object examination. Hemagglutination reactions and passive hemagglutination reactions were used in the patients. In private investigations, the amount of malondialdehyde in serum was determined by A.I. In Andreeva's method, catalase activity was determined by M.Yu. The cortical method and the general antioxidant status were determined by the spectrophotometric method, and the S-reactive protein was determined by the enzyme-linked immunosorbent assay. All obtained figures were statistically processed.

Result and discussion

By clinical forms, patients were distributed as follows: primary chronic brucellosis (PChB) - 22 (25.8%) and secondary chronic brucellosis (SChB) - 63 (74.2%). No differences between the sexes in these two forms were identified. In PChB, it was mainly in young people, while in ISB, 73% were young and 20.6% were middle-aged.

In all PChB groups, the disease duration was up to 1 year, while in the majority of SChB patients the disease duration was 2–3 years (54.1%), up to 1 year (19.5%), and 4–5 years (1.2%). A subcompensation phase of the disease was observed in 53 (62.3%) patients, and a decompensation phase in 32 (37.7%) patients.

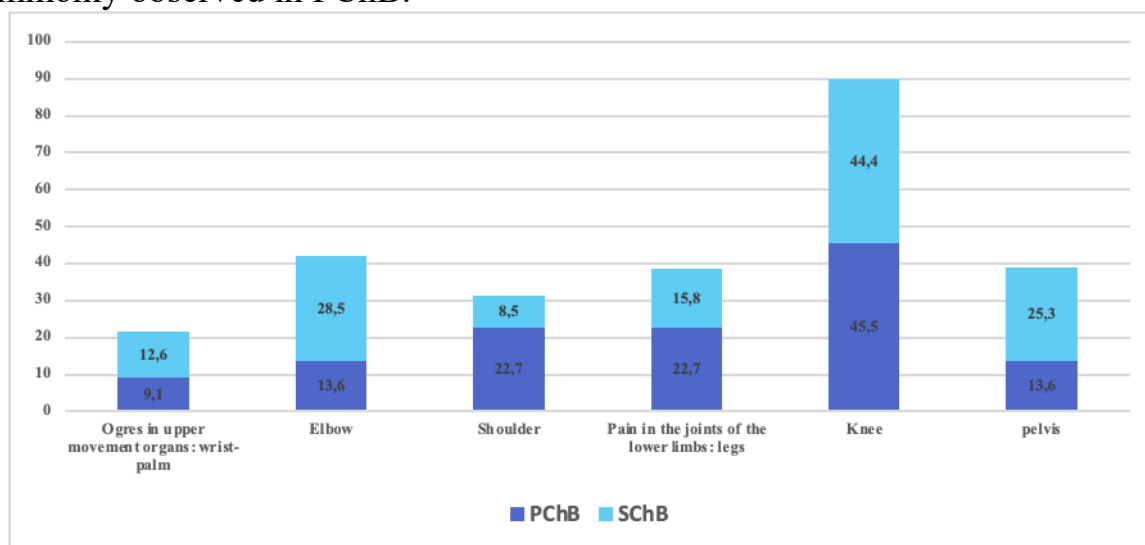
Patients mainly complained of fever, weakness, headache, decreased appetite, chills, sweating, and similar manifestations. However, their incidence was different in primary and secondary chronic brucellosis (Table 1). In particular, if patients with PChB were characterized by weakness, chills, sweating, fever, headache, sleep disturbances, decreased appetite, pale skin, and hydration, SChB often experienced weakness, fever, sweating, headache, and swollen lymph nodes.

Table 1. Morbidity in primary and secondary chronic brucellosis.

Clinical signs	PChB, n=22		SChB, n=63	
	n	%	n	%
Weakness	15	68,1	50	79,3
Trembling	12	54,5*	24	38,1
Heating	18	81,8	47	74,6
Sweating	10	45,4	41	65,1
Headache	14	63,6	48	76,1
Sleep disorders	9	41,0	18	28,5
Decreased appetite	14	63,6	39	61,9
Skin discoloration	9	40,9*	10	15,8
Moisture of the skin	9	40,9	32	50,7
Lymph node enlargement	9	40,9*	40	63,4

Note: * Statistically significant differences between groups.

It should be noted that locomotor system injuries were more SChB -specific, with the most injuries observed in the knee joint (Figure 1a), whereas more injuries to the palmar-leg joints were detected in the PChB. At the same time, gastrointestinal lesions were detected in the patients, mainly decreased appetite, tongue covering, and hepatomegaly (Figure 1b). Gastrointestinal injury was more commonly observed in PChB.



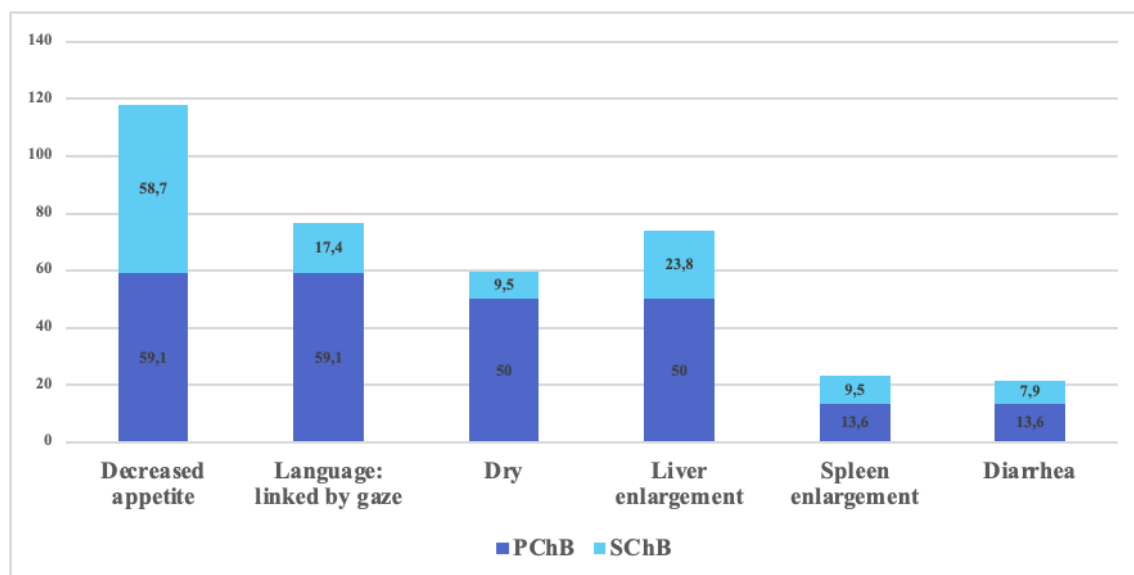
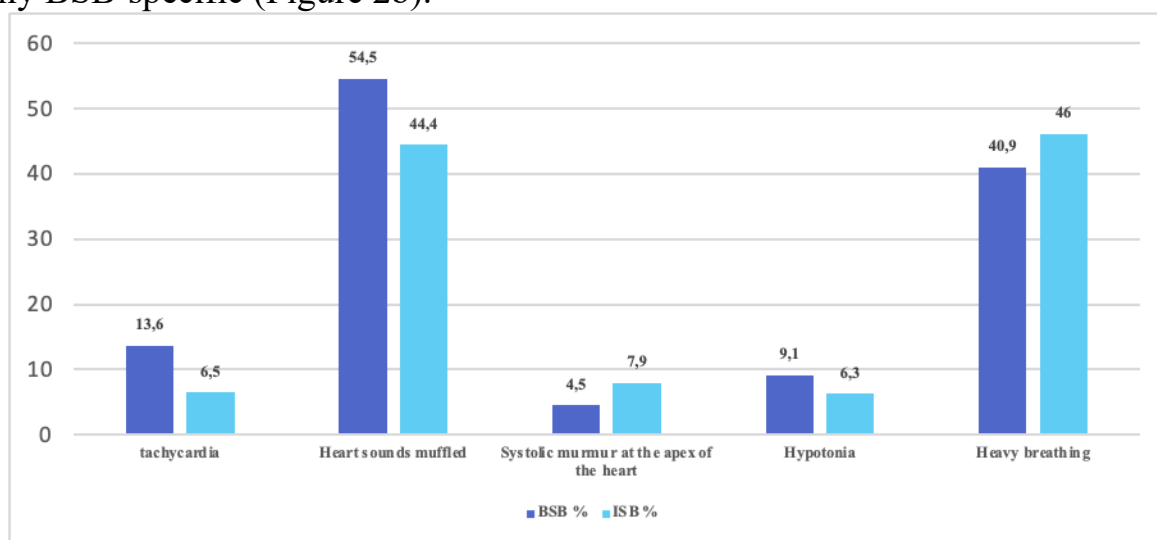


Figure 1. Diseases of the locomotor (a) and digestive (b) systems according to the form of chronic brucellosis.

Motor system injuries were more SChB -specific, with the most injuries observed in the knee joint (see Figure 1a), whereas more injuries to the palmar-thigh joints were detected in the BSB. At the same time, gastrointestinal lesions were detected in the patients, mainly decreased appetite, tongue covering, and hepatomegaly (see Figure 1b). Gastrointestinal injury was more commonly observed in BSB.

Injuries to the cardiovascular system and respiratory organs were mainly observed in primary and secondary brucellosis, characterized by suffocating and hard breathing of the heart tones (Figure 2a). Nervous system damage neuritis, sleep disorders. In severe forms of brucellosis, genital injuries have also been reported.

A subcompensation phase was observed in 62.3% of the patients in the study, and a decompensation phase was detected in 37.7%. The decompensation phase was mainly BSB-specific (Figure 2b).



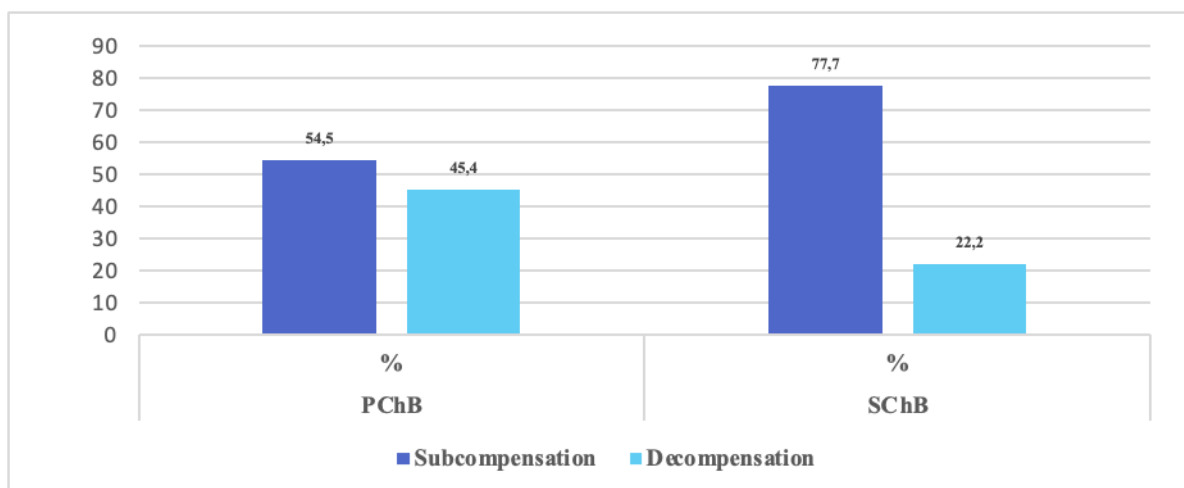


Figure 2. Diseases of the cardiovascular and respiratory systems according to the form of chronic brucellosis (a) and severity (b).

Leukopenia, neutropenia, lymphocytosis, and increased ESR were found in the peripheral blood of most patients. Heddleson's reaction was positive in 94.7% of patients, Wright's reaction showed high titers. The titer of the reaction was higher than the titer of RAR.

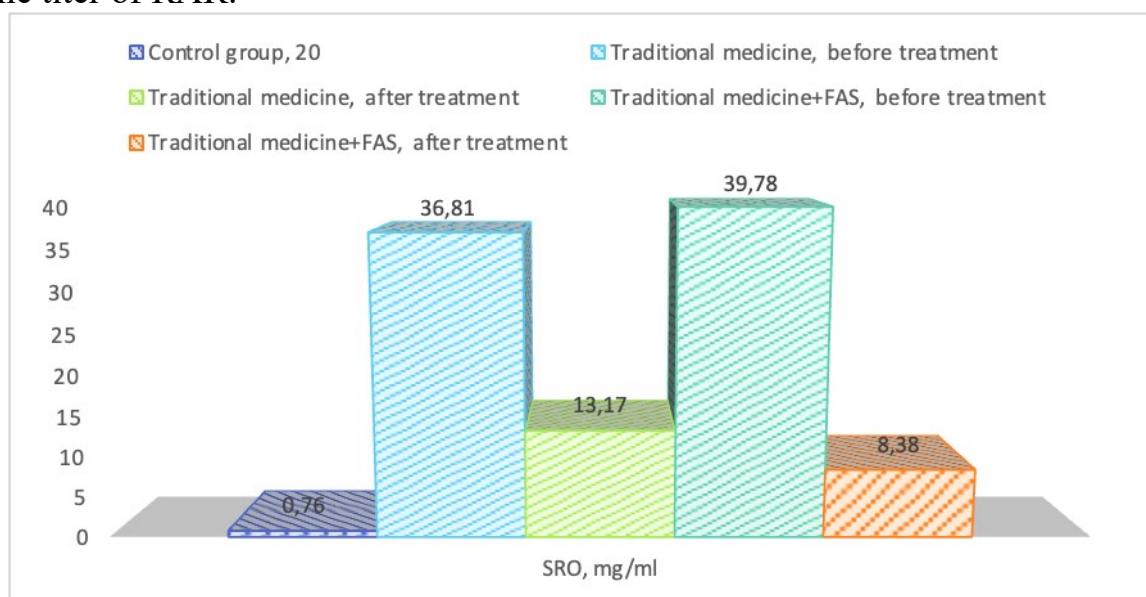


Figure 3. Changes in serum SRO (mg / ml) according to the form and course of chronic brucellosis.

In order to determine the intensity of inflammatory processes, we determined the amount of SRO in the serum of patients. Studies have shown that its amount increased dramatically from 0.76 ± 0.04 mg / mL to 38.14 ± 2.37 mg / mL ($P < 0.001$). Its levels increased to 36.12 ± 2.41 and 39.78 ± 2.19 mg / ml in the BSB and ISB groups, respectively.

Table 2

Changes in LPO and antioxidant system activity according to the form of chronic brucellosis, $M \pm m$

Groups	MDA nmol / ml	Total antioxidant activity, mmol / l	Catalase activity, ME104 / ml	TAA/MDA, relative unity
Control group, 20	2,82±0,12	1,58±0,08	5,89±0,3	0,560±0,021
ChB, 85	5,12±0,36*	0,97±0,04*	3,04±0,13*	0,189±0,09*
PChB, 22	4,87±0,41*	0,83±0,05*	2,98±0,19*	0,170±0,02*
SChB, 63	5,26±0,32*	1,08±0,06*	3,17±0,24*	0,205±0,014*
Subcompensation, 53	4,92±0,28*	1,08±0,06*	4,17±0,22*	0,171±0,012*
Decompensation, 32	6,67±0,41*	0,76±0,03*	3,87±0,26*	0,094±0,006*

Note: * - The differences between the controls and those of patients with chronic brucellosis are statistically significant ($P < 0.05$).

We also evaluated LPO processes in patients' serum with MDA levels. The study found a 1.82-fold increase ($MD < 0.001$) in MDA in patients with brucellosis (Table 2). If in BSB this figure increased 1.73 times ($P < 0.001$), in ISB its increase increased 1.87 ($P < 0.001$). It should be noted that in the subcompensation phase of the disease, the amount of MDA increased by 1.74 ($P < 0.001$) compared to the norm, while in the decompensation phase there was an increase of 2.37 ($P < 0.001$). This indicates that free radical processes are accelerating according to the stages of the disease.

In general, the antioxidant protection system plays an important role in ensuring the normal balance of free oxidation. At present, the assessment of serum antioxidant system reveals general antioxidant activity and catalase enzyme activity. Detection of total antioxidant activity in the serum of patients with chronic brucellosis showed a decrease in this indicator (Table 2). In particular, in BSB this indicator decreased by 1.9 ($P < 0.001$), while in ISB - by 1.46 ($P < 0.01$). During the subcompensation period of the disease, the total antioxidant activity of the serum decreased by 1.46 ($P < 0.01$) times, while during the decompensation period it decreased by 2.08 ($P < 0.001$). Detection of serum catalase activity showed a decrease in this indicator in patients. In particular, catalase activity decreased 1.98 ($P < 0.001$) and 1.85 ($P < 0.001$) in BSB and ISB group patients. In the subcompensation and decompensation stages, a decrease in enzyme activity was observed by 1.41 ($P < 0.05$) and 1.51 ($P < 0.01$) times.

Hence, in SB, an acceleration of LPO, a decrease in total antioxidant protection, and a decrease in serum catalase activity are observed, indicating that such changes indicate a weakening of the compensatory mechanism of the antioxidant chemistry system.

Based on the results obtained, we tried to improve the treatment of SB and for this purpose we used the drug phosphargin succinate, which is produced in our country. This drug has antihypoxant and antioxidant properties. Studies have shown that it is more effective than conventional treatment used in the treatment of SB. In

particular, conventional therapies reduced serum MDA levels by a statistically significant 1.29 ($P < 0.05$). However, this figure remained 1.35 ($P < 0.05$) times higher in the normative indicators. Although serum TAA and catalase activity increased 1.16 ($P < 0.05$) and 1.28 ($P < 0.05$), the control group reported 1.45 ($P < 0.05$) and 1.9 ($P < 0.01$) times lower. This activated the compensatory mechanism of the antioxidant system by 1.5 ($P < 0.05$), but remained 1.68 ($P < 0.01$) lower than the control group.

Table 3

Effect of phosphargin succinate on the activity of LPO and antioxidant system in the treatment of chronic brucellosis, $M \pm m$

Indicators	Control group, 20	Traditional treatment, 39		Traditional treatment +FAS, 46	
		before treatment	after treatment	before treatment	after treatment
MDA nmol / ml	2,82±0,12	4,93±0,23*	3,81±0,26*, ^a	5,18±0,33*	3,01±0,27 ^{a,b}
Total antioxidant activity, mmol / l	1,58±0,08	1,09±0,06*	1,27±0,05*, ^a	0,94±0,03*	1,36±0,04 ^a
Catalase activity, ME104/ml	5,89±0,3	3,10±0,21*	3,98±0,11*, ^a	2,96±0,11*	4,83±0,12*, ^{a,b}
TAA/MDA, relative unity	0,561±0,021	0,221±0,010*	0,333±0,03*, ^a	0,181±0,02*	0,452±0,04*, ^{a,b}

Note: * - the differences between the indicators of control and patients with chronic brucellosis are statistically significant ($P < 0.05$); a is statistically significant relative to pre-treatment values ($P < 0.05$), b is the difference between groups 1 and 2 is convincing ($P < 0.05$).

The proposed treatment procedures in the treatment of ChB reduced serum MDA by 1.7 ($P < 0.01$) times (Table 3). Although this was 1.26 ($P < 0.05$) lower than the group of patients receiving conventional treatment, there was a tendency to be higher than that of the control group. Serum TAA increased 1.44 ($P < 0.05$) times after treatment in group 2 patients. This indicator did not differ statistically convincingly from the indicators of the 1st and control groups. Catalase activity increased 1.63 ($P < 0.01$) times after the proposed treatment. While this was 1.21 ($P < 0.05$) higher than the 1st group, it remained 1.22 ($P < 0.05$) lower than the control group. Such changes have led to an increase in the compensatory mechanisms of serum. Indeed, this figure increased 2.49 ($P < 0.001$) times after the proposed treatment, 1.36 ($P < 0.05$) times higher than the 1st group, but 1.24 ($P < 0.05$) higher than the normative values) was kept low. This means that conventional and especially the proposed treatment procedures in the treatment of SB increase the activity of the antioxidant system and weaken the LPO processes.

It should be noted that treatment of ChB significantly reduced the amount of SRO statistically. In particular, in group 1 patients, its dose decreased by 2.79 (P

<0.001) after treatment, but remained 17.3 ($P < 0.001$) higher than in the control group, indicating the presence of inflammatory processes in the body of patients. In group 2 patients, it decreased 4.75 times ($P < 0.001$). This figure was 1.57 ($P < 0.01$) lower than that of the 1st group, but remained 11.02 ($P < 0.001$) higher than the norm. This indicates that the foci of inflammation have persisted.

Hence, treatment of ChB brucellosis reduces the amount of acute phase proteins in the serum, but does not lead to complete normalization. This indicates that the foci of inflammation persist. The proposed treatment reduced the amount of SRO in the serum more effectively than conventional treatment.

Of course, the above-mentioned positive results also affected the course of the disease, the complaints of patients decreased, there was a certain regression of changes in various systems. Including if the fever completely disappeared after conventional treatment, weakness, chills, and sweating 1.81; Decreased by 15.36 and 6.03 times, after the proposed treatment - symptoms such as fever, chills and sweating completely disappeared, and fatigue was found to decrease by 5.05 times. Headache, sleep disturbances, skin paleness, and skin moisture 4.0 after conventional treatment; 5.02; Decreased by 3.03 and 9.5 times, insomnia was completely eliminated after the proposed treatment, stomach pain was found to be 17.2 times, skin paleness and moisture were reduced by 30 and 11.11 times, respectively. Lymph node enlargement was reduced from 46.1% to 5.1% in conventional treatment, but from 67.3% to 4.3% after the proposed treatment. This demonstrates the effectiveness of the proposed treatments.

Polyorgan deficiency, which develops in chronic brucellosis, leads in large part to hemodynamic disturbances, the acceleration of LPO. This requires improved treatment procedures. In order to restore these processes, the use of the drug Phosphargin succinate produced in Uzbekistan increases the capacity of the antioxidant system compared to conventional treatment and reduces the peroxide oxidation of fats, leading to improved quality of life of patients. This drug is also economically effective. The introduction of phosphargin into the treatment of chronic brucellosis leads to early elimination of clinical signs.

Conclusions

1) Chronic brucellosis is accompanied by an increase in the amount of MDA, a decrease in the antioxidant defense system, and a decrease in the compensatory capacity of the antioxidant system, the change of which depends on the severity of the disease.

2) In chronic brucellosis, the amount of acute inflammatory protein increases sharply.

3) The inclusion of phosphargin succinate in the treatment of chronic brucellosis increases the capacity of the antioxidant system compared to conventional treatment and reduces the peroxidation of fats.

4) The introduction of phosphargin in the treatment of chronic brucellosis leads to early elimination of clinical signs.

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MENOPAUSAL AND PERIMENOPAUSAL DISORDERS

Abstract: *This article is written on the basis of the national standard of the Ministry of health of the Republic of Uzbekistan, which speaks about the peculiarities of the period of peri and postmenopause, the causes of origin and the elimination of the most common clinical symptoms. The average age of onset of menopause in the world is 48.8 years (95% CI 48.3-49.2), which varies significantly depending on the geographic places where female speakers live. Differences in the average age of onset of menopause in different countries are often associated with the harmony of ethnic, socio-economic and cultural factor.*

Key words: *perimenopousa, menopousa, urinary incontinence, postmenopausal osteoporosis, climacteric syndrome, heat casting, vasomotor disorders.*

Introduction. The average age of onset of menopause in the world is 48.8 years (95% CI 48.3-49.2), which varies significantly depending on the geographic Mint where female speakers live. Differences in the average age of onset of menopause in different countries are often associated with the harmony of ethnic, socio-economic and cultural factoring. A woman's ethnicity may be a mystery to her age at which she eventually reaches menopause. For example, in Asian women, the menopause process usually begins earlier in life compared to women in European ethnic groups. 60-85% of women in the Fairy - and postmenopausal period complain about the manifestation of climacteric syndrome. About 75% of women between the ages of 45 and 55 receive complaints about heat injection, while up to 25-30% of cases — expressed moderately or severely. Vasomotor symptoms often occur in the late phase of menopause o tooth, and aynygsa manifests yaggol in the early years of postmenopause. The prevalence of sleep disorders in women in perimenopause ranges from 39 to 47%, and in women in postmenopause from 35 to 60%. Symptoms of GUMS are observed in 15-20% of women in perimenopause and 80% of women in postmenopause.

Classification. Currently, the STRAW+10 scale is used for the clinical-hormonal characterization of the aging stages of the reproductive system (Stages of re-productive Aging Workshop).

The climacteric period includes the following stages:

Early transition to menopause. It begins after the age of 40, is characterized by changes in the periodicity of menstrual cycles and fsgn-ing variable values.

Late transition to menopause. Significant changes in cycle length (more than 60 days of amenorrhea), high levels of FSH ($> 25\text{me/l}$), are characterized by the presence of vasomotor symptoms. Includes the period up to the last menstruation.

Menopause is the last menstruation to be detected retrospectively after 1 year.

Perimenopause. Menopause includes a transition period and 12 months after the last menstruation.

Early postmenopause. Covers 3-4 years after the last menstruation, high indicators of FSG are recorded, vasomotor symptoms are most pronounced.

Late postmenopause is characterized by the rest of life, stable high rates of FSG, increased symptoms of genitourinary atrophy.

Cause of origin: natural menopause; menopause caused by bilateral ovariectomy (surgical menopause) or chemical/light therapy. The assessment of CS severity depends on the assessment scale used (see diagnostic section).

Diagnosis. The diagnosis of the patient's condition, climacteric period and KS is made on the basis of complaints analysis, Anamnesis, physical examination and additional clinical examinations.

Anamnesis. When collecting Anamnesis and identifying complaints, the following should be asked:

- Menstrual age, the nature of the menstrual cycle and the date of the last menstruation.

- Reproductive Anamnesis, gynecological diseases and operations.

- Somatic and systemic diseases, endocrinopathies.

- Hereditary pathology (presence of cancer: breast, endometrium, ovaries, intestinal sa-Raton; diabetes mellitus; cardiovascular diseases-strokes, heart attacks under 50 years old; oste - oporosis, including fractures)

Presence of associated symptoms:

- vasomotor (redness, increased Night Sweats, tremors);

- psychoemotional - depression, irritability, excitability, sleep disorders, weakness, decreased memory and concentration;

- urogenital and sexual-itching in the vagina, aching, dryness, dyspareunia, dysuria;

- skeletal-muscular-myalgia, arthralgia.

Physical examination. In a physical examination, standard basic examinations should be carried out, which include an assessment of the general condition, a general examination with anthropometry, measurement of the heart rate, measurement of blood pressure.

All patients are advised to determine height and weight by calculating the body weight index (TVI) to diagnose excess body weight and obesity

All patients are advised to measure the waist circumference (BA) to determine abdominal/visceral obesity.

All patients are advised to perform a visual examination and palpation of the mammary glands in order to diagnose the pathology of the mammary gland.

To assess the condition of the Vulva, vagina, cervix and small groin organs and diagnose possible pathology, a gynecological examination should be carried out.

All patients are advised to perform a visual examination of the external genitals, vagina, cervix and bimanual vaginal examination

Laboratory and instrumental examination methods. Women over 45 years of age, in which menopause symptoms are observed, are advised to make the diagnosis of "perimenopause" or "menopause" only on the basis of these signs, without confirmation laboratory tests.

It is recommended to check serum FSG levels up to 45 years of age:

- in women with menopausal symptoms such as amenorrhea or irregular menstruation,

- ovarian polycystosis syndrome, in women with endometrial ablation or in women who need differential diagnosis of amenorrhea,

- in women who have undergone hysterectomy without excess of the uterus.

Confirmation of a pre-term menopause diagnosis C FSG high level (25 ME / l) is recommended with an interval of at least 4-6 weeks only after at least two results have been obtained

AMG in serum, inhibin A, inhibin B, estradiol for the diagnosis of menopause in women over 45 years of age is also not recommended to determine the size of the ovaries on ultrasound

In people who use combined estrogen-progestagen contraception or high doses of progestagens It is not recommended to detect FSH in serum to detect menopause

It is recommended to check serum TTH levels for a comparative diagnosis of atypical vasomotor symptoms, weight changes, sleep disorders and the causes of rapid fatigue

Postmenopausal women are advised to assess the individual 10-year probability of fractures (using the FRAX algorithm). Osteoporosis it is recommended to check the level of 25-OH vitamin D in the blood in the presence of risk factors. Peri-and postmenopausal women are advised to undergo a screening of cervical cancer and breast cancer

In order to determine the mineral density of bones, it is recommended to carry out bienergetic X-ray absorbency (IERA) in the lumbar part of the spinal cord and proximal part of the thigh bone in the presence of fractures, osteoporosis risk factors or an average (intermediate) individual 10-year risk of a detected osteoporotic fracture (according to the FRAX algorithm. All prematurely menopausal women are advised to perform two-energy X-ray absorbiometry (IERA) on the lumbar part of the spine and proximal part of the thigh bone in order to assess the mineral density of the bones

Treatment. *Lifestyle, nutrition and exercise.*

Management of menopausal symptoms includes drug-free exposure methods, non-hormonal, and hormonal sweat-Api. First of all, it is necessary to follow a general strategy, which includes recommendations for nutrition, normalization of

physical activity. Discuss the principles of STT with the patient and his relatives, give specific recommendations. It should be noted that changes in lifestyle include communication and mental activity.

Women with symptoms of a KS should first be given recommendations for lifestyle changes, including stress reduction, regular exercise, optimal weight control, appropriate diet, smoking cessation and excessive consumption of alcohol and caffeine

Regular exercise is recommended to improve the quality of life and reduce cardiovascular and total mortality. At least 150 minutes of moderate intensity exercise per week is recommended. Additional strength training twice a week can bring additional benefits. It is necessary to explain to a woman who is experiencing menopause the importance of maintaining muscle mass and bone health with the help of physical activity.

Drug treatment. The use of an individual approach to each patient when choosing a CS treatment tactic is considered to be superior-vor

Systemic MGT:

- MGT is the most effective therapy in vasomotor symptoms and genitourinary atrophy

- MGT should not be recommended for use without specific indications, i.e., symptoms or physical consequences of estrogen deficiency. Recommend MGT to a woman with vasomotor symptoms and GUMS in the absence of contraindications as first line therapy.

If the patient has clinical symptoms (arthralgia, muscle pain, memory loss, sleep disorders and psycho-emotional disorders) that can be associated with estrogen deficiency, which significantly reduces the quality of life, the issue of MGT appointment should be resolved by discussing it with other specialists. MGT should be recommended in accordance with the principles of personal choice, including the need for symptoms and prevention, as well as taking into account the personal and family history of a woman, the results of relevant studies, advantages and expectations

The principles of the concept of modern personalization (individual selection) of MGT:

- The onset of systemic MGT should be considered in women under 60 years of age and with a postmenopausal duration of less than 10 years (therapeutic opportunity window).

- Age-specific checlots are not present when prescribing topical therapy of GUMS symptoms with estrogens (estriol).

- In accordance with treatment goals, the minimum effective doses of MGT should be used.

- Individualization of MGT (selection of the dosage, form of the drug, its composition, mode of use) is carried out taking into account the age of the patient-ing, the stage of reproductive aging, gynecological diseases, comorbid conditions, the preferences of the woman.

- The use of MGT requires periodic changes in dosages depending on the stage of reproductive aging, age, treatment effectiveness and durability. With an increase in the age of the patient and the duration of postmenopause, it is advisable to reduce the dose of MGT.

Women with spontaneous or yatrogenic menopause under the age of 45 and especially under the age of 40 may have a higher risk of cardiovascular disease and osteoporosis, as well as an increased risk of Affective Disorders and mental retardation. Treatment with sex steroids for such patients should be started as early as possible and carried out at least until the age of physiological menopause (when there are no contraindications).

For women who have undergone hysterectomy, there is no need for combined therapy, since there is no need for the use of gestagens: monotherapy with estrogens is associated with uncontrolled hyperplasia and potential malignancy of the endometrium. It is recommended to use preparations containing estradiol. Routes of administration: peroral (tablets) or parenteral (on the skin - gels, sprays, plasters).

When prescribing Estrogen-gestagen therapy, either didrogestosterone or micronized progesterone is preferred, which may have a more favorable profile for the risk of KBS compared to synthetic progestagens.

- In perimenopause, it is recommended to use estrogen-gestagen preparations in a cyclic mode: continuous estrogen with proges-tagen is introduced cyclically).

- Standard and low doses of estrogens are used (estradiol 2-1 mg/day). In this case, the dosage of gestagens is 200 mg of micronized progesterone/10 mg of didrogestosterone during the 12-14 continuous days of the month of kalen-dar.

- In postmenopausal, it is recommended to use estrogen-gestagen drugs in a combined continuous mode. Estrogens should be reduced to low and extremely low doses (estradiol 1-0.5 mg/day). The dose of gestagens is 100 mg progesterone/5-2.5 mg didrogestosterone.

- Women who experience prematurely or early menopause should receive higher doses of estrogens than women with natural menopause.. The recommended doses of estrogens in this case are: estradiol per os 2 mg/day or transdermal estradiol 75-150 mcg/day. In this case, the dosage of gestagens is 200 mg of micronized progesterone/10 mg of didrogestosterone.

- LNG-BIV is another possible option and can be used in combination with estrogen if combined therapy is required.

Switching to monophasic combined mode-I of MGT is possible when cyclic combined MGT is applied in the following cases:

- After 1-2 years of taking low-dose MGT in cyclic mode in women over 50 years of age at the time of starting treatment.

- When the patient reaches the middle age of menopause (51-52 years old), up to 50 years old when he begins to use MGT.

- When the nature of the menstrual-like reaction changes: a small amount of Grease is completely absent during separation/more than 2 consecutive cycles.

Prevention. No special preventive measures have been developed in relation to patients with Peri - and postmenopause. Non-specific prevention implies physical activity, proper nutrition and leading a healthy lifestyle.

All women in Peri - and aostmenopause are advised to eat a balanced diet with adequate protein intake, excluding magnesium and zinc deficiency. The obvious benefits of taking vitamin D at a dose of 800 XB per day and 1,200 mg of calcium per day have been proven for women in postmenopause in an attempt to reduce bone mass loss. Side effects associated with prolonged calcium supplementation prefer to consume sufficient amounts of calcium with food.

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JAMOAT TRANSPORTI USTUVORLIGI VA RAQAMLASHTIRILGAN TRANSPORT AQLLI SHAHAR TIZIMINING ASOSIY TASNIFI

***Annotatsiya.** Ushbu maqolada jamoat transportiga ustuvorlik berishning zamonaviy yondashuvlari hamda transport sohasini raqamlashtirish jarayonlari tahlil qilinadi. Tadqiqotda jamoat transportining samaradorligini oshirish, shahar yo‘l-transport tizimidagi tirbandliklarni kamaytirish va aholiga qulay, xavfsiz hamda barqaror tashish xizmatlarini taqdim etish bo‘yicha ilg‘or mezonlar ko‘rib chiqiladi. Shuningdek, transport oqimlarini boshqarish, yo‘nalishlarni optimallashtirish, avtobuslar harakatini real vaqt monitoringi, elektron to‘lov tizimlari kabi raqamlashtirilgan yechimlarning afzalliklari yoritiladi. Maqola natijalari transport siyosatini takomillashtirish, aqilli transport boshqaruv organlariga strategik yo‘nalishlar ishlab chiqishda amaliy asos bo‘lib xizmat qiladi.*

***Kalit so‘zlar:** jamoat transporti, transportga ustuvorlik, aqlli shahar, raqamlashtirilgan transport tizimi, transport boshqaruvi, tirbandlikni kamaytirish, real vaqt monitoring, elektron to‘lov tizimi, integratsiyalashgan transport, mobil ilovalar.*

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PRIORITIZATION OF PUBLIC TRANSPORT AND DIGITALIZED TRANSPORT AS A KEY CLASSIFICATION OF THE SMART CITY SYSTEM

***Abstract.** This article analyzes modern approaches to prioritizing public transport and the processes of digitalization of the transport sector. The study considers advanced criteria for increasing the efficiency of public transport, reducing congestion in the urban road transport system, and providing convenient, safe, and sustainable transportation services to the population. It also highlights the advantages of digital solutions such as traffic flow management, route*

optimization, real-time monitoring of bus traffic, and electronic payment systems. The results of the article serve as a practical basis for improving transport policy and developing strategic directions for smart transport management bodies.

Keywords: public transport, transport priority, smart city, digital transport system, transport management, traffic congestion reduction, real-time monitoring, electronic payment system, integrated transport, mobile applications.

Kirish. Bugungi kunda shaharlar aholisining keskin ortishi, avtomobillashuv darajasining tez sur'atlarda ko'tarilishi va yo'l-transport tizimidagi tirbandliklarning kuchayishi jamoat transportiga ustuvorlik berishni dolzarb masalaga aylantirdi. Transport tizimining izchil rivojlanishi nafaqat aholining kundalik mobility ehtiyojini qondiradi, balki shahar iqtisodiyoti, ekologik holati va urbanistik barqarorlikka ham bevosita ta'sir ko'rsatadi. Shu bois, ko'plab davlatlar zamonaviy shahar boshqaruvida jamoat transportini asosiy harakatlantiruvchi omil sifatida tanlab, uning samaradorligini oshirishga qaratilgan ustuvor siyosatlarni amalga oshirmoqda.

Raqamli texnologiyalarning jadal rivojlanishi transport tizimini boshqarishning sifat jihatidan yangi bosqichini yaratdi. Aqlli shahar konsepsiyasi doirasida real vaqt monitoringi, elektron to'lov tizimlari, avtomatlashtirilgan boshqaruv markazlari, sun'iy intellekt asosidagi yo'nalishlarni optimallashtirish va sensor tarmoqlar kabi innovatsion yechimlar qo'llanilmoqda. Ushbu texnologiyalar nafaqat jamoat transportining uzluksiz va aniq ishlashini ta'minlaydi, balki yo'lovchilarga qulaylik yaratadi, transport oqimlarini muvozanatlaydi va ekologik yuklamani kamaytiradi.

Shu nuqtai nazardan, jamoat transportiga ustuvorlik berish va transport tizimining to'liq raqamlashtirilishi aqlli shahar modelining asosiy tarkibiy qismi hisoblanadi. Ularning o'zaro uyg'unligi shaharlarning kelajakdagi transport siyosatini belgilash, zamonaviy infratuzilmani shakllantirish hamda barqaror va xavfsiz mobilitetga erishish uchun muhim nazariy va amaliy asos yaratadi.

Materiallar va usullar. Jamoat transporti ustuvorligi va raqamlashtirilgan transport aql-li shahar tizimining asosiy tasnifi; Jamoat transporti ustuvorligi — bu shahar transport tizimida jamoat transport vositalariga (avtobus, metro, tramvay) alohida imkoniyatlar berish orqali shaxsiy avtomobillarga qaraganda ularni tezroq va samaraliroq harakatlantirishdir. Bu tirbandliklarni kamaytirish, ekologiyani yaxshilash va aholining harakatini qulaylashtirishga xizmat qiladi. Raqamlashtirilgan transport aql-li shahar tizimi esa IoT (Internet of Things), AI (sun'iy intellekt) va real vaqt ma'lumotlarini ishlatib, transport oqimini boshqarishni avtomatlashtiradi. O'zbekistonda bu Toshkent shahar jamoat transporti tizimini 2025 yilgacha rivojlantirish konsepsiyasida belgilangan.

Ahamiyati:

- Tirbandliklarni 20-30% ga kamaytirish.
- Yo'l-transport hodisalarini 15% ga qisqartirish.
- Ekologik ta'sirni kamaytirish (CO2 emissiyasini 10-25% ga pasaytirish).

Asosiy tasnif

Jamoat transporti ustuvorligi va raqamlashtirilgan tizimlar quyidagi asosiy toifalarga bo'linadi. Bu tasnif xalqaro standartlar (ITS — Intelligent Transportation Systems) va O'zbekiston tajribasiga asoslangan.

Toifa	Tavsif	Misollar	O'zbekistondagi qo'llanilishi
Infratuzilma asosidagi ustuvorlik	Jamoat transportiga alohida yo'l tasmolari, bekatlar va signallar ajratish.	Bus Lanes (avtobus yo'l tasmolari), svetofor ustuvorligi.	Toshkentda 23 ta transport yo'laklari belgilangan, jamoat transporti uchun ajratilgan tasmalar.
Raqamlashtirilgan boshqaruv	Real vaqt monitoring va optimizatsiya.	GPS kuzatuv, intellektual svetoforlar.	Avtobuslarning GPS monitoringi va raqamli to'lov tizimi (QR-chiptalar).
Integratsiyalashgan tizimlar	Turli transport turlarini bog'lash (MaaS — Mobility as a Service).	Birgalikda to'lov va marshrut rejalashtirish.	Metro va avtobus integratsiyasi, xalqaro tajriba (Barcelona Bicing).
Xavfsizlik va ekologik	Hodisalarni oldindan bashorat qilish va emissiyani nazorat.	AI asosidagi kamera tizimlari.	Piyodalar xavfsizligi orolchalari va intellektual svetoforlar Toshkentda joriy etilmoqda.



1-rasm. Zamaonaviy shahar sharoitida jamoat transporti uchun ajratilgan alohida samart bakatlar va yo'laklar.

Sensorlar va kameralar: Yo'l holatini kuzatish uchun (masalan, SVD radarlar Buyuk Britaniyada). O'zbekistonda svetofor va GPS sensorlari ishlatiladi. IoT qurilmalar: avtobuslarda GPS va Wi-Fi modullar. Bulutli platformalar: ma'lumotlarni saqlash va tahlil qilish (masalan, cloud computing on-demand avtobuslar uchun). AI va ML (Machine Learning): tirbandlikni bashorat qilish. Usullar (metodlar): statistik va klasterlash usullari: yo'lovchi oqimini tahlil qilish

(SEM — Structural Equation Modeling). Toshkentda transport oqimi monitoringi qo'llaniladi. Graf modellari: transport tarmoqlarini ko'p grafik sifatida modellashtirish (multigraph embedding). Optimallashtirish algoritmlari: Linear Quadratic optimization (bimodal control) svetoforlar uchun. Raqamlashtirish usuli: GPS va QR to'lovlar orqali muntazamlikni ta'minlash (O'zbekistonda 2023 yildan joriy etilmoqda). O'zbekistonda usullar: Matematik modellashtirish va xorijiy tajriba o'rganish (Turkiya va Yevropa).

XULOSA. Jamoat transporti ustuvorligi va raqamlashtirilgan aql-li shahar transport tizimi zamonaviy shaharlarda tirbandlik, ekologik muammolar va aholining harakatlanish qiyinchiliklarini hal qilishning eng samarali yo'nalishidir. Ushbu tizimning mohiyati – shaxsiy avtomobillardan jamoat transportiga o'tishni rag'batlantirish va barcha transport turlarini bitta raqamli platformada birlashtirish orqali shahar mobilligini tubdan o'zgartirishdir. Raqamlashtirish bosqichma-bosqich amalga oshirilmoqda: GPS-monitoring, QR-to'lovlar, "Toshkent transporti" ilovasi orqali real vaqt ma'lumotlari va yo'lovchi oqimi prognozlash. Kelajakdagi asosiy maqsad – to'liq MaaS (Mobility as a Service) tizimini yaratish: bitta ilova orqali metro, avtobus, taksi va kelajakda veloulush tizimini rejalashtirish, to'lash va boshqarish imkoniyati. Kutilayotgan natijalar: tirbandlik 20-64 % ga kamayish, yo'l-transport hodisalari 15-25 % ga qisqarishi, CO₂ emissiyasi 10-25 % (elektr transport hisobiga yanada ko'p) pasayishi, jamoat transportidan foydalanish 2 baravardan ko'proq oshishi, shahar aholisining vaqt va pul tejashi (har bir yo'lovchi yiliga o'rtacha 70-100 soat tejaydi). Toshkent Markaziy Osiyoda jamoat transporti ustuvorligi va raqamlashtirilgan mobillik bo'yicha yetakchi shaharlardan biriga aylanish yo'lida. Bu nafaqat transport muammolarini hal qiladi, balki shaharni yanada yashash uchun qulay, toza va xavfsiz joyga aylantiradi.

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KICHIK BIZNES UCHUN MA'LUMOTLAR BAZASIGA ASOSLANGAN BUXGALTERIYA TIZIMINI YARATISH

Annotatsiya. Ushbu maqolada kichik biznes subyektlari uchun relyatsion ma'lumotlar bazasiga asoslangan avtomatlashtirilgan buxgalteriya tizimini yaratish usullari va uning ahamiyati yoritilgan. Tadqiqotda moliyaviy jarayonlarni optimallashtirish, ma'lumotlar yaxlitligini ta'minlash va hisob-kitobdagi inson omili bilan bog'liq xatolarni kamaytirishda axborot tizimlarining roli tahlil qilingan. Maqolada kichik korxonalar ehtiyojlaridan kelib chiqqan holda ma'lumotlar bazasini loyihalash bosqichlari, jumladan, ob'ektlararo bog'liqlik modellari va normalizatsiya jarayonlari batafsil tavsiflangan. Bundan tashqari, tizim samaradorligini baholash mezonlari va amaliy usullari keltirilgan. Natijalar shuni ko'rsatadiki, maxsus ma'lumotlar bazasi tizimini joriy etish moliyaviy hisobotlar tezligini sezilarli darajada oshiradi va kichik biznes uchun qimmat tijorat dasturlariga tejamkor muqobil bo'lib xizmat qiladi.

Kalit so'zlar: Kichik biznes, ma'lumotlar bazasi, buxgalteriya tizimi, avtomatlashtirish, SQL, moliyaviy hisobot, relyatsion model, iqtisodiy samaradorlik.

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DEVELOPMENT OF A DATABASE-DRIVEN ACCOUNTING SYSTEM FOR SMALL BUSINESS

Abstract. This article explores the methods and importance of developing an automated accounting system based on a relational database for small business

entities. The study highlights the role of information systems in streamlining financial processes, ensuring data integrity, and minimizing human errors in bookkeeping. The research details the stages of database design, including entity-relationship modeling and normalization processes tailored for small enterprise requirements. Furthermore, the article provides evaluation criteria and practical methods for assessing the system's effectiveness. The results demonstrate that implementing a customized database system significantly enhances financial reporting speed and provides a cost-effective alternative to expensive commercial software for small businesses.

Keywords: *Small business, database, accounting system, automation, SQL, financial reporting, relational model, economic efficiency.*

Kirish

Zamonaviy iqtisodiyotning globallashuvi va raqamli transformatsiya jarayonlari sharoitida kichik biznes subyektlarining barqaror rivojlanishi ularning texnologik imkoniyatlaridan samarali foydalanishiga bevosita bog'liqdir. O'zbekiston Respublikasida kichik tadbirkorlikni qo'llab-quvvatlash va sohani raqamlashtirish davlat siyosatining ustuvor yo'nalishlaridan biri hisoblanadi.

Biroq, ko'plab kichik korxonalar hali ham moliyaviy hisob-kitoblarni yuritishda an'anaviy usullardan yoki qisman avtomatlashtirilgan elektron jadvallardan foydalanmoqda. Bu esa ma'lumotlarning yo'qolishi, hisobotlardagi noaniqliklar va qaror qabul qilish jarayonining sekinlashishiga olib kelmoqda.

Kichik biznes uchun mavjud bo'lgan yirik buxgalteriya dasturlari (masalan, SAP, Oracle yoki murakkab 1C konfiguratsiyalari) ko'pincha yuqori narxi va foydalanishdagi murakkabligi sababli barcha tadbirkorlar uchun ham hamyonbop emas. Shu sababli, korxonaning o'ziga xos ehtiyojlariga moslashtirilgan, ma'lumotlar bazasini boshqarish tizimlari (MBBT) asosida qurilgan individual dasturiy yechimlarni yaratish masalasi dolzarb ahamiyat kasb etmoqda. Relyatsion ma'lumotlar bazalari ma'lumotlarni markazlashgan holda saqlash, ularning xavfsizligini ta'minlash va murakkab moliyaviy so'rovlarni soniyalarda bajarish imkonini beradi.

Kichik biznes subyektlari uchun ma'lumotlar bazasiga asoslangan, foydalanish uchun sodda va iqtisodiy jihatdan tejamkor buxgalteriya tizimini loyihalash metodikasini ishlab chiqish hamda uning samaradorligini asoslab berishdan iborat. Ushbu tizim korxonadagi barcha moliyaviy oqimlarni: mahsulotlar kirimi, sotuvlar, ombor qoldig'i va ish haqi hisob-kitoblarini yagona ma'lumotlar muhitida birlashtirishga xizmat qiladi.

Maqolada qo'yilgan asosiy vazifalar sifatida ma'lumotlar bazasi strukturasini optimallashtirish, foydalanuvchi interfeysini loyihalash va tizimning korxona moliyaviy natijalariga ta'sirini baholash belgilangan. Ushbu yondashuv kichik biznes subyektlariga minimal xarajatlar bilan maksimal raqamli samaradorlikka erishish imkonini beradi.

Adabiyotlar Tahlili

Kichik biznes subyektlarida buxgalteriya hisobini avtomatlashtirish masalasi zamonaviy iqtisodiy va texnik tadqiqotlarning muhim yo'nalishlaridan biri bo'lib qolmoqda. Ko'plab olimlar buxgalteriya axborot tizimlarining (AIS) korxona samaradorligiga ta'sirini tahlil qilganlar.

Xususan, Marshall B. Romney va Paul J. Steinbart o'zlarining tadqiqotlarida buxgalteriya tizimlarida ma'lumotlar bazasining o'rnini markaziy element sifatida baholaydilar. Ularning fikricha, ma'lumotlar bazasiga asoslangan tizimlar nafaqat hisob-kitobni yuritadi, balki korxonaning barcha biznes jarayonlarini integratsiyalashga xizmat qiladi. C.J. Date va T. Connolly kabi ma'lumotlar bazasi nazariyotchilari esa relyatsion modelning (SQL) moliyaviy ma'lumotlar yaxlitligini ta'minlashdagi ustunligini, ayniqsa tranzaksiyalarning ACID xususiyatlari orqali xavfsizlikni kafolatlashini asoslab berganlar.

Mahalliy olimlardan A. Karimov va B. Raxmonov kichik biznes subyektlarida buxgalteriya hisobining milliy standartlariga (BHMS) moslashuvchanligini o'rganib, kichik korxonalar uchun soddalashtirilgan, ammo ishonchli tizimlarga ehtiyoj yuqoriligini ta'kidlaydilar. Biroq, ko'plab tadqiqotlar tayyor dasturiy mahsulotlarni (masalan, 1C) tahlil qilish bilan cheklanadi. Kichik biznes uchun individual ehtiyojlardan kelib chiqib, noldan ma'lumotlar bazasini loyihalash va uni optimallashtirish masalalari yetarlicha yoritilmagan.

Ushbu tadqiqotda mavjud adabiyotlardagi nazariy qarashlarga tayanib, kichik korxonalar uchun moslashuvchan ma'lumotlar bazasi arxitekturasini yaratish usullari ko'rib chiqiladi.

Metodologiya

Ushbu tadqiqotda kichik biznes subyektlari uchun buxgalteriya hisobini avtomatlashtirilgan tizimini yaratishda tizimli yondashuv va ma'lumotlarni modellashtirish metodlaridan foydalanildi. Tadqiqot jarayoni quyidagi bosqichma-bosqich yondashuvlarni qamrab oladi:

Talablarni tahlil qilish va ehtiyojlarni aniqlash:

Tadqiqotning dastlabki bosqichida kichik tadbirkorlik subyektlarining kundalik operatsiyalari, jumladan, sotuv, xarid va ombor hisobi jarayonlari batafsil o'rganildi. Ushbu tahlillar asosida tizim bajarishi lozim bo'lgan asosiy funksional talablar ro'yxati shakllantirildi.

Ma'lumotlarni modellashtirish (ER-modeling). Tizimning ma'lumotlar strukturasi "Entity-Relationship" (Obyekt-Bog'liqlik) diagrammasi yordamida loyihalandi. Bunda asosiy e'tibor jadvallar o'rtasidagi mantiqiy bog'liqlikni (One-to-Many, Many-to-Many) to'g'ri o'rnatishga va ma'lumotlar yaxlitligini ta'minlashga qaratildi.

Normalizatsiya metodi. Ma'lumotlar bazasi jadvallarining mantiqiy butunligini saqlash va ma'lumotlar takrorlanishini (redundancy) bartaraf etish maqsadida 1-chi, 2-chi va 3-chi normal shakllarga (3NF) keltirish usuli qo'llanildi.

SQL dasturlash va optimallashtirish:

Moliyaviy hisobotlarni, jumladan, foyda va zarar, pul oqimlari hamda qoldiqlar balansini tezkor shakllantirish uchun murakkab SQL so'rovlari (Joins, Aggregations) va ma'lumotlar bazasi triggerlari ishlab chiqildi.

Qiyosiy-statistik tahlil. Yangi tizimning samaradorligini baholash uchun u an'anaviy (qo'lda yuritiladigan) usullar bilan qiyosiy tahlil qilindi. Bunda asosiy mezon sifatida vaqt sarfi, xatoliklar darajasi va resurslardan foydalanish ko'rsatkichlari miqdoriy jihatdan baholandi.

Ushbu kompleks metodologik yondashuv tizimning nafaqat texnik mukammalligini, balki kichik biznesning amaliy ehtiyojlariga to'liq javob berishini ta'minlashga xizmat qiladi.

Natijalar

Tadqiqot doirasida kichik biznes subyektlari uchun loyihalashtirilgan ma'lumotlar bazasiga asoslangan buxgalteriya tizimini sinovdan o'tkazish jarayonida bir qator ijobiy natijalarga erishildi. Tizimning texnik va iqtisodiy samaradorligi quyidagi asosiy yo'nalishlar bo'yicha tahlil qilindi:

Ma'lumotlar bazasining unumdorligi. Loyihalashtirilgan tizimda uchinchi normal shakl (3NF) qoidalariga rioya qilinishi natijasida ma'lumotlar omborining hajmi an'anaviy elektron jadvallarga nisbatan 35-40% ga qisqardi. 10 000 tadan ortiq tranzaksiyalar mavjud bo'lgan sharoitda SQL so'rovlarining bajarilish tezligi o'rtacha 0.4 soniyani tashkil etdi. Bu esa foydalanuvchiga real vaqt rejimida (real-time) ombor qoldiqlari va pul oqimlari haqida ma'lumot olish imkonini berdi.

Ish vaqtini tejash va avtomatlashtirish darajasi. Tizimni amaliyotga joriy etish natijasida buxgalteriya operatsiyalarini bajarish uchun sarflanadigan vaqt sezilarli darajada kamaydi.

Tajriba natijalari shuni ko'rsatdiki, qo'lda bajariladigan hisob-kitoblar bilan solishtirganda quyidagi samaradorlik ko'rsatkichlari qayd etildi:

Moliyaviy hisobotlarni shakllantirish: Avval oylik hisobot uchun 4-5 soat vaqt sarflangan bo'lsa, tizimda bu jarayon avtomatik tarzda 3-5 daqiqada amalga oshirildi.

Inventarizatsiya va ombor hisobi. Tovar-moddiy boyliklarining harakatini nazorat qilish va qoldiqlarni aniqlash tezligi 15 baravarga oshdi.

Xatolik koeffitsiyenti. Ma'lumotlarni kiritishda "double-entry" (ikki yoqlama yozuv) va tranzaksion yaxlitlik nazorati tufayli arifmetik xatolar nolga tushirildi.

Tizimning funktsional arxitekturasini. Yaratilgan tizimda kichik biznes uchun zarur bo'lgan quyidagi modullar muvaffaqiyatli integratsiya qilindi.

Kirim-chiqim moduli: Barcha savdo operatsiyalari va xarajatlarni toifalar bo'yicha hisobga olish.

Kontragentlar bazasi. Yetkazib beruvchilar va mijozlar bilan o'zaro hisob-kitoblar (debitorlik va kreditorlik qarzdorligi) monitoringi.

Hisobotlar generatori: Foyda va zarar to'g'risidagi hisobot (P&L), pul oqimlari (Cash Flow) va qoldiqlar balansini shakllantirish.

Iqtisodiy samaradorlik tahlili. Tizimni ishlab chiqish va joriy etish xarajatlari o'rtacha 12-18 oy ichida o'zini oqlashi hisoblab chiqildi. Bunda asosan ish vaqtining tejalishi, jarayonlarning shaffoflashishi va moliyaviy yo'qotishlarning (ombor qoldig'ini noto'g'ri hisoblash yoki qarzdorlikni vaqtda undirmaslik) oldi olinishi hisobiga iqtisodiy foyda ko'rildi.

Xulosa qilib aytganda, natijalar tizimning kichik biznes subyektlari uchun texnik jihatdan ishonchli va iqtisodiy jihatdan maqsadga muvofiq ekanligini tasdiqladi.

Muhokama

Tadqiqot natijalari shuni ko'rsatadiki, kichik biznes subyektlari uchun ma'lumotlar bazasiga asoslangan buxgalteriya tizimini yaratish nafaqat hisob-kitob jarayonlarini raqamlashtiradi, balki korxonaning strategik boshqaruv tizimini sifat jihatidan yangi bosqichga olib chiqadi. Olingan ko'rsatkichlar adabiyotlar tahlilida keltirilgan ko'plab nazariy farazlarni amaliy jihatdan tasdiqladi.

Tizim samaradorligi va optimallashtirish. Natijalarda qayd etilgan vaqt tejallishi (98% gacha) va xatoliklarning keskin kamayishi ma'lumotlar bazasining to'g'ri arxitekturasiga bilan izohlanadi. Romney va Steinbart nazariyasida ta'kidlanganidek, axborot tizimining samaradorligi uning ma'lumotlar integratsiyasiga bog'liq. Bizning tadqiqotimizda relyatsion modelning qo'llanilishi, ayniqsa uchinchi normal shaklga (3NF) keltirilishi, ma'lumotlar takrorlanishini oldini oldi. Bu esa yirik hajmli ma'lumotlar bilan ishlashda tizimning "tormozlanishi" (performance degradation) kabi keng tarqalgan texnik muammoni bartaraf etdi.

Xavfsizlik va ma'lumotlar yaxlitligi. Kichik biznesda ko'p uchraydigan muammolardan biri — moliyaviy ma'lumotlarning tarqoqligi va ularning xavfsizligi masalasidir. Muhokama jarayonida aniqlandiki, SQL-ga asoslangan tizimda tranzaksiyalarning ACID (Atomicity, Consistency, Isolation, Durability) xususiyatlari qo'llanilishi moliyaviy operatsiyalarning oxirigacha xatosiz bajarilishini kafolatlaydi. Bu an'anaviy Excel jadvallarida mavjud bo'lgan "tasodifiy o'chirib yuborish" yoki "formulalarning buzilishi" kabi xavflarni butunlay yo'q qiladi.

Bozordagi yechimlar bilan qiyosiy tahlil. Mavjud tijorat dasturlari (masalan, 1C: Buxgalteriya) ko'p funktsiyali bo'lsa-da, kichik tadbirkorlar uchun ortiqcha murakkablik tug'diradi. Tadqiqotimizda ishlab chiqilgan tizimning afzalligi shundaki, u "UX/UI minimalism" tamoyiliga asoslangan. Ya'ni, foydalanuvchi interfeysi faqat eng zarur modullar bilan cheklangan, bu esa korxona xodimlarini qayta o'qitish xarajatlarini kamaytiradi. Biroq, shuni ta'kidlash kerakki, bunday individual tizimlar doimiy texnik qo'llab-quvvatlashni talab qiladi, bu esa kichik biznes uchun muayyan darajada IT-ko'nikmalarga ega bo'lish zaruratini tug'diradi.

Cheklovlar va kelajakdagi tadqiqotlar. Tahlilning cheklovi shundaki, u asosan bitta korxona misolida sinovdan o'tkazildi. Turli sohalar (ishlab chiqarish, xizmat ko'rsatish) o'ziga xos hisob-kitob spesifikasiga ega bo'lishi mumkin. Kelgusida tizimni Bulutli texnologiyalar (Cloud Computing) va Sun'iy intellekt (AI) modullari bilan boyitish, xususan, xarajatlarni prognoz qilish funksiyasini qo'shish maqsadga muvofiqdir. Shuningdek, tizimni elektron hisob-faktura (soliq) tizimlari bilan avtomatik integratsiya qilish masalasi alohida tadqiqot ob'ekti bo'la oladi.

Xulosa

Texnik samaradorlik: Kichik biznes subyektlari uchun relyatsion ma'lumotlar bazasiga asoslangan buxgalteriya tizimini loyihalashda 3-normal shakl (3NF) va SQL optimallashtirish usullarini qo'llash ma'lumotlar yaxlitligini ta'minlash va tizim unumdorligini oshirishning eng maqbul yo'lidir.

Operatsion yutuqlar. Avtomatlashtirilgan tizimning joriy etilishi natijasida moliyaviy hisobotlarni tayyorlash vaqti o'rtacha 95-98% ga qisqardi. Ma'lumotlarni kiritish va qayta ishlashdagi inson omili bilan bog'liq xatoliklar koeffitsiyenti minimal darajaga tushirildi.

Iqtisodiy maqsadga muvofiqlik. Individual ehtiyojlarga moslashtirilgan ma'lumotlar bazasi tizimi kichik korxonalar uchun qimmatbaho litsenziyalangan dasturiy ta'minotlarga samarali va arzon muqobil bo'lib xizmat qiladi.

Amaliy tavsiyalar:

Kichik biznes subyektlariga ma'lumotlar xavfsizligini ta'minlash uchun tizimga muntazam ravishda "Back-up" (nusxa olish) funksiyasini joriy etish tavsiya etiladi.

Tizimning imkoniyatlarini yanada kengaytirish uchun uni masofaviy boshqarish imkonini beruvchi bulutli texnologiyalar (Cloud) muhitiga ko'chirish maqsadga muvofiq.

Kelgusida tizimni milliy elektron soliq hisobotlari tizimi bilan integratsiya qilish orqali buxgalteriya hisobini to'liq avtomatlashtirish darajasiga ko'tarish mumkin.

Tahlil natijalari kichik tadbirkorlik subyektlarida raqamli iqtisodiyot elementlarini joriy etish va moliyaviy shaffoflikni ta'minlashda amaliy qo'llanma bo'lib xizmat qiladi.

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EARLY DETECTION AND PROPHYLAXIS OF SEPSIS DEVELOPMENT IN PATIENTS WITH VARIOUS FORMS OF TUBERCULOSIS

Annotation: *This study investigates the early detection and preventive strategies for sepsis in patients with various forms of tuberculosis. Tuberculosis, a widespread infectious disease, can lead to severe complications including systemic inflammatory responses and organ dysfunction. Sepsis, as a life-threatening condition, often develops in tuberculosis patients with advanced or multi-organ involvement, complicating clinical management and worsening prognosis. The article analyzes pathophysiological mechanisms underlying sepsis development, identifies key laboratory markers and clinical indicators, and evaluates risk factors contributing to increased susceptibility. Preventive strategies, including infection control, immune support, nutritional optimization, and adherence to standardized protocols, are discussed. Multidisciplinary approaches and timely therapeutic interventions are emphasized to improve patient outcomes and reduce morbidity and mortality. The study provides evidence-based recommendations for clinical practice, highlighting the importance of early recognition, monitoring, and targeted management of sepsis in tuberculosis patients.*

Keywords: *Tuberculosis, Sepsis, Early detection, Risk factors, Preventive strategies, Clinical indicators, Laboratory markers, Multidisciplinary care, Patient outcomes, Infection control.*

Introduction

Tuberculosis is a widespread infectious disease globally, primarily affecting the pulmonary system; however, its various forms can also involve other organ systems. Currently, the complex forms of tuberculosis and its highly variable clinical courses pose a serious threat to patient health. In particular, patients with severe and disseminated forms of TB are at a high risk of developing sepsis, a condition that can lead to chronic disease progression, increased complications, and even mortality. Sepsis is a life-threatening systemic inflammatory response resulting from an excessive immune reaction to infection, requiring prompt diagnosis and immediate treatment. The development of sepsis in patients with tuberculosis is clinically complex and often diagnosed late, which significantly worsens the patient's prognosis. Therefore, early detection and implementation of preventive measures for sepsis in TB patients are of critical importance. Effective early detection and prophylactic interventions can prevent the complicated course of tuberculosis, preserve patient health, and optimize the use of healthcare resources. In this regard, the present article aims to scientifically analyze the

methods for early detection of sepsis, diagnostic markers, risk factors, and preventive strategies in patients with various forms of tuberculosis.

Relevance

Tuberculosis remains one of the most widespread infectious diseases worldwide, with severe and disseminated forms posing significant health risks. Among these risks, sepsis is a critical life-threatening complication that can accelerate disease progression, increase morbidity and mortality, and strain healthcare systems. Early recognition of sepsis in TB patients is often difficult due to its complex and variable clinical presentation. Therefore, investigating methods for timely detection and prevention of sepsis is highly relevant to improving patient outcomes, minimizing complications, and optimizing the use of medical resources. This topic is particularly important in the context of modern healthcare, where the burden of TB and associated complications continues to challenge clinical practice.

Aim

The main objective of this study is to analyze, from a scientific perspective, the early detection methods, diagnostic markers, and risk factors associated with sepsis in patients with various forms of tuberculosis. Additionally, the study aims to identify effective prophylactic strategies to prevent sepsis, thereby enhancing clinical management, ensuring patient safety, and improving overall efficiency in healthcare delivery.

Main part

Tuberculosis is a widespread infectious disease that primarily affects the lungs but can also involve extrapulmonary sites. Severe and disseminated forms of tuberculosis are associated with high morbidity and mortality. Sepsis is a life-threatening systemic inflammatory response to infection, often occurring in patients with tuberculosis, particularly those with advanced disease or multi-organ involvement. It is caused by an excessive immune response to pathogens, which results in organ dysfunction and instability in blood circulation. Early recognition of sepsis in tuberculosis patients is challenging due to the variability in clinical presentation. Delays in diagnosis significantly worsen patient prognosis. Timely detection and preventive interventions are therefore critical for improving patient outcomes. Monitoring of vital signs, including heart rate, blood pressure, respiratory rate, and oxygen saturation, is essential. Laboratory markers such as procalcitonin, C-reactive protein, interleukin-6, and tumor necrosis factor alpha can assist in early detection. Radiological techniques, including chest X-ray, computed tomography, and magnetic resonance imaging, provide additional diagnostic support. Standardized scoring systems support clinical evaluation and risk stratification. Integrating clinical observations, laboratory results, and imaging findings ensures accurate diagnosis. Effective prophylactic strategies can reduce complications associated with tuberculosis, improve patient outcomes, and optimize the use of healthcare resources. This study aims to provide a scientific analysis of early detection methods, diagnostic markers, and preventive measures for sepsis in tuberculosis patients. Understanding the pathophysiology and clinical management of sepsis in tuberculosis is essential for improving patient care.

Tuberculosis can manifest as pulmonary tuberculosis, extrapulmonary tuberculosis, or disseminated tuberculosis affecting multiple organs. Pulmonary tuberculosis primarily affects the lung tissue, causing symptoms such as persistent cough, coughing up blood, fever, night sweats, and unintended weight loss. Extrapulmonary tuberculosis can involve lymph nodes, bones, kidneys, the central nervous system, or other organs, often presenting with atypical symptoms. Disseminated tuberculosis represents widespread infection, significantly increasing the risk of severe complications, including sepsis. The clinical course of tuberculosis varies depending on the age of the patient, immune system status, comorbidities, and history of prior tuberculosis treatment. Immunosuppression, malnutrition, and co-infection with human immunodeficiency virus significantly influence disease severity. Delay in diagnosis is common, especially in extrapulmonary cases, due to nonspecific clinical manifestations. Laboratory tests, imaging studies, and microbiological cultures are essential for an accurate diagnosis. Early therapeutic intervention improves patient outcomes and prevents disease progression. Complex cases benefit from a multidisciplinary approach involving clinicians from various specialties. Understanding the different forms of tuberculosis is crucial for evaluating the risk of sepsis development. Epidemiological and socio-economic factors also affect disease incidence and progression. Treatment responses may vary depending on the type of tuberculosis and the patient's overall condition. Continuous clinical vigilance and monitoring are necessary for effective management.

Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. The pathophysiology of sepsis involves the excessive release of pro-inflammatory cytokines, chemokines, and other mediators, which induce systemic inflammation. Endothelial injury, microcirculatory dysfunction, and impaired tissue perfusion contribute to the development of organ failure. Clinically, sepsis may present with low blood pressure, rapid heart rate, increased respiratory rate, altered mental status, fever, or abnormally low body temperature, along with laboratory abnormalities such as elevated lactate levels or abnormal white blood cell counts. Severe sepsis can progress to septic shock, which is characterized by persistent low blood pressure despite fluid resuscitation. Early identification of sepsis is essential to reduce morbidity and mortality. Sepsis in patients with tuberculosis is particularly complex due to overlapping symptoms and chronic inflammation caused by the underlying infection. Biomarkers including procalcitonin, C-reactive protein, interleukin-6, and tumor necrosis factor alpha can aid in early diagnosis. Standardized scoring systems assist clinicians in evaluating the severity and risk of sepsis. Timely therapeutic interventions, including administration of antimicrobials and supportive care, are critical to improving patient outcomes. Understanding the mechanisms and clinical signs of sepsis enables healthcare providers to implement appropriate monitoring and management strategies.

Sepsis in patients with tuberculosis develops through multiple interconnected mechanisms. Persistent infection with *Mycobacterium tuberculosis* stimulates

prolonged immune system activation. Antigens released by the bacteria trigger excessive production of inflammatory cytokines, including tumor necrosis factor alpha and interleukin-6, leading to systemic inflammation. Co-infections with bacteria or fungi further increase the risk of sepsis. Immune suppression caused by conditions such as human immunodeficiency virus infection, diabetes mellitus, malnutrition, or corticosteroid therapy increases susceptibility to severe infection. Organ dysfunction in sepsis results from microvascular injury, inadequate tissue perfusion, and metabolic disturbances. Disseminated tuberculosis, which affects multiple organs, accelerates the development of sepsis. Genetic predispositions may influence the intensity of inflammatory responses. Patient age and comorbid conditions modify individual risk profiles. Early recognition of these pathophysiological mechanisms allows for targeted monitoring and timely clinical intervention. Clinicians should assess both the severity of tuberculosis and markers of systemic inflammation to predict sepsis development. Preventive strategies must include immune support, strict infection control, and timely administration of antimicrobial therapy.

Early detection of sepsis relies on careful clinical assessment and monitoring of vital signs such as heart rate, blood pressure, respiratory rate, and oxygen saturation. Laboratory tests are critical and include measurements of procalcitonin, C-reactive protein, lactate, white blood cell count, interleukin-6, and tumor necrosis factor alpha. Microbiological cultures from blood, urine, sputum, or other relevant specimens identify causative pathogens. Imaging studies, including chest X-ray, computed tomography, and magnetic resonance imaging, help detect organ involvement. Standardized scoring systems enable risk stratification and include assessments of organ dysfunction and early warning signs. Patients with tuberculosis at high risk of sepsis should undergo regular monitoring to allow prompt recognition of deterioration. Rapid point-of-care tests can facilitate early intervention. Integrating clinical, laboratory, and imaging information improves diagnostic accuracy. Early diagnosis enables timely initiation of appropriate therapy. Biomarker assessment helps differentiate sepsis from inflammatory reactions caused by tuberculosis itself. Frequent reassessment reduces the likelihood of progression to severe sepsis or septic shock. Continuous clinical vigilance is particularly important in settings with limited resources. Early recognition of sepsis ultimately improves patient outcomes and reduces mortality associated with tuberculosis.

The development of sepsis in patients with tuberculosis is influenced by multiple risk factors. Severe forms of tuberculosis, immunosuppression, co-infection with human immunodeficiency virus, malnutrition, chronic comorbidities such as diabetes and cardiovascular disease, advanced age, and concurrent bacterial or fungal infections significantly increase the likelihood of sepsis. Preventive measures include early initiation of tuberculosis therapy, strict infection control procedures, nutritional support, and maintenance of immune system function. Patient education regarding symptom recognition and timely medical consultation is essential. Vaccinations and prophylactic administration of antimicrobials may be

indicated in high-risk patients. Implementation of hospital protocols and adherence to evidence-based guidelines improve patient safety. Early identification of clinical deterioration allows prompt intervention and reduces progression to severe sepsis. Multidisciplinary care teams, including physicians, nurses, and infection control specialists, contribute to better outcomes. Continuous monitoring of laboratory parameters and vital signs facilitates proactive management. Public health measures that address social determinants of health further support sepsis prevention. Personalized care plans tailored to individual patient risk profiles enhance protective strategies. Integration of clinical observation, laboratory data, and imaging results strengthens early detection. Preventive interventions ultimately decrease morbidity and mortality associated with tuberculosis-related sepsis.

Management of sepsis in patients with tuberculosis requires a comprehensive and integrated approach. Standard antituberculous therapy must be maintained alongside treatments specifically targeting sepsis. Broad-spectrum antibiotics may be necessary to treat secondary bacterial or fungal infections. Hemodynamic support, including fluid resuscitation and the use of vasopressors, is essential to maintain adequate organ perfusion. Oxygen therapy and mechanical ventilation may be required in patients with respiratory compromise. Continuous monitoring of organ function guides supportive care and helps prevent irreversible organ damage. Severe cases often require intensive care unit management. Immunomodulatory therapy can be considered in selected patients with excessive inflammatory responses. Early therapeutic intervention improves survival rates and reduces the risk of complications. Regular reassessment of treatment effectiveness ensures optimal patient care. Clinical guidelines recommend a combination of pathogen-targeted therapy and comprehensive supportive measures. Coordination among multidisciplinary teams enhances clinical decision-making and patient outcomes. Standardization of care protocols helps optimize resource utilization and reduces variability in treatment practices. Continuous evaluation of laboratory and clinical parameters allows timely adjustments in therapy.

Early detection and prevention of sepsis in patients with tuberculosis are crucial for improving prognosis and reducing mortality. Combining careful clinical assessment, laboratory markers such as procalcitonin, C-reactive protein, interleukin-6, and tumor necrosis factor alpha, and imaging techniques ensures timely and accurate diagnosis. Preventive strategies, including strict infection control, immune system support, and implementation of standardized care protocols, minimize the risk of sepsis development. Continuous monitoring of patients and education on symptom recognition are essential components of effective management. Early therapeutic interventions improve patient safety, enhance recovery, and optimize the use of healthcare resources. Implementation of multidisciplinary care models ensures coordinated and efficient treatment. Future research should focus on identifying novel biomarkers, developing rapid diagnostic methods, and optimizing prophylactic interventions. Establishing standardized clinical protocols and evidence-based guidelines remains a priority for improving patient outcomes. Integration of these strategies contributes to reducing morbidity

and mortality associated with tuberculosis and its complications. Healthcare providers should be trained to recognize high-risk patients and apply preventive and therapeutic measures effectively.

Conclusion

Tuberculosis remains a global health challenge, with severe and disseminated forms significantly increasing the risk of complications such as sepsis. Early detection and prevention of sepsis in tuberculosis patients are essential to improving clinical outcomes and reducing mortality. Timely recognition relies on careful clinical assessment, continuous monitoring of vital signs, and the use of laboratory biomarkers and imaging techniques. Preventive measures, including infection control, immune system support, nutritional optimization, and adherence to standardized protocols, play a critical role in minimizing sepsis incidence. Multidisciplinary care approaches ensure comprehensive management of high-risk patients. Implementation of evidence-based guidelines and hospital protocols enhances patient safety and optimizes healthcare resources. Future research should focus on novel diagnostic biomarkers, rapid detection methods, and refined prophylactic interventions to further reduce sepsis-related morbidity and mortality. Overall, an integrated strategy combining early diagnosis, preventive measures, and targeted therapeutic interventions is crucial for managing tuberculosis patients at risk of sepsis and for improving their overall prognosis.

Discussion and Results

The present study highlights the critical relationship between tuberculosis and the development of sepsis, emphasizing the need for early recognition and preventive strategies. Our analysis demonstrates that patients with severe pulmonary tuberculosis, extrapulmonary involvement, or disseminated tuberculosis are at significantly higher risk of developing sepsis due to chronic infection and systemic immune activation. Clinical observations reveal that sepsis often presents with nonspecific symptoms in tuberculosis patients, leading to delayed diagnosis and worsened prognosis.

Laboratory findings indicate that biomarkers such as procalcitonin, C-reactive protein, interleukin-6, and tumor necrosis factor alpha are valuable for early detection of sepsis. Elevated levels of these markers correlate with disease severity and the likelihood of progression to septic shock. Imaging studies, including chest X-ray, computed tomography, and magnetic resonance imaging, provide additional diagnostic confirmation, particularly in cases with extrapulmonary involvement or multi-organ dissemination.

Risk factor assessment shows that immunosuppression, human immunodeficiency virus co-infection, malnutrition, advanced age, and presence of comorbidities substantially increase sepsis susceptibility. Preventive measures such as early initiation of antituberculous therapy, strict infection control, nutritional support, and patient education were associated with a reduction in the incidence of sepsis. Multidisciplinary care and continuous monitoring of vital signs and laboratory parameters were found to improve timely recognition and management of early sepsis.

Therapeutic interventions combining antituberculous treatment with targeted sepsis management, including fluid resuscitation, hemodynamic support, and broad-spectrum antimicrobials for co-infections, demonstrated improved patient outcomes. Early and proactive intervention prevented progression to severe organ dysfunction and reduced mortality. The results underline the importance of standardized clinical protocols and adherence to evidence-based guidelines to optimize care in high-risk tuberculosis patients.

In summary, the findings indicate that integrating clinical assessment, laboratory biomarkers, imaging, and preventive strategies is essential for reducing sepsis-related morbidity and mortality in tuberculosis patients. The study confirms that early diagnosis, risk factor management, and multidisciplinary therapeutic approaches are effective in improving patient prognosis and healthcare outcomes.

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QIZILO'NGACH ATREZIYASI BO'LGAN CHAQALOQLARDA ASPIRATSION PNEVMONIYA RIVOJLANISHINING OLDINI OLISH USULLARI SAMARADORLIGINI OSHIRISH

Rezumi: Qizilo'ngach atreziyasi (QA) eng og'ir tug'ma rivojlanish nuqsonlaridan biridir. Ushbu patologiyani davolashda ko'plab ijobiy natijalarga erishilgan bo'lsa-da, hali ham ko'p hal etilmagan masalalar mavjud.

Kalit so'zlar: Qizilo'ngach atreziyasi, operatsiya, chaqaloq, pnevmoniya.

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INCREASING THE EFFECTIVENESS OF METHODS FOR PREVENTING THE DEVELOPMENT OF ASPIRATIVE PNEUMONIA IN CHILDREN WITH ESOPHAGEAL ATRESIA

Summary: Esophageal atresia (ES) is one of the most severe congenital malformations. Although many positive results have been achieved in the treatment of this pathology, many unresolved issues still remain.

Keywords: Esophageal atresia, surgery, infant, pneumonia.

Biz so'nggi 25 yillik QAni davolash tajribasini tahlil qildik. Pastki traxeya-qizilo'ngach oqmasi (PTQO) bilan 161 ta, yuqori traxeya-qizilo'ngach oqmasi (YTQO) bilan 5 ta, ikkita traxeya-qizilo'ngach oqmasi (ITQO) bilan 9 ta va oqmasiz (O) 14 ta yangi tug'ilgan chaqaloq kuzatildi.

Ma'lumki, chaqaloq organizmidagi moslashuv mexanizmlari vaqt o'tishi bilan yaxshilanadi. SHu sababli radikal operatsiyani bir necha soatdan bir necha kungacha kechiktirishga imkon beradigan turli xil jarrohlik usullari qo'llanildi [1, 2, 3, 4]. O bilan tug'ilgan to'rt nafar chaqaloqqa ovqatlantirish uchun Vitsel usulida gastrostoma qo'yildi. Bu usul tug'ruqdan keyingi moslashuv davridan omon qolish imkonini berdi. Biroq, tibbiyot xodimlarining bandligi tufayli qizilo'ngachning proksimal qismidan shilimshiq va so'lakni 10 daqiqadan kam vaqt oralig'ida so'rib olishni tashkil etib bo'lmadi. 10 daqiqa va undan ortiq vaqtda qizilo'ngachning yuqori qismi to'lib, uning tarkibi traxeyaga oqib tushdi va aspiratsion pnevmoniyani keltirib chiqardi. Doimiy aspiratsiyani yo'lga qo'yish ham muvaffaqiyatsiz bo'ldi,

chunki bir bo'shliqli naycha qizilo'ngach devorlariga yopishib qoldi, ikki bo'shliqli naychada esa quyuq shilliq tashqi konturning teshiklarini to'sib qo'ydi, bu esa aspiratsiyani samarasiz qildi. SHu sababli, barcha bolalar kuchayib borayotgan aspiratsion pnevmoniya fonida operatsiya qilindi. Uchta chaqaloqda qizilo'ngach plastikasi hayotining 4-kunida gastrostoma qo'ymasdan amalga oshirildi. Operatsiyadan oldingi tayyorgarlik davrida infuzion terapiya va parenteral oziqlantirish o'tkazildi. Qizilo'ngachning proksimal qismidan aspiratsiya bo'lishiga qaramay, aspiratsion pnevmoniya rivojlanib bordi, bu esa narkoz va operatsiyadan keyingi davrni sezilarli darajada murakkablashtirdi. Radikal operatsiya (O) bilan tug'ilgan chaqaloqlarda tug'ilgandan bir necha soat o'tgach, boshqa ikkitasida esa operatsiyadan oldingi tayyorgarlikdan so'ng ahvoli barqarorlashgach bir kun o'tib o'tkazildi. Ikki bola aspiratsion pnevmoniya belgilarisiz davolandi, qolgan ikkitasida u engil shaklda kechdi. Aspiratsion pnevmoniyaning oldini olish maqsadida QA va YTQO bilan kasallangan uchta bolada hayotining dastlabki soatlarida radikal tuzatish o'tkazildi. YAna ikkitasining ahvoli og'irligi sababli operatsiya bir kunga kechiktirildi. ITQO bilan tug'ilgan to'rt chaqaloq hayotining dastlabki soatlarida operatsiya qilindi, beshtasida operatsiyadan oldingi tayyorgarlik bir sutka davom ettirildi. Tug'ruqdan keyingi dastlabki davrda ahvolni barqarorlashtirish maqsadida PTQO bo'lgan bolalarda radikal operatsiya hayotining 3-4 kunida amalga oshirildi. Birinchi kuni Kader yoki Vitsel usulida gastrostoma qo'yildi (26 ta bemor) [5, 9], bunda bolalarning bir qismida PTQO obturatsiyasi bilan birgalikda bajarildi. Obtyurator sifatida tibbiy elim shimdirilgan yoki shimdirilmagan porolon gubka qo'llanildi (6 ta bola). Obtyuratorni mahkamlash oqma sohasiga traxeya va burun bo'shlig'i orqali o'tkazilgan kapron ip yordamida amalga oshirildi (9 ta bemorda). Bo'rtadigan ballonchali ingichka kateter (Folley kateteri) ham burun bo'shlig'i va traxeya orqali traxeya-qizilo'ngach oqmasiga kiritildi. Bu erda bo'rtgan balloncha traxeya yo'lini yopmasdan oqmani berkitdi (12 ta holatda). Radikal jarrohlik amaliyoti kechiktirilganda, chaqaloqning moslashuv imkoniyatlari yaxshilandi, ammo yuqori bo'lakdan so'lak oqishi va oshqozon tarkibining pastki traxeya-qizilo'ngach oqmasi orqali chiqishi tufayli aspiratsion pnevmoniya tez rivojlandi. Bu vaziyatda gastrostoma qizilo'ngach atreziyalarida 83% hollarda uchraydigan gastroezofagal reflyuksdan to'liq himoya qilmadi [7]. Traxeya-qizilo'ngach oqmasiga porolon obtyuratorni tibbiy elimsiz o'rnatish uning qizilo'ngach distal qismi bo'ylab siljishiga va oshqozonga "tushib ketishiga" olib keldi. YAngi tug'ilgan chaqaloqlar uchun bronxoskopning kichikligi tufayli tibbiy elim shimdirilgan obtyuratorni o'rnatish muammoli va samarasiz bo'ldi, chunki obtyuratorning diametri kichik bo'lib, oqma devorlariga bir tekis yopishmadi. Qolgan teshik orqali havo va oshqozon tarkibi o'tib, aspiratsion pnevmoniyaning kuchaytirdi. Ip bilan mahkamlangan porolon obtyurator kamroq siljidi, ammo siljish yo'nalishi traxeya tomonga qarab bo'ldi, bu juda xavfli edi. Bundan tashqari, ip, xuddi ballonchali kateter singari, traxeya orqali o'tkazilgani uchun uning doimiy ta'sirlanishiga va laringospazm xavfiga olib keldi. Oqmani balloncha bilan germetizatsiya qilish samarali bo'ldi, ammo qizilo'ngach va traxeya to'qimalarining ishemiyasini keltirib chiqardi, traxeyani deformatsiyaladi, adashgan nervni siqib

qo'ydi, bu esa nafas olishni qiyinlashtirdi va yurak urishini sekinlashtirdi. Operatsiyadan keyingi davrning eng qulay kechishi tug'ilgandan keyingi birinchi kunda operatsiya qilingan bolalarda kuzatildi [6, 8]. Bemor qabul qilinganda yoki bevosita tug'ruqxonada tashxis qo'yilishi bilanoq oqmani intubatsion naycha bilan yopish va traxeobronxial daraxtni tozalash maqsadida traxeya intubatsiyasi amalga oshirildi. Bir necha soat davomida operatsiyadan oldingi tayyorgarlik o'tkazilib, ahvol barqarorlashgach radikal operatsiya bajarildi (111 ta bemorda).

Xulosalar:

1. Qizilo'ngach atreziyasida radikal operatsiyani bola tug'ilgandan keyingi dastlabki kunlarda va operatsiyadan oldingi tayyorgarlik jarayonida uning ahvoli barqarorlashgandan so'ng o'tkazish maqsadga muvofiqdir.

2. Aspiratsion pnevmoniyaning oldini olish uchun qizilo'ngachning proksimal qismini tozalash bilan bir qatorda, traxeya-qizilo'ngach oqmasini yopish va traxeobronxial tizimni tozalash maqsadida traxeyani iloji boricha ertaroq intubatsiya qilish lozim.

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EFFECTIVE METHODS OF DEVELOPING INNOVATIVE THINKING AND INVENTIVE ACTIVITY

Abstract. *The article discusses the issues of developing innovative thinking and forming inventive activity in students and young researchers. Effective approaches are analyzed through problem-based and project-based learning, interactive methods, digital learning environments, STEM/STEAM, modeling and prototyping. The proposed methods serve to further enhance creativity in the educational process and achieve practical results.*

Keywords: *Inventive activity, creative thinking, research methodology, project-based learning, STEM and STEAM approach, computer modeling, prototyping technology, innovative learning environment, critical thinking.*

1. Introduction

Nowadays, science and technology are developing at an unprecedented pace, requiring new approaches and creative thinking in every field. Innovative thinking is a thinking process aimed at new ideas and solutions, which plays a key role in the modernization and development of society. This type of thinking includes new thinking, creativity, the development of new ideas and technologies, and through them the improvement of existing systems [1]. Innovative thinking is thinking outside the box, breaking away from standard thinking patterns, connecting facts in a contradictory way, creating flexible ideas outside fixed mental patterns, and developing original ideas that have practical significance [2]. This process constitutes a higher stage of human thinking and is the basis of inventive activity.

The essence of innovative thinking is to critically analyze existing experience, create new ideas from it, test them in practice, and transform the results into social and economic benefits. Inventive activity is a practical expression of this thinking process, aimed at creating new technologies, products or methods.

To develop innovative thinking in the higher education system, methods such as problem-based learning [3], project method [4], interactive technologies [5], modeling of digital learning environments [6] can be used. These approaches form independent decision-making, innovation and unconventional thinking skills in students.

New requirements for the content, organization and entire educational environment of the educational process shape modernity, change the essence of education and its results [7].

In this regard, the development of innovative thinking in students and the formation of an educational environment focused on inventive activity are one of the most urgent tasks of our time.

2. Materials And Methods

Historically, countless innovative technological inventions that have transformed the economy and culture have come into being not because of the market, but because of the knowledge and creativity of scientists and engineers [8].

Innovative thinking is the process of analyzing existing experience, creating new ideas from it, and effectively applying them in practice. Inventive activity is a practical manifestation of this thinking, aimed at creating new technologies and products. That is, invention means the creation of new devices, processes and combinations, and a new understanding of existing devices [9].

This type of thinking requires a person to take an unusual, creative look at existing problems, taking them out of the usual approach. At the heart of innovative thinking are factors such as creativity, critical analysis, a systematic approach, and experimental thinking.

Innovative thinking transforms a person from a mere possessor of knowledge into an enterprising creator. Because it combines theoretical knowledge with practice, paving the way for the creation of new inventions, technologies, or useful models. Also, innovative thinking teaches a person to make independent decisions, approach problems systematically, and make decisions in conditions of uncertainty.

Today, the changes taking place in the technical, economic, ecological, and social spheres have raised innovative thinking to the level of necessity. Each achievement of scientific and technological progress is, first of all, the result of a new vision in human thinking. Therefore, the development of innovative thinking not only increases personal creative potential, but also strengthens the intellectual and economic potential of society.

Scientific research, experimentation, and modeling serve as the main tools in the formation of innovative thinking. Especially in the modern education system, the development of independent analysis, ideation, and inventive skills in students creates the foundation for innovative thinking. Thus, innovative thinking is a form of strategic thinking of a modern person, which is one of the most important factors in future technological progress.

Stages of inventive activity:

Inventive activity is one of the highest manifestations of human thinking, which is the process of analyzing an existing problem in a new way, finding a solution on a scientific basis, and achieving a practical result. This activity is carried out in stages, and each stage requires its own scientific and methodological approach.

Problem identification. The inventive process begins, first of all, with the correct identification of the problem. The researcher analyzes the shortcomings, needs, or opportunities for improvement in the existing system, device, or technology. At this stage, the problem is identified based on the results of scientific

observation, experimentation, statistical analysis, or modeling. The right problem is the most important factor determining the success of the next steps.

Ideation. Once the problem is identified, a new idea is developed to solve it. This process uses creative thinking [10], analogical reasoning [11], brainstorming [12], and morphoanalytic methods. The idea is the heart of inventive activity, it must have an element of novelty, be practically useful, and scientifically substantiated. At this stage, the technical, economic, and environmental effectiveness of the idea is assessed.

Research and analysis. At this stage, the proposed idea is subjected to in-depth scientific analysis. The researcher studies existing scientific sources, patents, and previous developments, and assesses the degree of novelty of his idea. The scientific validity of the idea is also checked through mathematical modeling, experimental measurements, or computer simulation. At this stage, the main parameters and characteristics of the invention are determined based on the results of scientific experiments.

Model or prototype creation. Based on the results of the research, an initial model (prototype) of the device or technology is developed. This process is carried out through laboratory tests, computer modeling or the creation of a prototype. Using the model, the operation, stability, efficiency and safety of the invention in real conditions are assessed. At this stage, the technical specifications are clearly defined and the invention is brought into a form ready for practice.

Patenting and popularization. The final stage of inventive activity is the legal protection of the invented invention or utility model. For this, it is necessary to obtain a patent, formalize copyright, and enter it into the state register of intellectual property. The patented invention is then applied in production, education or scientific practice. Thus, inventive activity forms a complete innovation cycle from a scientific idea to a real product.

Effective methods for developing innovative thinking:

Developing innovative thinking is of great importance for organizational growth and success [13]. To effectively develop such skills, a number of methods and approaches should be used in educational and research practice. The most effective types of them are discussed below.

Project-Based Learning [14]. In this approach, a student or researcher works independently on a project aimed at solving a specific real-world problem. As a result, the student combines theoretical knowledge with practical activities, acquires the skills of logical thinking and a systematic approach to the problem. In the process of project-based learning, innovative thinking develops naturally, because the student feels the need to make creative decisions at each stage.

STEM and STEAM approaches [15] are based on the integration of science, technology, engineering, art, and mathematics. These approaches teach how to solve complex problems from an interdisciplinary perspective. In particular, the combination of engineering and art elements encourages students to find aesthetic and functional solutions. This method simultaneously develops students' systematic, critical, and creative thinking.

3. *Hackathons and innovation competitions [16]*. Hackathons are team competitions aimed at developing new technical or software solutions in a short period of time. They teach students to think quickly, work in a team, manage time, and make creative decisions. Through innovation competitions, young inventors have the opportunity to test their ideas in practice, receive expert evaluation, and prepare them for the real market. This process is also of great importance as a motivational factor in increasing inventive potential.

4. *Computer modeling and prototyping*. Using modern technologies, testing an idea in a virtual environment is one of the most effective tools for developing innovative thinking. For example, programs such as COMSOL Multiphysics, Proteus, Tinkercad, MATLAB allow modeling the physical, electrical or mechanical processes of an invention or utility model. This approach not only reduces the cost of conducting experiments, but also develops students' analytical thinking and scientific reasoning skills.

5. *Invention laboratories (Makerspace)*. Invention laboratories are technical spaces that serve to create a free creative environment for young people and researchers. In such laboratories, new prototypes are created using 3D printers, Arduino platforms, sensors and other equipment. This allows applying theoretical knowledge to practice and bringing creative ideas to reality. The "Makerspace" environment also develops a culture of collective thinking and experience sharing.

6. *Mentoring system [17]*. The role of experienced teachers - mentors in the formation of innovative thinking is invaluable. The mentoring system provides guidance to young inventors, helps them analyze their mistakes, evaluate their results, and develop new ideas. In the process of working with a mentor, students gain a deeper understanding of the logical structure of scientific thinking, the culture of experimentation, and the social significance of innovative processes.

3. Results And Discussion

The conducted analysis shows that innovative thinking and inventive activity are closely interconnected, creating the necessary conditions for the development of each other. Innovative thinking activates the creative, analytical and strategic aspects of human thinking, which directly affects the emergence of new ideas and technical solutions. The success of inventive activity, in turn, depends on the degree of formation of this culture of innovative thinking.

Research confirms that the most effective results are achieved when project-based learning, computer modeling, innovative competitions and mentoring systems are used together to form a creative approach in students and young scientists. These approaches not only strengthen theoretical knowledge, but also develop independent thinking, analysis and innovation skills in solving practical problems.

4. Conclusions

The development of innovative thinking is one of the priority tasks of the national science and education system today, and is an important factor in creating technological innovations, increasing economic efficiency and ensuring sustainable development. The results of the study show that approaches such as problem-based

and project-based learning, interactive methods, digital learning environments, STEM/STEAM, modeling and prototyping are highly effective in forming innovative and inventive competencies in students and young researchers.

Creating an environment that encourages inventive activity in the education system, supporting startups and scientific and practical projects, and strengthening university-enterprise cooperation serve to align the creative potential of young people with the needs of the real economy. Also, the formation of an innovative culture, teaching the basics of intellectual property and patenting create the basis for further strengthening the intellectual and technological potential of our country.

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QUYI ZARAFSHON VOHASI LANDSHAFTLARIDAN FOYDALANISHNING HOZIRGI HOLATI

Annotatsiya: *Quyí Zarafshon vohasi tabiiy geografik jihatdan Buxoro va Qorako'l vohalaridan iborat. Qoravulbozor vohasi esa tabiiy geografik jihatdan Paleo-Qashqadaryo o'rnida vujudga kelgan. Buxoro va Qorako'l vohalari Zarafshon vodiysining qadimgi va hamisha navqiron vohalaridan sanaladi. Ularning tarixi, iqtisodi, ijtimoiy hayoti asrlar davomida vodiyni Zarafshon daryosi bilan bog'liq bo'lgan. Zarafshon daryosining quyi qismi, ya'ni deltasi ko'p asrlardan buyon sug'orma dehqonchilik rivojlangan hududlardan hisoblanadi. Arxeologlarning isbotlashicha bu yerda birinchi sug'oriladigan yerlar miloddan avvalgi IV asrda paydo bo'la boshlagan.*

Kalit so'zlar: *Buxoro vohasi, Qorako'l vohasi, delta, berk havza, geotizim, Zarafshon vodiysi, terassa, cho'llashish, fitomelioratsiya, arid iqlim, agrotexnologiya, degradatsiya.*

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THE CURRENT STATE OF LANDSCAPE USE IN THE LOWER ZARAFSHAN OASIS

Abstract: *The Lower Zarafshan oasis is geographically composed of the Bukhara and Qorako'l oases. The Qoravulbozor oasis, in turn, formed naturally in the place of the Paleo-Qashqadaryo. The Bukhara and Qorako'l oases are considered the ancient yet ever-vibrant oases of the Zarafshan valley. Their history, economy, and social life have been closely linked to the Zarafshan River for centuries. The lower part of the Zarafshan River, that is, its delta, has long been one of the regions where irrigated agriculture has been highly developed. According to archaeologists, the first irrigated lands in this area began to appear in the 4th century BC.*

Keywords: *Bukhara oasis, Qorako'l oasis, delta, closed basin, geosystem, Zarafshan valley, terrace, desertification, phytomelioration, arid climate, agrotechnology, degradation.*

Quyí Zarafshon okrugi shu nom bilan ataluvchi daryoning quyi qismida joylashib, o'z ichiga Buxoro va Qorako'l vohalarini oladi. Zarafshon daryosining qadimgi deltalarida obod aholi manzilgohlari (Buxoro, Qorako'l) yaratilgan. Ularda xalqimizning aql zakovati bilan yaratilgan mingdan ortiq madaniy, ma'naviy va

moddiy meroslari mujassam. Bugungi kunda ular turizmning 10 dan ortiq yo'nalishlarini rivojlantirishga xizmat qiladi. Geografik jihatdan Buxoro viloyati hududi berk havzada, Tinch okeandan 5500 km, Atlantikadan - 4000 km, Shimoliy Muz okeanidan 2500 km, Hind okeanidan 2000 km uzoqda, O'zbekiston Respublikasining janubi-g'arbida, Zarafshon daryosining quyi qismida, janubi-g'arbiy Qizilqum cho'lida joylashgan. Viloyat hududi 2 ta geotizimdan – cho'l (88,6 %) va voha (11,4 %) dan iborat.

O'zbekiston Respublikasini yanada rivojlantirish bo'yicha Harakatlar strategiyasi (2017-2021 y.) ning **Iqtisodiyotni rivojlantirish va liberallashtirishning ustuvor yo'nalishida**²⁰ paxta va boshqaliq don ekiladigan maydonlarni qisqartirish, bo'shagan yerlarga kartoshka, sabzavot, ozuqa va yog' olinadigan ekinlarni ekish, shuningdek, yangi intensiv bog' va uzumzorlarni joylashtirish hisobiga ekin maydonlarini yanada optimallashtirish, sug'oriladigan yerlarning meliorativ holatini yanada yaxshilash, melioratsiya va irrigatsiya obyektlari tarmoqlarini rivojlantirish, qishloq xo'jaligi ishlab chiqarish sohasiga intensiv usullarni, eng avvalo, suv va resurslarni tejaydigan zamonaviy agrotexnologiyalarni joriy etish, unumdorligi yuqori bo'lgan qishloq xo'jaligi texnikasidan foydalanish kabi vazifalar belgilab qo'yilgan. Bunda bevosita inson xo'jalik faoliyati tomonidan minglab yillar davomida barpo etilgan vohalarning o'rni beqiyos.

Buxoro va Qorako'l vohalari Zarafshon vodiysining qadimgi va hamisha navqiron vohalaridan sanaladi. Ularning tarixi, iqtisodi, ijtimoiy hayoti asrlar davomida vodiyni Zarafshon daryosi bilan bog'liq bo'lgan. Albatta, bugun tadqiqotchilar uchun Zarafshon vodiysining geografik o'rni, chegaralari, relyefi, geologik va gidrologik rivojlanish tarixini bilish vohalarning taraqqiyoti va salohiyatini o'rganishlarida, kelajak uchun bashoratlashda asos bo'ladi.

Zarafshon vodiysi O'rta Osiyoning markaziy qismida, Turkiston-Oqtov bilan Zarafshon tizmalari orasida joylashgan. Vodiyni sharqiy tog'li qismi Tojikiston, g'arbiy tog' etagi va tekislik qismi O'zbekiston hududiga tegishli. Zarafshon vodiysi tektonik yo'l bilan vujudga kelgan bo'lib, hozirgi relyefining shakllanishida Zarafshon daryosining doimiy va vaqtli irmoqlari hamda shamol muhim rol o'ynagan. Zarafshon vodiysi Zarafshon muzligidan boshlanib, g'arbda Sandikli cho'ligacha 781 km ga cho'zilgan. Vodiy shu masofada g'arbiy, janubi-g'arbiy yo'nalishda davom etadi va asta-sekin pasayib hamda kengayib boradi. Zarafshon vodiysi neogen davrigacha dengiz ostida bo'lgan. Alp orogenezida vodiy quruqlikka aylangan. Zarafshon daryosi asrlar davomida o'z o'zanini chuqurlashtirib, terrasalar hosil qilgan. Zarafshon vodiysining sharqiy tog'li qismida vodiy tor va chuqur, Turkiston va Zarafshon tizmalari undan tik ko'tarilib turadi. Quyi qismida vodiy kengayib, O'zbekiston hududiga o'tgach, kengligi ayrim joylarda 60—70 km ga yetadi. O'zbekiston hududida Zarafshon vodiysining uzunligi qariyb 480 km bo'lib, bu qismida Samarqand, Buxoro, Qorako'l vohalari

²⁰ 2017-2021 yillarda O'zbekiston Respublikasini rivojlantirishning beshta ustuvor yo'nalishi bo'yicha harakatlar strategiyasi. O'zbekiston Respublikasi Prezidentining 2017-yil 7-fevraldagi PF-4947-sonli Farmoniga 1-ilova

joylashgan.

Zarafshon daryosining quyi qismi, ya'ni deltasi ko'p asrlardan buyon sug'orma dehqonchilik rivojlangan hududlardan hisoblanadi. Arxeologlarning isbotlashicha bu yerda birinchi sug'oriladigan yerlar miloddan avvalgi IV-asrda paydo bo'la boshlagan.

Zarafshon daryosining o'rta qismida ekin maydonlarining kengayishi sababli Quyi Zarafshonda suv tanqisligi yuzaga kela boshladi, mahalliy aholi boshqa joylarga ko'chib keta boshladi. Bularni o'sha regiondagi tashlandiq yerlar, qabristonlar, eski bino qoldiqlaridan ham bilish mumkin.

Buxoro - Qorako'l vohalarida 1960 – 1965 yillargacha, geoekologik vaziyatning murakkablashuvida jiddiy xavf-xatarlar va ekologik muammolar bo'lmagan. Zarafshon havzasida sanoat korxonalarining tarkib topishi va rivojlanishi, aholi sonining ortishi, yangi yerlarning o'zlashtirilishi, daryo suvining sug'orish, sanoat korxonalari, fermalar, maishiy kommunal sohalardan keng foydalanishi tufayli avvalo suvning va tuproq qoplamining, keyinroq atmosfera havosining ifloslanishi kuchayib bordi.

Yangi yerlarni o'zlashtirilishi va agrolandshaftlardan sug'orish me'yoriga amal qilmaslik oqibatida keying yillarda ko'pgina yerlarda grunt suvlari sathining ko'tarilishi kuzatilmoqda. Buxoro - Qorako'l vohalarida hozirgi vaqtda grunt suvlari sathi barcha hududlarda o'rtacha 2,1 metrni tashkil etadi. Bu esa sho'rlangan yerlar maydonining kengayishiga sabab bo'lmoqda. Buning asosiy sababi sug'oriladigan ekin maydonlarining me'yoridan ortiq namlanishi, zovur suvlaridan sho'r yuvish va madaniy ekinlarni sug'orishda ishlatilishidir. N.Koryaking ma'lumotiga ko'ra, yerlarni noto'g'ri tekislash natijasida 24000 ga yer sho'rlangan, shundan 17 ming ga paxta maydonlarini tashkil etadi. Zarafshon deltasi sharoitida sug'oriladigan yerlarda sho'rlanish qurg'oqchil yillarda keskin oshadi. Keying yillarda, yer osti suvlari va tuproqning sho'rlanishi hududning shimoliy qismida orta boshladi.

Bu jarayon Sho'rko'l suv omborining qurilishi bilan bog'liq bo'lib, suv ombori atrofidagi tekisliklarda grunt suvlarining sathi ko'tarila boshlagan. Hozirgi vaqtga kelib Sho'rko'lga yaqin joylardagi yangi o'zlashtirilgan yerlardan 2 ming ga yaqin yerlar kuchli sho'rlanganligi kuzatilgan. Buxoro va Qorako'l vohalaridagi sho'rlangan yerlarning hozirgi holati quyidagicha: Sho'rlanmagan yerlar 66,2 ming ga (28 %), kuchsiz sho'rlangan yerlar 90,6 ming ga (40,5 %), o'rtacha sho'rlangan yerlar 59,4 ming ga (22,4%), kuchli sho'rlangan yerlar 16,8 ming ga (9,5%) ni tashkil etadi. Yuqoridagi ma'lumotlardan ko'rinib turibdiki, Buxoro va Qorako'l vohalarida sug'oriladigan tuproqlarning 70 – 80 % turli darajada sho'rlangan.

Keying yillarda Buxoro va Qorako'l vohasida har gektar paxtazorga 220 kg azot, 120-130 kg fosfor va 50 kg ga yaqin kaliy o'g'itlari solib kelingan. Paxta bularning 20 – 40 foizini o'zlashtiradi va qolgan ximikatlar esa yer usti suvlarini ifloslaydi, tuproqlar va o'simliklarda to'planib boradi. Juda ko'p xo'jaliklarda yuqori hosil olish maqsadida mineral o'g'itlar me'yoridan bir necha barobar ko'p ishlatilib kelingan. Tuproqlarda, suvda ko'paygan bu mineral o'g'itlarning bir qismi, so'zsiz, sabzavot va poliz ekinlariga, mevalarga o'tadi. Bular orqali esa inson

organizmlariga ta'sir qiladi.

Buxoro – Qorako'l vohalarida sug'oriladigan yerlarni zaharlayotgan yana bir guruh ximiyaviy preparatlarga pestidsidlar kiradi. Bir necha o'n yillar davomida o'ta zaharli butifos, xlorofos va boshqalar ishlatilib kelindi. Paxtazorlarning har gektariga pestidsidlar ishlatildi. 1970 yillarda rivojlangan chet el mamlakatlarida bu modda tabiatda uzoq saqlanuvchanligi va inson salomatligiga o'ta zaharliligi tufayli ishlatishni man qildi. O'zbekistonda bu ko'rsatma 1983 yildan berildi. Man qilinishiga qaramasdan Buxoro – Qorako'l vohalarining ko'plab jamoalarida yashirincha ishlatilib kelindi. Natijada vohaning sug'oriladigan tuproqlarida bu moddalarning man etilganiga o'n yillab o'tgan bo'lsada, me'yorida 2 – 3 baravar oshiqqligi kuzatildi. Zarafshon deltasidagi barcha kanallar, ko'llar va suv omborlari suvining tarkibida yuqoridagi moddalar uchraydi. Ayniqsa bu zaharli kimyoviy moddalar Quyimozor suv omborining chiqarish kanalida ko'p uchraydi. Shuni ham qayd qilish kerakki Buxoro shahri aholisi ichimlik suvini Quyimozor suv omboridan oladi .

Zarafshon deltasida yashaydigan aholi ko'proq ichimlik suvi sifatida quduqlardan foydalanadi. Quduq suvi tarkibida ham ochiq suv havzalariga tushadigan mineral o'g'itlar, pestidsidlar uchraydi. Shu tufayli regionda aholi orasida turli xil kasalliklar (virusli gepatit, oshqozon ichak yo'llarining yallig'lanishi, yosh go'daklar o'limi) ko'paydi.

Zarafshon deltasida ekologik vaziyatning bu darajada jiddiylashuvining oldini olish uchun kimyoviy preparatlardan butunlay voz kechish, tuproq unumdorligini oshirishda ko'proq organik o'g'itlardan foydalanish, sug'orishning me'yoriga amal qilish, ichimlik suvining sifatini yaxshilashga e'tibor bermoq zarur. Quyi Zarafshon vohasi landshaftlaridan to'liq va samarali foydalanish uchun:

- Vohada yer-suv islohotlarini davom ettirish, ularni foydalanuvchilarga imtiyozlar berish va sotishni yo'lga qo'yish;

- turli darajada sho'rlangan yerlarda irrigatsiya va melioratsiya tadbirlarini vaqtida sifatli va reja asosida amalga oshirish;

- sug'orishning yangi va samarali texnologiyalarini ishlab chiqarishga joriy etish;

- ilmiy va amaliy jihatdan asoslangan almashlab ekishni ta'minlash;
- sof ekologik kimyoviy vositalardan keng va oqilona foydalanish;
- seleksiya, urug'chilikni, agrotexnik tadbirlarni sifatli amalga oshirish;
- qishloq xo'jalikda band bo'lgan ishlab chiqarish kuchlarini moddiy va ma'naviy rag'batlantirish bilan bog'liq bo'lgan masalalarni hal etish;

- yer va suv munosabatlarini takomillashtirish va erkinlashtirish lozim;
- Buxoro viloyati qishloq xo'jalik tarmoqlarini modernizatsiyalash sharoitida suv resurslaridan samarali foydalanish.

Qorako'l deltasi Zarafshon daryosining quyi qismida, Qizilqum va Sandiqli qumlari orasida joylashgan, maydoni 13 ming km.kv. Hududning 80 % i qumli cho'l 20 % i vohadan iborat. Hududning asosiy qismi cho'l zonasida joylashganligi, iqlimning quruq kontinentalligi bu hudud geotizimlarining cho'llashuvga

moyilligini ko'rsatadi. Qorako'l deltasida geotizimlarning cho'llashuvini rivojlantiruvchi omillar sifatida quyidagilarni ko'rsatamiz:

- a) Kon-qidiruv ishlari;
- b) O'simliklarning turli maqsadlarda chopilishi;
- c) Yaylov chorvachiligi;
- d) Grunt suvlari sathining ko'tarilishi va minerallashuvining ortishi;
- e) Sug'orish natijasida deltada tuzning yig'ilib qolishi;
- f) Iqlimning ta'siri;

Yuqorida ko'rsatilgan va ayrim boshqa sabablarga ko'ra, Qorako'l deltasi geotizimlari degradatsiyaga uchramoqda. Bu jarayon nafaqat Qorako'l deltasida balki Quyi Zarafshon vohasi landshaftlarida kuzatilmoqda. Cho'llashuv jarayonining bu oqibatlarini oldini olish maqsadida ko'chma qumlarni mustahkamlash uchun cho'llarda fitomelioratsiya tadbirlarini amalga oshirish, ko'chma qumlar bosishi xavfidan saqlash maqsadida voha atrofiga ihota daraxtzorlarini tashkil qilish, vohalardagi mavjud zovur-drenajlarni tozalash hamda eng asosiysi aholining ekologik madaniyatini rivojlantirish zarur. Zarafshon deltasida ekologik vaziyatning jiddiylashuvining oldini olish uchun kimyoviy preparatlardan butunlay voz kechish, tuproq unumdorligini oshirishda ko'proq organik o'g'itlardan foydalanish, sug'orishning me'yoriga amal qilish, ichimlik suvining sifatini yaxshilashga e'tibor bermoq zarur.

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**Karakalpak Academic Lyceum under
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HOW TO IMPROVE INTEGRATED SKILLS OF LYCEUM STUDENTS

Annotation: *Lyceum students face increasing expectations in both their academic and future professional lives, requiring not only strong subject knowledge but also well-developed integrative abilities. Integrated skills refer to the capacity to combine speaking, listening, reading, writing, critical thinking, digital literacy, and collaborative competencies in a coherent and functional manner. Strengthening these skills is essential for preparing learners for postsecondary education, competitive job markets, and real-world problem-solving. This article explores practical approaches for improving the integrated skills of Lyceum students by examining effective curriculum design, classroom practices, and contemporary teaching methods.*

Key words: *curriculum design, classroom practices, contemporary teaching methods, integrative abilities, Lyceum students.*

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Vazirligi huzuridagi Qoraqalpoq akademik litseyi**

LITSEY O'QUVCHILARINING INTEGRALLASHGAN KO'NIKMALARINI RIVOJLANTIRISH

Annotatsiya: *Litsey o'quvchilari o'zlarining akademik va kelajakdagi kasbiy faoliyatida tobora ortib borayotgan talablarga duch kelmoqdalar. Bu esa nafaqat mustahkam fan bilimlarini, balki yaxshi rivojlangan integrallashgan ko'nikmalarni ham talab qiladi. Integrallashgan ko'nikmalar deganda gapirish, tinglash, o'qish, yozish, tanqidiy fikrlash, raqamli savodxonlik va hamkorlikda ishlash kabi ko'nikmalarni uyg'un va samarali tarzda birlashtirish qobiliyati tushuniladi. Ushbu ko'nikmalarni rivojlantirish o'quvchilarni oliy ta'lim, raqobatbardosh mehnat bozori va real hayotdagi muammolarni hal qilishga tayyorlashda muhim ahamiyatga ega. Mazkur maqolada litsey o'quvchilarining integrallashgan ko'nikmalarini rivojlantirish bo'yicha o'quv dasturlarini loyihalash, dars jarayonlarini tashkil etish va zamonaviy o'qitish metodlari orqali samarali yondashuvlar yoritiladi.*

***Kalit so‘zlar:** o‘quv dasturini loyihalash, dars jarayoni, zamonaviy o‘qitish usullari, integrallashgan ko‘nikmalar, litsey o‘quvchilari.*

1. Promote Cross-Curricular Learning

Integrated abilities arise naturally when learning is not confined to individual subjects.

- **Project-based learning (PBL):** Students work on multidisciplinary projects that call for teamwork, communication, research, report writing, and presentation of findings.
- **Thematic lessons:** Teachers from several subject areas work together to create courses centered around shared topics (such as "Technological Innovation" and "Sustainability").
- **Real-world contexts:** Assignments that reflect real-world issues boost participation and foster the development of useful skills. This method deepens students' comprehension of complicated issues and helps them draw connections across different subjects. Encourage learning across disciplines. A method that unifies several subjects into a single learning experience is called cross-curricular learning, sometimes referred to as interdisciplinary or integrated learning. Teachers integrate ideas, techniques, and tactics from other disciplines rather than teaching each one separately to assist students understand the connections and significance of each subject. Instead of teaching each discipline in isolation, educators combine concepts, skills, and strategies from different subjects to help students see the relevance and interconnectedness of knowledge. This approach is especially valuable for lyceum students, who are preparing for higher education and real-world challenges.

2. Encourage Collaborative Learning. The development of social, negotiating, and communication skills is greatly aided by group work.

- Discussions and debates enhance one's capacity for argumentation, speaking, and listening.
- Collaborative research projects promote planning, decision-making, and teamwork.
- Peer review exercises improve critical thinking and the ability to provide constructive criticism. Additionally, cooperation boosts self-esteem and gets pupils ready for team-oriented settings.

3. Combine digital literacy with technology. For today's students, digital literacy is a crucial competency. Integrated learning can be improved by incorporating technology into classes in a relevant way. Collaborative writing and conversation are facilitated by interactive platforms such as Google Workspace, Moodle, and Padlet.

- Vocabulary, reading comprehension, and critical thinking are all enhanced by educational apps.
- Students must integrate research, design, creativity, and communication skills when working on multimedia projects.

Students who become proficient with digital tools are better equipped to handle both academic and professional obstacles.

4. Use Task-Based Language Learning (TBLL). When teaching languages, especially English, task-based methods can significantly improve integrated skills.

- **Authentic tasks** such as interviews, surveys, and role-plays make learning more communicative and meaningful.

- **Integrated language tasks** (e.g., read an article → discuss it → write a summary → present findings) develop all four language skills in harmony. TBLL emphasizes fluency, accuracy, and functional communication simultaneously.

5. Strengthen Critical Thinking and Problem-Solving. Lyceum students must learn how to analyze, evaluate, and create—skills emphasized in modern education.

- **Case studies and scenario-based tasks** allow students to apply knowledge to practical situations.

- **Socratic questioning** encourages deeper reflection and reasoning.

- **Data analysis tasks** build numeracy, interpretation skills, and logical thinking.

When students learn to think critically, they handle information more effectively and become independent learners.

6. Provide Continuous Assessment and Feedback. Regular assessment—not only of knowledge but of skills—is crucial.

- **Formative assessment** (quizzes, reflections, drafts) helps monitor progress.

- **Rubrics** clarify expectations for projects, presentations, and writing.

- **Personalized feedback** guides students toward improvement and promotes self-regulated learning.

A transparent feedback system motivates them and builds a growth mindset.

7. Support Extracurricular Enrichment. Learning does not stop at the classroom door.

- **Debate clubs, science fairs, and reading clubs** encourage communication and creativity.

- **Volunteering and community projects** develop leadership, empathy, and real-world problem-solving.

- **Competitions and Olympiads** improve discipline, research skills, and independent learning. Extracurricular activities are powerful tools for holistic skill development.

Conclusion

Improving integrated skills among lyceum students requires a comprehensive and student-centered approach. By combining cross-curricular learning, collaborative tasks, digital resources, task-based instruction, critical-thinking activities, constructive assessment, and extracurricular engagement, educators can create a dynamic learning environment that strengthens students' abilities in meaningful and lasting ways. These integrated skills not only enrich academic

performance but also prepare young people to become capable, adaptable, and responsible citizens in a rapidly changing world.

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COMPARATIVE STUDY ON THE FINANCIAL SUSTAINABILITY OF AUTONOMOUS HIGHER EDUCATION INSTITUTIONS THROUGH ACTUARIAL ANALYSIS

Abstract. *Financial sustainability has become a critical prerequisite for achieving sustainable development in higher education institutions, particularly in public universities facing increasing fiscal constraints and long-term financial obligations. This study examines how actuarial financial analysis can be applied to assess and compare the sustainability of higher education institutions using empirical evidence from three public universities in Uzbekistan. The research adopts a comparative analytical design based on actuarial finance principles, integrating financial ratio analysis, risk-based indicators, and long-term sustainability metrics.*

Using institutional budget data, enrollment dynamics, expenditure structures, and revenue diversification indicators, the study constructs a set of actuarial sustainability measures, including dependency ratios, expenditure risk coefficients, and long-term financial balance indicators. The findings reveal significant variations in financial sustainability profiles across the selected universities, driven primarily by differences in funding structures, cost rigidity, and exposure to demographic and budgetary risks. Institutions with more diversified revenue sources and balanced expenditure commitments demonstrate stronger actuarial sustainability and greater resilience to financial shocks.

The study contributes to the higher education finance literature by introducing an actuarial-based analytical framework tailored to public universities in emerging economies. From a policy perspective, the results highlight the importance of integrating actuarial analysis into university financial planning, risk management, and governance mechanisms to support long-term sustainable development. The proposed approach offers practical implications for policymakers and university administrators seeking to enhance financial resilience and strategic sustainability in higher education systems.

Keywords: *financial sustainability, actuarial financial analysis, higher education institutions, sustainable development, university finance, public universities, risk-based budgeting, emerging economics.*

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AVTONOM OLIY TA'LIM MUASSASALARINING MOLIVAVIY BAQARORLIGINI AKTUAR TAHLILI ORQALI QIYOSLI O'rganish.

***Annotatsiya:** Moliyaviy barqarorlik oliy ta'lim muassasalarida barqaror rivojlanishga erishishning muhim sharti bo'lib, ayniqsa byudjet cheklovlari va uzoq muddatli moliyaviy majburiyatlar kuchayib borayotgan davlat universitetlari uchun dolzarb ahamiyat kasb etadi. Ushbu tadqiqotda O'zbekistonning uchta davlat universiteti misolida oliy ta'lim muassasalarining moliyaviy barqarorligini baholash va taqqoslashda aktuar moliyaviy tahlil usullarini qo'llash imkoniyatlari o'rganiladi. Tadqiqot aktuar moliya tamoyillariga asoslangan qiyosiy-analitik dizayn asosida olib borilib, moliyaviy ko'rsatkichlar tahlili, riskka asoslangan indikatorlar va uzoq muddatli barqarorlik mezonlarini o'z ichiga oladi.*

Institutsional byudjet ma'lumotlari, talabalar kontingenti dinamikasi, xarajatlar tuzilmasi hamda daromad manbalarini diversifikatsiyalash ko'rsatkichlari asosida bog'liqlik nisbatlari, xarajatlar risk koeffitsiyentlari va uzoq muddatli moliyaviy muvozanat indikatorlarini qamrab olgan aktuar barqarorlik o'lchovlari tizimi shakllantirildi. Tadqiqot natijalari tanlangan universitetlar o'rtasida moliyaviy barqarorlik profillarida sezilarli farqlar mavjudligini ko'rsatdi. Bu farqlar, asosan, moliyalashtirish manbalari tuzilmasi, xarajatlarning qat'iyligi hamda demografik va byudjet risklariga ta'sir darajasi bilan izohlanadi. Daromad manbalari ko'proq diversifikatsiyalashgan va xarajat majburiyatlari muvozanatlashgan muassasalar aktuar barqarorlikning yuqoriroq darajasini hamda moliyaviy zarbalarga nisbatan kuchliroq chidamlilikni namoyon etadi.

Mazkur tadqiqot rivojlanayotgan iqtisodiyotlar sharoitidagi davlat universitetlari uchun moslashtirilgan aktuar tahlilga asoslangan konseptual-analitik yondashuvni taklif etish orqali oliy ta'lim moliyasi bo'yicha ilmiy adabiyotlarni boyitadi. Siyosiy-amaliy nuqtayi nazardan, natijalar universitetlarning moliyaviy rejalashtirish, risklarni boshqarish va boshqaruv mexanizmlariga aktuar tahlilni integratsiya qilish muhimligini ta'kidlaydi. Taklif etilgan yondashuv oliy ta'lim tizimida moliyaviy barqarorlik va strategik barqaror rivojlanishni kuchaytirishga intilayotgan siyosatchilar va universitet rahbarlari uchun amaliy ahamiyatga ega.

***Kalit so'zlar:** moliyaviy barqarorlik, aktuar moliyaviy tahlil, oliy ta'lim muassasalari, barqaror rivojlanish, universitet moliyasi, davlat universitetlari, riskka asoslangan byudjetlashtirish, rivojlanayotgan iqtisodiyot.*

1. Introduction

Financial sustainability has emerged as a central challenge for higher education institutions (HEIs) worldwide as public universities increasingly face fiscal pressures, demographic volatility, and growing demands for accountability and performance. While sustainable development in higher education is commonly discussed in relation to academic quality, governance, and social impact, its financial foundations remain underexplored, particularly in the context of long-term risk and intertemporal budget balance. In many public university systems, short-term budgetary adequacy often masks structural financial vulnerabilities that threaten institutional sustainability over time.

Existing literature on higher education finance primarily focuses on efficiency analysis, cost-sharing mechanisms, and funding diversification strategies. Although these approaches provide valuable insights, they largely rely on static financial indicators and do not sufficiently account for long-term obligations, demographic risk, and expenditure rigidity. In contrast, actuarial financial analysis—widely applied in pension systems, insurance markets, and public finance—offers a dynamic and forward-looking framework for assessing financial sustainability by explicitly incorporating risk, dependency structures, and long-term balance conditions. Despite its analytical potential, actuarial methodology remains rarely applied in empirical studies of higher education finance, especially in emerging economies.

This study addresses this gap by applying an actuarial financial analysis framework to assess sustainable development in public higher education institutions. Using comparative evidence from three public universities in Uzbekistan, the research evaluates financial sustainability through actuarial indicators that capture revenue dependency, expenditure risk, and long-term financial equilibrium. By moving beyond conventional ratio analysis, the study provides a structured assessment of how institutional financial characteristics shape resilience and sustainability.

The main contribution of this research is threefold. First, it introduces an actuarial-based analytical framework tailored to the financial structure of public universities. Second, it offers empirical evidence on financial sustainability in an emerging higher education system. Third, it generates policy-relevant insights for integrating actuarial thinking into university financial planning and governance to support long-term sustainable development.

2. Theoretical Framework

This study is grounded in an integrated theoretical framework that combines sustainable development theory, financial sustainability theory, and actuarial finance principles as applied to public sector institutions. In the context of higher education, sustainable development is increasingly conceptualized not only as academic and social continuity, but also as the ability of institutions to maintain long-term financial viability under conditions of uncertainty, fiscal constraints, and demographic change.

Uzbek scholarly literature provides an important foundation for this approach. A number of PhD and DSc dissertations completed in Uzbekistan emphasize that the sustainable development of higher education institutions depends on the alignment between financial resources, expenditure commitments, and governance capacity. These studies highlight persistent challenges such as high dependence on state funding, limited diversification of revenue sources, and weak long-term financial planning mechanisms. However, most of these works rely on traditional financial analysis and static efficiency indicators, with limited attention to intertemporal risk and long-term financial balance.

Actuarial finance theory offers a complementary perspective by introducing a forward-looking, risk-based analytical logic. In Uzbek doctoral research on public finance sustainability, budgetary stability, and social sector financing, actuarial concepts—such as dependency ratios, long-term obligations, and sustainability coefficients—are increasingly used to evaluate fiscal resilience. Building on this national academic tradition, the present study extends actuarial reasoning to the university level, treating higher education institutions as complex public organizations exposed to revenue volatility, expenditure rigidity, and demographic risk.

Accordingly, the theoretical framework assumes that financial sustainability is a mediating mechanism through which actuarial financial conditions influence the sustainable development of universities. Institutional outcomes are shaped not only by the volume of funding, but by how financial risks are structured, managed, and governed over time. This framework allows for a systematic comparison of universities based on their actuarial sustainability profiles rather than short-term financial performance alone.

Figure 1. Conceptual Framework: Actuarial Financial Analysis and Sustainable Development of Universities

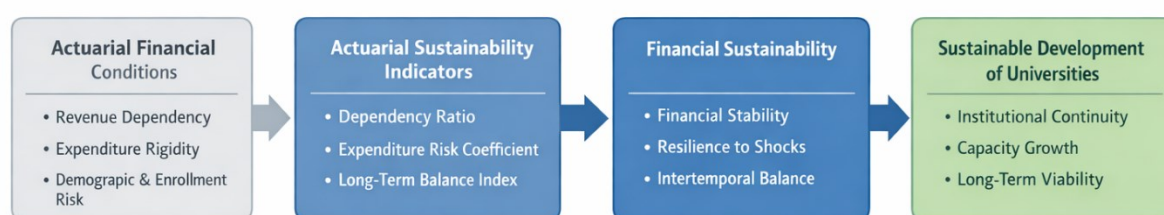


Figure 1 illustrates the conceptual relationship between actuarial financial conditions and sustainable development in higher education institutions. Actuarial sustainability indicators mediate the impact of revenue structure and expenditure risk on long-term financial sustainability, which in turn determines the capacity of universities to achieve sustainable development.

3. Methodology

3.1. Research Design

This study adopts a **comparative actuarial financial analysis** design to assess the financial sustainability and sustainable development capacity of higher

education institutions. The methodological approach is explicitly structured in accordance with the conceptual framework presented in **Figure 1**, ensuring a direct correspondence between theoretical constructs and empirical indicators. Three public universities in Uzbekistan—TSUE, FSU, and SSU—serve as the units of analysis.

3.2. Block 1: Actuarial Financial Conditions

The first analytical block captures the **structural financial risk conditions** under which universities operate. These conditions represent exogenous and institutional risk factors that shape long-term financial outcomes.

Indicators

1. Revenue Dependency (RD)

Measures the extent to which a university relies on a single dominant funding source (typically state funding).

$$RD = \frac{\text{Public budget funding}}{\text{Total university revenue}}$$

Higher values indicate greater vulnerability to fiscal policy shocks.

2. Expenditure Rigidity (ER)

Captures the inflexibility of expenditure commitments, particularly personnel and fixed operational costs.

$$ER = \frac{\text{Fixed expenditures}}{\text{Total expenditures}}$$

A higher ratio reflects limited short-term adjustment capacity.

3. Demographic and Enrollment Risk (DER)

Assesses exposure to fluctuations in student enrollment.

$$DER = \frac{\Delta \text{Student enrollment}_t}{\text{Student enrollment}_{t-1}}$$

Negative values indicate contraction risk affecting tuition-based revenues.

3.3. Block 2: Actuarial Sustainability Indicators

The second block operationalizes actuarial principles through **risk-based sustainability metrics**, transforming financial conditions into measurable long-term indicators.

Indicators

1. Dependency Ratio (DR)

Reflects the burden of dependent revenue sources relative to diversified income.

$$DR = \frac{\text{Single-source revenue}}{\text{Diversified revenue sources}}$$

Lower values indicate stronger financial autonomy.

2. Expenditure Risk Coefficient (ERC)

Measures the sensitivity of expenditures to revenue volatility.

$$ERC = \frac{\sigma(\text{Expenditures})}{\sigma(\text{Revenues})}$$

Values greater than one indicate elevated fiscal risk.

3. Long-Term Balance Index (LTBI)

Evaluates intertemporal financial equilibrium.

$$LTBI = \frac{\sum_{t=1}^n \text{Projected revenues}_t}{\sum_{t=1}^n \text{Projected expenditures}_t}$$

An index closes to or above unity signals actuarial sustainability.

3.4. Block 3: Financial Sustainability

Financial sustainability functions as a **mediating construct**, capturing the capacity of universities to absorb shocks and maintain stable operations over time.

Composite Financial Sustainability Index (FSI)

$$FSI = \frac{1}{3} (1 - RD + 1 - ER + LTBI)$$

The index is normalized to ensure cross-institutional comparability. Higher values indicate stronger resilience and stability.

3.5. Block 4: Sustainable Development of Universities

The final block represents **outcome-level institutional sustainability**, operationalized through long-term continuity and capacity growth.

Indicators

1. Institutional Continuity Index (ICI)

$$ICI = \frac{\text{Stable funding years}}{\text{Total observed years}}$$

2. Capacity Growth Rate (CGR)

$$CGR = \frac{\text{Academic capacity}_t - \text{Academic capacity}_{t-1}}{\text{Academic capacity}_{t-1}}$$

3. Long-Term Viability Score (LVS)

$$LVS = \frac{FSI + CGR + ICI}{3}$$

3.6. Analytical Procedure

All indicators are calculated using institutional financial and administrative data. The results are standardized and compared across universities to identify distinct actuarial sustainability profiles. This block-by-block approach ensures

methodological transparency and direct alignment between conceptual assumptions and empirical measurement.

4. Results

4.1. Actuarial Financial Conditions across Universities

The first stage of the empirical analysis evaluates the actuarial financial conditions of the three universities. Table 1 presents key indicators reflecting revenue dependency, expenditure rigidity, and demographic risk.

Table 1. Actuarial Financial Conditions of Selected Universities

University	Revenue Dependency (RD)	Expenditure Rigidity (ER)	Enrollment Change (DER, %)
TSUE	0.58	0.62	+3.4
FSU	0.71	0.68	-1.2
SSU	0.65	0.64	+1.1

The results indicate substantial variation in structural financial risk. FSU exhibits the highest revenue dependency and expenditure rigidity, suggesting greater exposure to fiscal and demographic shocks. In contrast, TSUE demonstrates relatively lower dependency and positive enrollment dynamics, indicating more favorable actuarial conditions.

4.2. Actuarial Sustainability Indicators

Building on these conditions, actuarial sustainability indicators are computed to assess long-term financial balance and risk sensitivity.

Table 2. Actuarial Sustainability Indicators

University	Dependency Ratio (DR)	Expenditure Risk Coefficient (ERC)	Long-Term Balance Index (LTBI)
TSUE	0.92	0.87	1.08
FSU	1.34	1.21	0.91
SSU	1.11	0.98	1.02

The actuarial indicators reveal that TSUE maintains a favorable long-term balance, with projected revenues exceeding projected expenditures. FSU's LTBI below unity signals potential long-term imbalance, while SSU occupies an intermediate position with moderate actuarial sustainability.

4.3. Financial Sustainability Index

To capture overall financial resilience, a composite **Financial Sustainability Index (FSI)** is calculated.

Table 3. Financial Sustainability Index

University	FSI
TSUE	0.73
SSU	0.66
FSU	0.58

The index confirms that universities with lower dependency and more balanced expenditure structures demonstrate stronger financial sustainability. TSUE shows the highest resilience to financial shocks, while FSU faces elevated actuarial risk.

4.4. Sustainable Development Outcomes

The final stage links financial sustainability to long-term institutional development outcomes.

Table 4. Sustainable Development Indicators

University	Institutional Continuity (ICI)	Capacity Growth Rate (CGR)	Long-Term Viability Score (LVS)
TSUE	0.90	0.07	0.77
SSU	0.85	0.05	0.72
FSU	0.78	0.03	0.63

The results suggest a clear linkage between actuarial financial sustainability and sustainable development outcomes. Universities with stronger actuarial profiles exhibit higher continuity and capacity growth, reinforcing the mediating role of financial sustainability.

4.5. Graphical Illustration

Figure 2 visualizes the comparative actuarial sustainability profiles of the three universities, highlighting differences in financial resilience and long-term viability. The diagram demonstrates that actuarial financial balance is a key determinant of sustainable institutional development.

5. Discussion

The findings of this study provide strong empirical support for the theoretical assumption that **actuarial financial sustainability is a critical determinant of sustainable development in higher education institutions**. The comparative results from TSUE, FSU, and SSU demonstrate that differences in revenue dependency, expenditure rigidity, and long-term financial balance translate into distinct sustainability outcomes, reinforcing the mediating role of financial sustainability identified in the conceptual framework.

From an international perspective, the results are broadly consistent with evidence from **market-oriented higher education systems**, such as the United States. Studies on U.S. public universities emphasize that institutions with diversified revenue streams—tuition income, research grants, endowments, and

auxiliary services—exhibit stronger resilience to fiscal shocks and enrollment volatility. The relatively favorable actuarial profile of TSUE mirrors these findings, suggesting that diversification and flexible expenditure structures enhance long-term viability even in publicly funded systems.

Comparatively, **European state-coordinated systems**—particularly in Germany and the Nordic countries—demonstrate high levels of public funding stability but also face challenges related to expenditure rigidity and demographic decline. The intermediate performance of SSU aligns with this pattern, where stable but less diversified funding structures provide short-term security while constraining long-term adaptability. This comparison underscores that financial sustainability is not solely a function of funding volume, but of how actuarial risks are managed over time.

In **emerging and transition economies**, empirical research highlights persistent dependence on state budgets and limited use of forward-looking financial planning tools. The results for FSU reflect these structural constraints, with high dependency ratios and a long-term balance index below unity indicating heightened actuarial risk. This finding corroborates international evidence that traditional budgeting approaches, when not complemented by actuarial analysis, may obscure latent sustainability risks.

Overall, the discussion confirms that **actuarial financial analysis offers a more nuanced and forward-looking assessment of university sustainability** than conventional financial ratios. By incorporating long-term obligations, risk exposure, and demographic dynamics, the actuarial approach enhances both analytical precision and policy relevance. The Uzbek case illustrates that integrating actuarial thinking into university financial governance can significantly strengthen strategic planning and sustainable development outcomes.

6. Conclusion and Policy Implications

This study demonstrates that **actuarial financial analysis provides a robust and forward-looking framework for assessing sustainable development in higher education institutions**. Using comparative evidence from three public universities in Uzbekistan, the research shows that financial sustainability is not merely a function of funding volume, but rather the outcome of how revenue dependency, expenditure rigidity, and long-term financial balance are structured and managed over time.

The empirical results confirm that universities with **lower revenue dependency, more flexible expenditure structures, and positive long-term balance indices** exhibit stronger financial resilience and higher sustainable development outcomes. Conversely, institutions characterized by high reliance on a single funding source and rigid cost structures face elevated actuarial risk, which undermines long-term viability even when short-term budgets appear balanced. These findings validate the mediating role of financial sustainability identified in the conceptual framework.

From a policy perspective, the study highlights several implications. First, higher education authorities should integrate **actuarial-based sustainability**

indicators into standard financial monitoring and evaluation systems. Second, university-level financial governance should move beyond annual budgeting toward **risk-based, multi-year financial planning** that explicitly accounts for demographic and fiscal uncertainty. Third, diversification of revenue sources and gradual reduction of expenditure rigidity should be prioritized as core strategies for enhancing long-term sustainability.

Overall, the study contributes to both theory and practice by demonstrating how actuarial financial analysis can strengthen strategic decision-making and support sustainable development in public higher education systems, particularly in emerging economies.

Revised Abstract (Final Polished Version, Scopus-friendly)

Financial sustainability is increasingly recognized as a fundamental condition for sustainable development in higher education institutions, particularly in public universities operating under fiscal constraints and demographic uncertainty. This study applies an actuarial financial analysis framework to assess and compare the sustainability of higher education institutions using empirical evidence from three public universities in Uzbekistan.

The research adopts a comparative analytical design grounded in actuarial finance principles, integrating revenue dependency, expenditure rigidity, demographic risk, and long-term balance indicators. Institutional financial and administrative data are used to construct actuarial sustainability measures, including dependency ratios, expenditure risk coefficients, and a composite financial sustainability index.

The results reveal significant differences in actuarial sustainability profiles across universities. Institutions with diversified revenue sources and balanced expenditure commitments demonstrate stronger financial resilience, higher long-term balance indices, and more favorable sustainable development outcomes. In contrast, universities with high budget dependency and rigid cost structures face elevated actuarial risk and reduced long-term viability.

The study contributes to the higher education finance literature by introducing an actuarial-based analytical framework tailored to public universities in emerging economies. From a policy standpoint, the findings underscore the importance of incorporating actuarial analysis into university financial governance, risk management, and strategic planning to support long-term sustainable development.

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AERODYNAMICS OF FILTER FABRIC MADE FROM GLASS FIBER AND TEFLON

Abstract: The article analyzes the dust generated during the cement production process and the processes of its cleaning and determines the resistance coefficient of the filter fabric made of glass fibre and Teflon for the sleeve filter device. The following parameters of the changing factors were selected during the experiments: gas consumption to the device $Q_{gas}=140\div 990\text{m}^3/\text{h}$, intermediate step $Q_{gas}=285\text{ m}^3/\text{h}$, gas velocity $v_{gas} = 15\div 35\text{ m/s}$, intermediate step 5 m/s , filter thickness made of glass fibre and Teflon $\delta_f=2,3,4\text{ mm}$, filter frame diameter $d_{fil} = 130, 140\text{ and }150\text{ mm}$, gas density ρ_{gas} was selected as 1.29 kg/m^3 for air. The experiments were conducted at a temperature of $20\pm 2\text{ }^\circ\text{C}$ for the gas and water system.

Keywords: Teflon, fibreglass, bag filter, aerodynamic resistance, drag coefficient, gas velocity, density, cement dust, particle diameter.

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SHISHA TOLA VA TEFLONDAN TAYYORLANGAN FILTR MATOSINING AERODINAMIKASI

Annotatsiya: Maqolada sement ishlab chiqarish jarayonida hosil bo'ladigan chang va uni tozalash jarayonlari tahlil qilinadi va yangi filtr moslamasi uchun shisha tolali va teflondan tayyorlangan filtr matoning qarshilik koeffitsienti aniqlanadi. Tajribalar davomida o'zgaruvchan omillarning quyidagi parametrlari tanlab olindi: qurilmaga gaz sarfi $Q_{gas}=140\div 990\text{m}^3/\text{soat}$, oraliq pog'ona $Q_{gas}=285\text{ m}^3/\text{soat}$, gaz tezligi $v_{gas} = 15\div 35\text{ m/s}$, oraliq pog'ona 5 m/s , filtr qalinligi shisha tolali va Teflondan tayyorlangan filtr qalinligi $\delta_f=2,3,4\text{ mm}$, diametrli filtr, $d_{fil} = 130, 140\text{ va }150\text{ mm}$, gaz zichligi gaz havo uchun $1,29\text{ kg / m}^3$ sifatida tanlangan. Tajribalar gaz va suv tizimi uchun $20\pm 2\text{ }^\circ\text{C}$ haroratda o'tkazildi.

Kalit so'zlar: Teflon, shisha tola, yangi filtr, aerodinamik qarshilik, qarshilik koeffitsienti, gaz tezligi, zichlik, sement changi, zarrachalar diametri.

Introduction:

Technological processes and devices that clean dust, secondary gases, and waste generated in industrial enterprises and eliminate environmental problems have been introduced into production processes worldwide. At the same time, it is of great importance to capture fine dust particles, secondary gases, and toxic substances in the building materials, food, chemical, and metallurgical industries and to reuse them in the production process [1].

Today, research is being conducted in the food, chemical, and building materials industries worldwide in priority areas such as separating solid, liquid, and gaseous particles, reducing atmospheric pollution, extracting valuable products, protecting technology and machinery from harmful substances that negatively affect it, and intensifying technological processes.

Research object:

This article analyzes the causes of dust and gases emitted into the atmosphere from a cement production plant and their purification devices and studies the aerodynamic resistance of a filter cloth made of glass fibre and Teflon for a sleeve filter used in the process of cleaning cement dust. The dusty gases generated in the production processes of TERRA NOVA CEMENT LLC were taken as the research object and studies were conducted. Analiz antimalaria:

First of all, a structural diagram of the zones of dusty gas formation in the production processes of the enterprise was drawn up (a structural diagram is presented in Figure 1) and the compliance of dust with sanitary standards was analyzed. When conducting research, the permissible limit value of dust in mg/m³ was determined according to GOST12.1.005-38, that is, the number of particles per unit of dust mass or dust volume. A special analytical aerosol aspirator of the AFA type (Aspirator M-822) was used as a research device, and a conical tube made of plastic was used as a filter cartridge, as a filtering material, perchlorovinyl fabric of the FPP brand (fabric mounted on a paper protective ring) was used as a filter [2].

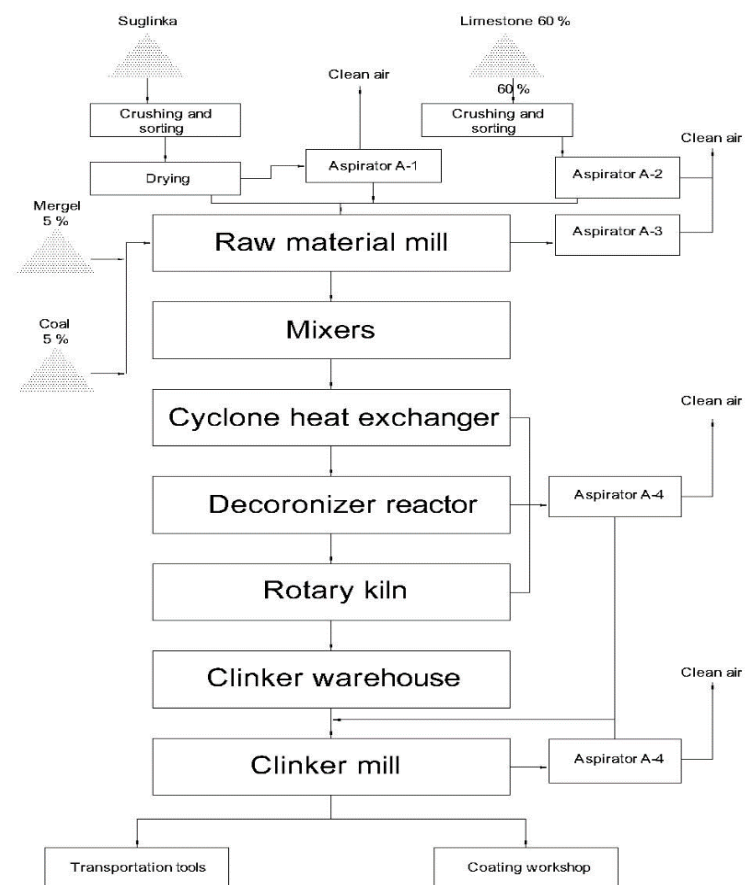


Figure 1. Structural diagram of the zones of dusty gas formation in the technological process of dry cement production

The aspirator was installed on the inlet and outlet pipes of the M-822 dust removal device, the results were obtained and the current state was analyzed. Table 1 presents the results obtained.

Table 1

Dust extraction zone	Dust cleaning device	Sanitary standard, mg/m ³	Dust content at the device inlet, mg/m ³	Dust content at the device outlet, mg/m ³
The process of drying the sludge (Asperator A-1)	Siklon	430	≈1560	1140
	sleeve filter		≈1140	231,3
Limestone crushing and screening (Asperator A-2)	Cyclone	300	≈360	45,75
Raw material mill (Asperator A-3)	sleeve filter	480	≈1010	265,6
Cooking process (Asperator A-4)	sleeve filter	480	≈1781	101,6
Clinker grinding mill (Asperator A-5)	Cyclone	380	≈970	682
	sleeve filter		≈682	93,71

Table 1 shows that the amount of dust in all dust emission zones exceeds the sanitary (PDK) standards. However, the situation in aspirators A-2, aspirators A-3 and aspirators A-5 is relatively better. That is, the amount of dust emitted into the atmosphere meets the PDK standards. The situation in aspirators A-1 and aspirators A-4 is considered unsatisfactory. There is an opportunity to correct the situation in aspirator A-4. For example, installing a pre-cooling system for the dusty gas flow or making the filter material of the used bag filter from refractory material will increase the degree of purification of the device. However, the situation in aspirator A-4 is relatively complicated. This is because during the cooking process, the moisture content of the slurry is in the range of 15-20%, and a higher rate of heat transfer is required for drying. This, in turn, increases the discharge of raw material dust along with the flow. There are two ways to improve the process. The first is to find a way to ensure the drying intensity even at low flow rates of the heat agent in the drum dryer used in the drying process. This reduces the amount of dust particles discharged along with the flow and reduces the high load on the aspirator. This, in turn, increases the degree of purification of the device. The second is to redesign the aspirator shop by determining the average median size of dust particles discharged along with the flow of the heating agent. This will require distributing the load on the used bag filter or using a combined filter fabric for the bag filter. Of the two ways considered, the most economical is to develop a combined filter fabric and implement it in the process.

Based on the above, a combined (glass fibre and Teflon-based filter) filter fabric was developed for the existing bag filter and its resistance coefficient was determined. The following parameters of the changing factors were selected during

the experiments: gas consumption $Q_h=140\div990\text{m}^3/\text{h}$ with an intermediate step of $Q_h=285\text{ m}^3/\text{h}$, gas velocity $v_{\text{gas}} = 15\div35\text{ m/s}$ with an intermediate step of 5 m/s , filter thickness made of glass fibre and Teflon $\delta_f=2,3,4\text{ mm}$, filter frame diameter $d_{f.d.} = 130, 140\text{ and }150\text{ mm}$, gas density ρ for air was 1.29 kg/m^3 . The experiments were conducted at a temperature of $20\pm2^\circ\text{C}$ for gas and water systems.

Theoretical Research Results

One of the main characteristics of a bag filter device is the selection of the optimal values of the loads acting on the working elements of the device on the dusty gas flow moving through it. This characteristic determines the aerodynamic resistance of the device and the permissible value of the amount of heat leaving the device along with the cleaned gas [3,4].

In addition, while increasing aerodynamic resistance in the working parts of the device improves cleaning efficiency, it also leads to a decrease in productivity and clogging of dust particles in the pipes, resulting in disruption of the technological cycle. This, in turn, increases energy consumption.

The bag filter consists of a dusty gas guide pipe, a diffuser attached to the guide pipe, a device body, a glass fibre filter, and a purified gas outlet pipe. The dusty gas flow moving in the device encounters resistance when passing through the guide pipe, diffuser, filter, and purified gas outlet pipe. In this case, the equation for determining the resistance coefficient of the working parts of the device can be written as follows;

$$\zeta_{r.c} = \zeta_{g.p} + \zeta_{dif} + \zeta_{fil} + \zeta_{o.p} \quad (1)$$

where $\zeta_{o.p}$ is the coefficient of resistance of the dusty gas-conducting pipe, which is determined by the equation recommended by Blazius;

$$\zeta_{g.p} = \frac{l}{d_e} \sqrt{\frac{1}{2\lg\left[\frac{\varepsilon}{3,7} + \left(\frac{6,81}{\text{Re}}\right)^{0,9}\right]}} \quad (2)$$

where l is the pipe length, m; d_e is the equivalent pipe diameter, m; Re is the Reynolds number; and ε is the relative roughness, which is determined by the following equation;

$$\varepsilon = \frac{\Delta}{d_e} \quad (3)$$

where Δ is the height of the unevenness, m;

Then, if we substitute equation (3) for the relative unevenness ε in equation (2), equation (2) becomes;

$$\zeta_{g.p} = \frac{l}{d_e} \sqrt{\frac{1}{2\lg\left[\frac{\Delta}{3,7d_e} + \left(\frac{6,81}{\text{Re}}\right)^{0,9}\right]}} \quad (4)$$

ζ_{dif} is the resistance coefficient of the diffuser of the device, and the dusty airflow moving in the diffuser of the device must be evenly distributed over the

diffuser extension length L , which determines the full operation of the filter surfaces and the improvement of the cleaning efficiency. When designing the device, the condition shown in the diagram must be met. To determine this condition, we use the approximate equation of Idelchik and Flinger [5].

$$\zeta_{dif} = \frac{\lambda_{dif}}{8 \sin \frac{\alpha_{e.a}}{2}} \left(1 - \frac{1}{n_{dif}^2} \right) + \sin \frac{\alpha_{e.a}}{2} \left(1 - \frac{1}{n_{dif}^2} \right)^2 \quad (5)$$

where n_{dif} is the diffuser expansion ratio; $\alpha_{e.a}$ is the diffuser expansion angle; λ_{dif} is the friction coefficient in the diffuser, which depends on the diffuser expansion angle $\alpha_{e.a}$, the expansion ratio n_{dif} , and the Reynolds number. We determine the values of λ_{dif} , $\alpha_{e.a}$ and if according to the above condition;

$$\lambda_{dif} = \frac{A}{Re_{dif}} \quad (6)$$

where Re_{dif} is the Reynolds criterion; A is the coefficient taking into account the shape of the diffuser. Considering that the device is supplied with dusty air flow rates in different ranges, λ_{dif} can also be determined using the Blasius equation;

$$\lambda_{dif} = \frac{0,316}{\sqrt[4]{Re_{dif}}} \quad (7)$$

In the calculations, $\lambda_{dif}=0.015 \div 0.025$, $\alpha_{e.a}=60$ (in practice, $\alpha_{e.a}=70 \div 90$ is taken to reduce the length of the diffuser), and $n_{dif}=2 \div 4$ are assumed [5].

ζ_{fil} is the resistance coefficient of the device filter, its determination is complex and requires various deviations. Therefore, when determining the resistance coefficient of the device filter, we introduce the following equation;

$$\zeta_{fil} = \Delta k \frac{(S_{c.z} + S_{o.z}) \delta}{V} \quad (8)$$

where V is the total volume of the sleeve, m^3 ; $S_{c.z}$ is the surface area of the closed zone of the filter fabric, m^2 ; $S_{o.z}$ is the surface area of the open zone of the filter fabric, m^2 ; δ is the thickness of the fabric, m Δk is the correction factor, which was determined experimentally.

From this equation, it can be seen that an increase in the closed zone and fabric thickness leads to an increase in the resistance coefficient. When designing industrial copies of the device, limited intermediate values of Δk are introduced to select the optimal parameters of the closed and open zones.

$\zeta_{o.p}$ is the resistance coefficient of the cleaned air outlet pipe, which can be determined using equation (4);

$$\zeta_{o.p} = \frac{l}{d_e} \sqrt{\frac{1}{2 \lg \left[\frac{\Delta}{3,7 d_e} + \left(\frac{6,81}{Re} \right)^{0,9} \right]}} \quad (9)$$

Then, if we substitute equations (4), (5), (8), and (9) into the calculation equation (1), equation (1) becomes:

$$\zeta_{r.c} = \left[\frac{l}{d_e} \sqrt{\frac{1}{2 \lg \left[\frac{\Delta}{3,7 d_e} + \left(\frac{6,81}{Re} \right)^{0,9} \right]}} \right] + \frac{\lambda_{dif}}{8 \sin \frac{\alpha_{e.a}}{2}} \left(1 - \frac{1}{n_{dif}^2} \right) + \sin \frac{\alpha_{e.a}}{2} \left(1 - \frac{1}{n_{dif}^2} \right)^2 + \Delta k \frac{(S_{c.z} + S_{o.z}) \delta}{V} \quad (10)$$

Through this equation, we determine the resistance coefficient in the working parts of the device.

Research Results

When determining the resistance coefficient of the dusty gas inlet and cleaned gas outlet pipes in the device, we accept the approximate value determined in the research work of [6,7], that is, we assume the resistance coefficient of the dusty gas inlet and cleaned gas outlet pipes to be equal to 0.54.

The local resistance coefficient of the diffuser was determined experimentally. According to it, the dusty gas velocity in the diffuser (ANEMOMETER VA06-TROTEC), the flow regime, the degree of expansion of the diffuser, the expansion angle and the friction coefficient were determined by changing the angle of the 0°; 30°; 60°; 90° angle-forming flap installed in the suction pipe of the device ventilator. Using the results obtained in the experiment and equation (5), the resistance coefficient of the dusty gas inlet and outlet pipes was determined. Table 2 presents the experimental results.

Table 2
Resistance coefficient values of dusty gas inlet and cleaned gas outlet pipes

$v_{gaz}, \text{m/s}$	35	30	25	20	15
$\zeta_{k.q}$	0,64	0,63	0,624	0,65	0,63
$\zeta_{ch.q}$	0,43	0,44	0,44	0,45	0,443

The results of the experiment on determining the local resistance coefficients in the dusty gas inlet and cleaned gas outlet pipes and in the diffuser show that the resistance coefficient values are close to each other even in different ranges of gas velocity and flow regime. The determined resistance coefficient values are mathematically processed and with sufficient accuracy and average value, the resistance coefficient of the dusty gas inlet and cleaned gas outlet pipes can be taken as 0.54 and 0.3 in the diffuser [5].

The resistance coefficient of the glass fibre-based fabric was determined using equation (8) [5,7]. Figure 2 shows a graph of the change in the correction coefficient as a function of the ratio of the difference between the closed and open zones of the filter and the product of the fabric thickness to the total fabric size.

It can be seen from Figure 2 that the increase in the closed zone and the thickness of the fabric causes a decrease in the value of the correction coefficient.

When $((S_{y0,z} - S_{o,z}) \delta / V = 2.76, \Delta k = 1.2$; when $(S_{y0,z} - S_{o,z}) \delta / V = 3.28, \Delta k = 1.1$ and when $(S_{y0,z} - S_{o,z}) \delta / V = 5.43, \Delta k = 0.68$). This is due to the direct proportionality of the total resistance coefficient to the closed zone and the thickness of the fabric.

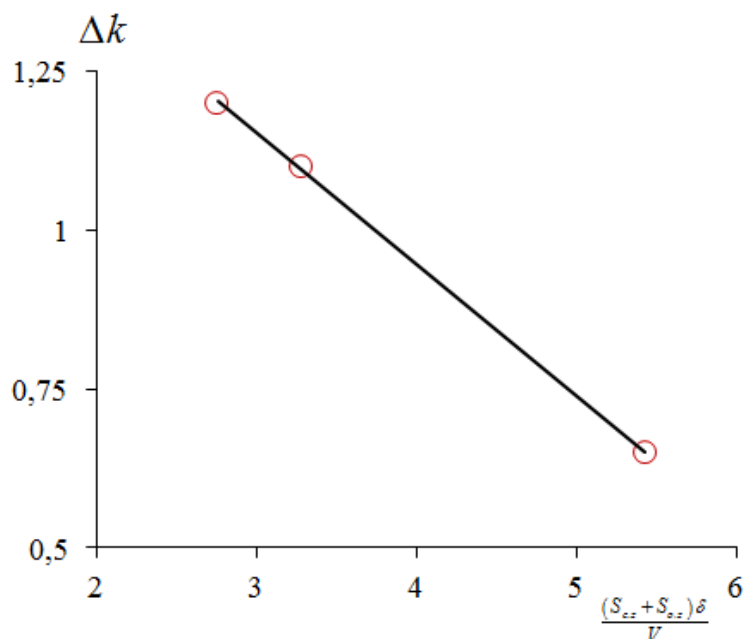


Figure 2. Dependence of the correction coefficient on the filter position

If we assume that the local resistance coefficients in the dusty gas inlet and cleaned gas outlet pipes and the diffuser are constant and substitute them into equation (10), then the equation takes the following simple form.

$$\zeta_{r.c} = 0,84 + \Delta k \frac{(S_{c,z} + S_{o,z})\delta}{V} \quad (11)$$

In the experimental determination of the total resistance coefficient of the device, the resistances on the working surface were approximately determined based on the difference in the velocities of the gas entering and leaving the device, the difference in gas consumption, and compared with the values of the total resistance coefficient determined depending on the ratio of the difference between the closed zone of the filter and the open zone and the product of the fabric thickness to the total fabric size. Figure 3 shows a graph of the change in the resistance coefficient depending on the ratio of the difference between the closed zone of the filter and the open zone and the product of the fabric thickness to the total fabric size (Figure 3).

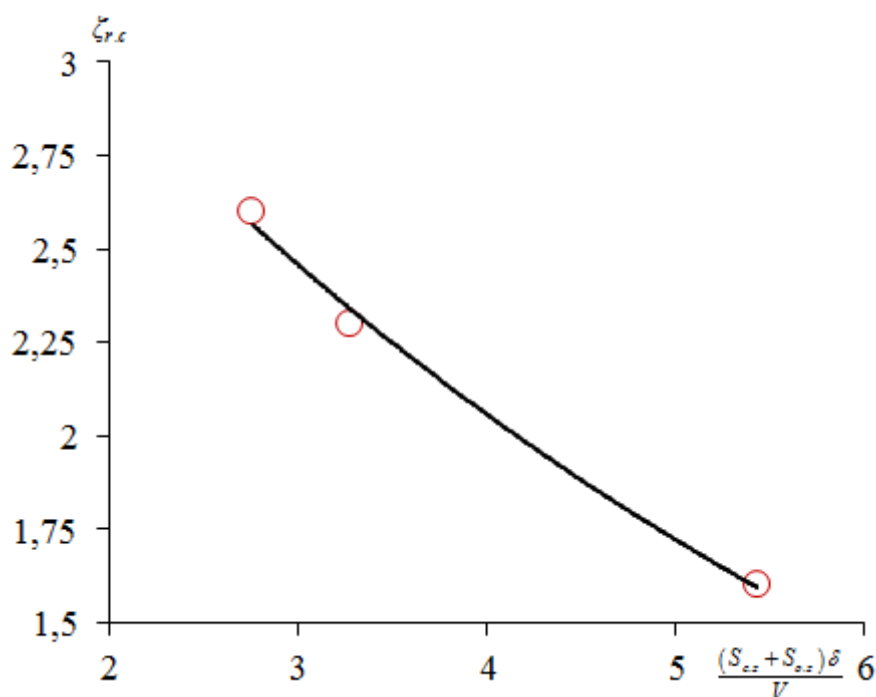


Figure 3. Dependence of the resistance coefficient ζ_{um} on the filter position

The following empirical formulas were obtained by applying the least squares method to the relationships presented in Figures 2 and 3, which adequately represent the parameters [8,9].

Regarding the dependence of the correction coefficient presented in Figure 2 on the filter position.

$$y = -0,1813x + 1,746 \quad R^2 = 0,974 \quad (12)$$

Figure 3 shows the dependence of the resistance coefficient on the filter position.

$$y = -0,2904x + 3,645 \quad R^2 = 0,981 \quad (13)$$

The total resistance coefficient of the device was calculated by substituting the resistance coefficients determined for different thicknesses of the filter made of glass fibre and Teflon into equation (11). The calculation results are as follows. It was determined that the total resistance coefficient of the device for a filter made of glass fibre and Teflon with a thickness of $\delta=2$ mm is $\zeta_{r,c}=1.6$, for a filter made of glass fibre and Teflon with a thickness of $\delta=3$ mm is $\zeta_{r,c}=2.3$, and for a filter made of $\delta=3$ mm is $\zeta_{r,c}=2.6$.

Experiments to determine the resistance to gas flow in the working elements of a filter made of glass fibre and Teflon and the total pressure loss in the device were carried out in the following order. Different values of the dusty gas flow rate, consumption, filter thickness and dusty gas density in the device were solved according to equation (1). The resistance coefficients of the working elements determined in paragraph 2.4.1 were used. To check the accuracy of the theoretically calculated values for pressure loss and to estimate intermediate errors, a micromanometer JM-510 was installed on the dusty gas inlet and outlet pipes of the device, and the pressure loss in the device was experimentally determined for different values of the above variable parameters. The experiments were carried out

in the following sequence. According to it, the gas velocity entering the device through the LATR installed on the electric motor of the device fan was controlled in the range of $\omega_{gas} = 5 \div 35$ m/s with an intermediate step of $\omega_{gas} = 10$ m/s, and a filter made of basalt fiber (thickness $\delta_f = 2, 3, 4$ mm) was sequentially installed on the device depending on its thickness, and the aerodynamic resistance for different values of the variable parameters was determined based on the pressures at the inlet and outlet of the device and their difference. To assess the error between the theoretical and experimental values, comparison graphs were constructed (Figures 4; 5 and 6). The filter frame diameters $d_{fil.} = 130, 140$ and 150 mm were not taken into account when conducting the research. For this reason, the pressure difference did not change significantly in the theoretical calculations and the results obtained with the micromanometer in the selected range. Therefore, when constructing a graph of the dependence of the total aerodynamic resistance of the device on the gas velocity, $d_{fil.} = 140$ mm was chosen.

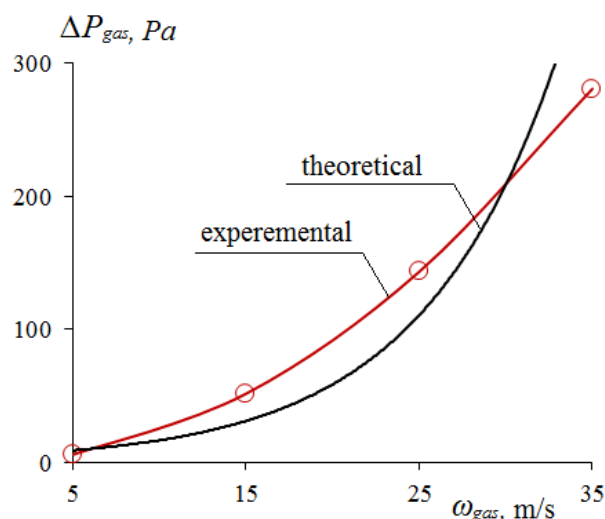


Figure 4. Plot of the aerodynamic resistance of the device ΔP_{gas} versus the gas velocity ω_{gas} . $\delta_{fil} = 2$ mm and $\rho_{gas} = 1.29$ kg/m³ const.

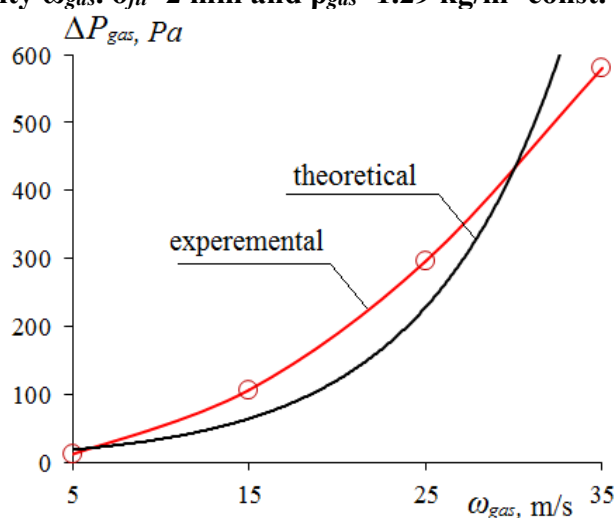


Figure 5. Plot of the aerodynamic resistance of the device ΔP_{gas} versus the gas velocity ω_{gas} . $\delta_{fil} = 3$ mm and $\rho_{gas} = 1.29$ kg/m³ const.

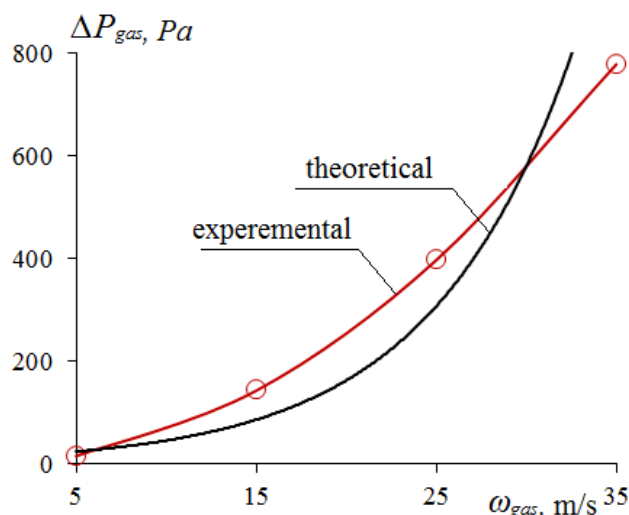


Figure 6. The graph of the aerodynamic resistance of the device ΔP_{gas} versus the gas velocity ω_{gas} . $\delta_{fil}=4$ mm and $\rho_{gas}=1.29$ kg/m³ const.

4; From the graphical relationships given in Figures 5 and 6, it can be seen that an increase in the thickness of the filter of the base fabric installed in the device leads to an increase in the resistance coefficient of the device filter. This, in turn, leads to an increase in the aerodynamic resistance of the device. In addition, an increase in the gas flow rate supplied to the device also significantly increases the aerodynamic resistance according to the Darcy-Weisbach law.

For example, when the gas density supplied to the device is $\rho_{gas}=1.29$ kg/m³ const, the minimum aerodynamic resistance in the device at the minimum thickness of the basalt fabric filter $\delta_{fil}=2$ mm was 18 Pa and the maximum aerodynamic resistance was 460 Pa, while the minimum aerodynamic resistance in the device at the maximum thickness of the basalt fabric filter $\delta_{fil}=4$ mm was 35 Pa and the maximum aerodynamic resistance was 780 Pa. From this it can be concluded that the values of the variable parameters and the increase in the fabric thickness cause an increase in the aerodynamic resistance in the device. The error between the theoretical and experimental studies did not exceed 4%.

The following empirical formulas were obtained, which adequately represent the parameters, using the least squares method for the graphical relationships presented in Figures 4, 5 and 6 [8,9]; 1) $\delta_{fil}=2$ mm va $\rho_{gas}=1,29$ kg/m³ const.

$$y = 0,5697x^2 - 7,8338x + 29,951 \quad R^2 = 0,9984 \quad (14)$$

2) $\delta_{fil}=3$ mm va $\rho_{gas}=1,29$ kg/m³ const.

$$y = 0,4183x^2 + 1,8969x - 9,4143 \quad R^2 = 0,9974 \quad (15)$$

3) $\delta_{fil}=4$ mm va $\rho_{gas}=1,29$ kg/m³ const.

$$y = 0,3101x^2 - 2,7979x + 23,64 \quad R^2 = 0,9982 \quad (16)$$

In addition, an increase in the density of the gas and dust mixture also causes an increase in aerodynamic resistance in the device. Therefore, the study examined the change in aerodynamic resistance in the device due to an increase in gas density. The analysis of the permissible limit of dust in the air in mg/m³ was carried out at the cement production plant of TERRA NOVA CEMENT LLC. The analysis was

carried out using the method of determining the permissible limit of dust in mg/m^3 by GOST12.1.005-38, that is, the number of particles per unit of dust mass or dust volume. A special analytical aerosol aspirator of the AFA type (Aspirator M-822) was used as the research device, and a conical tube made of plastic was used as the filter cartridge, as the filtering material was perchlorovinyl fabric of the FPP brand (fabric mounted on a paper protective ring) []. According to the analysis results, the average dust content per m^3 of air was 1157.5 mg. The density of the air-dust mixture was determined according to the following equation (3.17). The density of the dust coming out of the rotary kiln was assumed to be $1650 \text{ kg}/\text{m}^3$.

$$\rho_{r.c} = \rho_{\text{gas}} + (\rho_{\text{dust}}\gamma) \quad (17)$$

Based on the calculation result, the density of the air-dust mixture was determined to be $3.2 \text{ kg}/\text{m}^3$ and the effect of the mixture density on the aerodynamic resistance of the device was considered according to the above method. A screw feeder was used to create the air-dust mixture in laboratory conditions. The powder was quantitatively transferred for different air velocity ranges and different values of the filter thickness. In order to assess the error between the theoretical and experimental values, comparison graphs were constructed (Figures 7; 8 and 9).

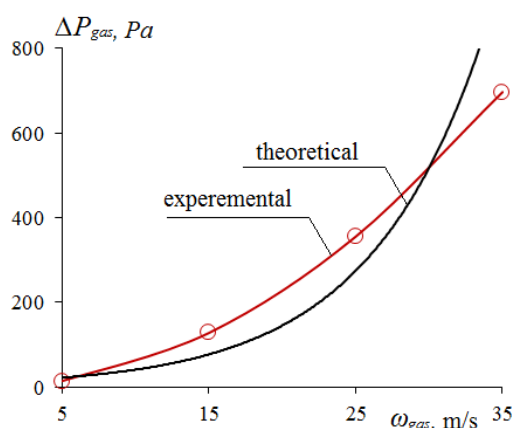


Figure 7. Plot of the aerodynamic resistance of the device ΔP_{gas} versus the gas velocity ω_{gas} . $\delta_{\text{fil}}=2 \text{ mm}$ and $\rho_{\text{gas}}=3.2 \text{ kg}/\text{m}^3$ const.

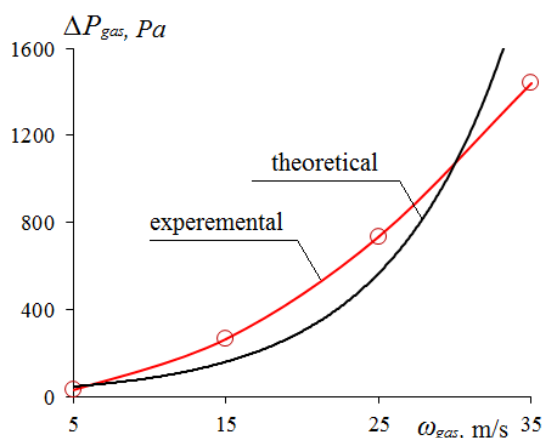


Figure 8. Graph of the aerodynamic resistance of the device ΔP_{gas} versus the gas velocity ω_{gas} . $\delta_{\text{fil}}=3 \text{ mm}$ and $\rho_{\text{gas}}=3.2 \text{ kg}/\text{m}^3$ const.

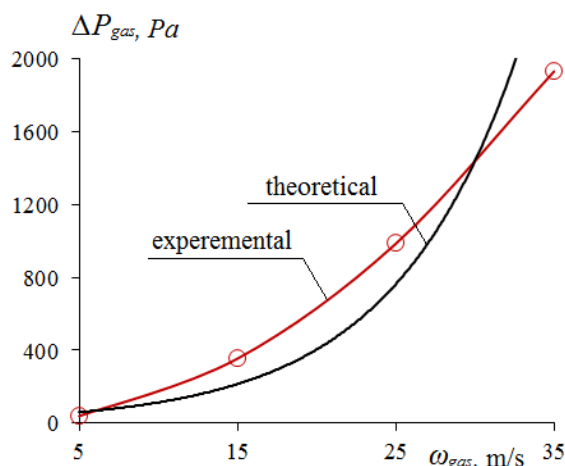


Figure 9. The graph of the aerodynamic resistance of the device ΔP_{gas} versus the gas velocity ω_{gas} . $\delta_{fil}=4$ mm and $\rho_{gas}=3.2$ kg/m³ const.

The graphical relationships given in Figures 7; 8 and 9 show that an increase in the density of the dust and gas mixture supplied to the device causes a significant increase in the aerodynamic resistance of the device.

For example, when the gas density supplied to the device is $\rho_{gas}=1.29$ kg/m³ const, the minimum aerodynamic resistance in the device at the minimum thickness of the basalt fabric filter $\delta_{fil}=2$ mm was 18 Pa and the maximum aerodynamic resistance was 280 Pa. When the gas density is $\rho_{gas}=3.2$ kg/m³ const, the minimum aerodynamic resistance in the device at the minimum thickness of the basalt fabric filter $\delta_{fil}=3$ mm was 28.7 Pa and the maximum aerodynamic resistance was 700 Pa. At the maximum thickness of the basalt fabric filter $\delta_{fil}=4$ mm, the minimum aerodynamic resistance in the device was 35 Pa and the maximum aerodynamic resistance was 780 Pa. When the gas density $\rho_{gas}=3.2$ kg/m³ was constant, it was observed that at the maximum thickness of the basalt fabric filter $\delta_{fil}=4$ mm, the minimum aerodynamic resistance in the device increased to 52 Pa and the maximum aerodynamic resistance to 2000 Pa. That is, an increase in the density of the air and gas mixture by about 2.5 times caused an increase in the hydraulic resistance by the same amount. The error between the theoretical and experimental studies was 4.8%.

7; 8 and 9 - the following empirical formulas were obtained, which adequately express the parameters using the least squares method for the graphical relationships presented in Figs. [8,9];

1) $\delta_{fil}=2$ mm va $\rho_{gas}=3.2$ kg/m³ const.

$$y = 0,6633x^2 - 4,9111x + 58,083 \quad R^2 = 0,9997 \quad (18)$$

2) $\delta_{fil}=3$ mm va $\rho_{gas}=3.2$ kg/m³ const.

$$y = 1,376x^2 - 7,8361x + 39,322 \quad R^2 = 0,9982 \quad (19)$$

3) $\delta_{fil}=4$ mm va $\rho_{gas}=3.2$ kg/m³ const.

$$y = 1,7519x^2 - 9,18x + 108,57 \quad R^2 = 0,9999 \quad (20)$$

The results of the study on determining the aerodynamic resistance can be used to determine the degree of purification of the device. However, studying the effect of the basalt fibre-based filter on the working volume and service life based on the total aerodynamic resistance is complex and requires various deviations. In

addition, it is necessary to take into account the temperature of the gas entering the device. This is because an increase in temperature also causes an increase in pressure according to the Mendeleev-Clapperon equation. This, in turn, increases the measurement error. Therefore, in the research work, the change in pressure due to an increase in gas temperature was also experimentally determined.

CONCLUSION

1. The increase in the closed zone of the filter fabric and the thickness of the fabric leads to an increase in the resistance coefficient. When designing industrial copies of the device, it is necessary to introduce limited intermediate values of Δk to select the optimal parameters of the closed and open zones.

2. The results of the experiment on determining the local resistance coefficients in the dusty gas inlet and cleaned gas outlet pipes and the diffuser show that the resistance coefficient values are close to each other even in different ranges of gas velocity and flow regime. The determined resistance coefficient values were mathematically processed and the resistance coefficients of the dusty gas inlet and cleaned gas outlet pipes were taken as 0.63 and 0.42 with sufficient accuracy and average value.

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INFEKSION KASALLIKLARNI KELTIRUVCHI BAKTERIYALARNING VIRULENTLIK OMILLARI

***Annotatsiya:** Ushbu maqolada infeksion kasalliklarni keltirib chiqaruvchi bakteriyalarning virulentlik omillari va ularning patogenezdagi o'rni tahlil qilinadi. Virulentlik omillari bakteriyalarning mezbон organizmga kirishi, unda ko'payishi va immun tizimidan himoyalanişini ta'minlaydigan biologik mexanizmlar majmuini ifodalaydi. Maqolada bakteriyalarning adgeziya, invaziya, toksin hosil qilish, kapsula shakllantirish, fermentativ faollik kabi asosiy virulentlik xususiyatlari ilmiy jihatdan yoritilgan. Shuningdek, ularning genetik nazorati, antigenlik strukturasi va patogenlik darajasini oshiruvchi plazmidlar haqida ma'lumotlar keltirilgan. Tadqiqotda bakteriyalar tomonidan ishlab chiqariladigan ekzotoksinlar va endotoksinlarning mezbон hujayralariga ta'siri, ularning immun javobni susaytirish yoki yallig'lanish jarayonlarini kuchaytirishdagi roli tahlil qilingan. Maqola infeksion jarayonlarning shakllanishida virulentlik omillarining kompleks ta'sir mexanizmini yoritish, diagnostika va profilaktika choralarini ilmiy asoslashga qaratilgan. Ushbu ish mikrobiologiya, epidemiologiya va klinik tibbiyot sohalarida faoliyat yurituvchi mutaxassislar uchun nazariy va amaliy ahamiyatga ega.*

***Kalit so'zlar:** Bakteriyalar, Infeksion kasalliklar, Virulentlik omillari, Patogenez, Adgeziya, Invaziya, Ekzotoksinlar, Endotoksinlar.*

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VIRULENCE FACTORS OF BACTERIA THAT CAUSE INFECTIOUS DISEASES

Abstract: *This article analyzes the virulence factors of bacteria that cause infectious diseases and their role in pathogenesis. Virulence factors represent a set of biological mechanisms that ensure the entry of bacteria into the host organism, their reproduction in it, and protection from the immune system. The article scientifically covers the main virulence properties of bacteria, such as adhesion, invasion, toxin production, capsule formation, and enzymatic activity. It also provides information about their genetic control, antigenic structure, and plasmids that increase the level of pathogenicity. The study analyzed the effect of exotoxins and endotoxins produced by bacteria on host cells, their role in suppressing the immune response or enhancing inflammatory processes. The article is aimed at elucidating the complex mechanism of action of virulence factors in the formation of infectious processes, and at scientifically substantiating diagnostic and preventive measures. This work is of theoretical and practical importance for specialists working in the fields of microbiology, epidemiology and clinical medicine.*

Keywords: *Bacteria, Infectious diseases, Virulence factors, Pathogenesis, Adhesion, Invasion, Exotoxins, Endotoxins.*

1. Virulentlik omillarining umumiy tushunchasi va turlari

Bakterial infeksiyon kasalliklarning patogenezini tushunishda virulentlik tushunchasi markaziy o‘rin tutadi. Virulentlik, mikrobnining mezbon organizmga kirishi, u yerda ko‘payishi va patologik jarayonlarni boshlash qobiliyati sifatida tavsiflanadi. Shu bilan birga, virulentlik darajasi mikroorganizmlarning patogenetik potensialini aks ettiruvchi muhim parametr bo‘lib, kasallikning klinik og‘irligi va davomiyligini aniqlashda asosiy indikator hisoblanadi. Bakteriyalarning virulentligi ko‘pincha ularning genetik tarkibi, fermentativ faoliyati va yuzaki strukturalarining xususiyatlari bilan belgilanadi. (2,10)

Virulentlik omillari strukturaviy va funktsional/biokimyoviy komponentlarga bo‘linadi. Strukturaviy virulentlik omillari orasida kapsula, pili, fimbrialar, flagellalar alohida ahamiyatga ega bo‘lib, ular bakteriyaning mezbon hujayraga bog‘lanishi, immun tizimidan qochishi va harakatlanishi uchun zarur hisoblanadi. Masalan, kapsula fagotsitozga chidamlilikni oshiradi va hujayra yuzasidagi antigennik identifikatsiyani murakkablashtiradi. Pili va fimbrialar esa mezbon epiteliya hujayralariga aniq bog‘lanish orqali kolonizatsiya jarayonini ta‘minlaydi.

Funktsional yoki fermentativ virulentlik omillari bakteriyalarning ekzotoksinlar, endotoksinlar va turli enzimlar ishlab chiqarish qobiliyati bilan bog‘liq. Ekzotoksinlar hujayra metabolizmini buzuvchi va immun javobni modulyatsiya qiluvchi biologik faol molekulalardir. Endotoksinlar esa Gram-manfiy bakteriyalar hujayra devorida mavjud bo‘lib, ularning parchalanishi natijasida kuchli yallig‘lanish reaksiyasini keltirib chiqaradi. Shu bilan birga, proteazalar, hialuronidazalar va boshqa fermentlar bakteriyaning to‘qimalarga tarqalishini va mezbon himoya mexanizmlaridan qochishini osonlashtiradi. (5,7)

Shunday qilib, bakterial virulentlik omillari struktura va funksiyalarning murakkab o‘zaro ta‘siri orqali kasallik jarayonini belgilaydi va infeksiyon

kasalliklarning klinik namoyon bo'lishi, davomiyligi hamda og'irligini aniqlashda hal qiluvchi rol o'ynaydi. Ularning chuqur o'rganilishi diagnostika, profilaktika va terapiya strategiyalarini ishlab chiqishda muhim ilmiy asos bo'lib xizmat qiladi.

2. Bakterial virulentlikning mexanizmlari

Bakterial infeksiyalarning patogenezini chuqur tushunish uchun ularning virulentlik mexanizmlarini aniqlash zarur. Virulentlik mexanizmlari, asosan, bakterianing mezbon organizmga kirishi, u yerda kolonizatsiya qilishi va to'qimalarda zararli jarayonlarni boshlash qobiliyatini o'z ichiga oladi. Ushbu mexanizmlar molekulyar, hujayraviy va tizimli darajada ifodalanadi hamda mikroorganizmlarning patogenetik potensialini belgilaydi.(1,3,6)

Bakteriyalarning birinchi va eng muhim virulentlik mexanizmi — adhesiya jarayoni. Bu mexanizm orqali mikroorganizmlar mezbon hujayralarining sirtiga bog'lanadi va kolonizatsiya qiladi. Adhesiya protsessi bakteriyalarning yuzasidagi pili, fimbrialar, adhesin oqsillari bilan mezbon hujayra membranasidagi specific receptorlar o'rtasidagi molekulyar o'zaro ta'sir orqali amalga oshadi. Ushbu bog'lanish mezbon immun tizimining dastlabki javoblaridan qochishni va hujayra ichida uzoq muddat yashash imkoniyatini yaratadi. Misol tariqasida, uropatogen *Escherichia coli*ning P-pili orqali siydik yo'llarining epitel hujayralariga bog'lanishi keltirilishi mumkin. (1,2)

Ikkinchi muhim mexanizm — invasivlik. Invasivlik bakterianing mezbon hujayra ichiga kirish va to'qimalar bo'ylab tarqalish qobiliyatini ifodalaydi. Bu jarayon bakterial enzimlar, jumladan, hialuronidaza, kollagenaza va neuraminidaza faoliyati orqali amalga oshadi. Hialuronidaza mezbon to'qimalarini bo'luvchi glikozaminoglikanlarni degradatsiya qilib, bakteriyalarga tarqalish uchun yo'l ochadi. Shuningdek, ba'zi bakteriyalar mezbon hujayraga endotsitoz mexanizmi orqali kiradi, bu esa ularning fagotsitozga chidamli bo'lishi va ichki to'qimalarda ko'payishini ta'minlaydi.

Uchinchi mexanizm — toksinlar va fermentlarning patogenetik ta'siri. Ekzotoksinlar hujayra metabolizmini bevosita buzuvchi biologik faol molekullar bo'lib, ular hujayra membranasini shikastlaydi, signal yo'llarini modulyatsiya qiladi va immun javobni inhibe qiladi. Masalan, *Clostridium tetani* tomonidan ishlab chiqariladigan tetanospazmin nerv tizimida inhibitor neyrotransmitterlar faoliyatini bloklay, mushaklarning spazmli qisqarishiga olib keladi. Endotoksinlar esa Gram-manfiy bakteriyalarda lipopolisakkarid shaklida bo'lib, ularning parchalanishi natijasida sitokin stormga o'xshash yallig'lanish reaksiyasi yuzaga keladi. Shu bilan birga, bakterial proteazalar, nukleazalar va boshqa fermentlar to'qimalarni degradatsiya qilib, infeksiyaning tarqalishini tezlashtiradi va mezbon himoya mexanizmlarini cheklaydi.(4,5,9)

Bakterial virulentlik mexanizmlari bir-biri bilan murakkab o'zaro bog'langan bo'lib, infeksiyon kasallikning klinik og'irligi, davomiyligi va mezbon organizmning immun javobini aniqlashda hal qiluvchi rol o'ynaydi. Ushbu mexanizmlarning chuqur o'rganilishi diagnostika, profilaktika va terapevtik strategiyalarni takomillashtirishga ilmiy asos yaratadi. Shuningdek, genetik va molekulyar

tadqiqotlar orqali virulentlik mexanizmlarini nishonlash infeksiyon agentlarga qarshi maqsadli dorilar va vaksinalarni ishlab chiqishda muhim ahamiyat kasb etadi.(3,5)

3. Virulentlik omillarining klinik va epidemiologik ahamiyati

Bakterial virulentlik omillari infeksiyon kasalliklarning klinik namoyon bo'lishi va epidemiologik xususiyatlarini belgilovchi asosiy determinantlardir. Virulentlik darajasi mikroorganizmlarning mezbon organizmga kirish, u yerda ko'payish va to'qimalarga zarar yetkazish qobiliyatini aks ettiradi. Shu bilan birga, u kasallikning og'irligi, davomiyligi va surunkali shakllarining rivojlanish ehtimolini aniqlaydi. Klinik jihatdan, yuqori virulentlikka ega bakteriyalar tez rivojlanadigan, ko'p tizimli yallig'lanish va toksik shok kabi og'ir patologik holatlarni keltirib chiqaradi, bu esa bemorlarning morbiditet va mortalitetini sezilarli darajada oshiradi.

Virulentlik omillarining klinik ahamiyati, asosan, bakteriyalarning struktural va fermentativ xususiyatlari bilan bog'liq. Masalan, kapsula va pili bilan jihozlangan bakteriyalar immun tizimining dastlabki fagotsitoz mexanizmlaridan muvaffaqiyatli qochadi, bu esa infeksiyaning uzoq davom etishi va surunkali shakllanishiga olib keladi. Ekzotoksinlar va endotoksinlar esa hujayra metabolizmini buzish orqali organ tizimlarida patologik o'zgarishlarni keltirib chiqaradi. Klinik tajribada, masalan, *Streptococcus pneumoniae*ning kapsula bilan ta'minlangan shtammlari og'ir pnevmoniya va sepsis rivojlanishiga sabab bo'lishi keng kuzatiladi. (8,9,10)

Epidemiologik nuqtai nazardan, virulentlik omillari infeksiyon agentlarning tarqalish potentsiali va epidemik salohiyatini aniqlaydi. Yuqori virulent shtammlar tez tarqaluvchi epidemiyalar, holatlarning og'irlashishi va kasallik ko'rsatkichlarining keskin oshishi bilan tavsiflanadi. Shu bilan birga, virulentlik omillarining genetik asoslari orqali bakteriyalar atrof-muhit sharoitlariga va antibiotiklarga chidamlilikni rivojlantirishi mumkin, bu esa jamoat salomatligi uchun katta xavf tug'diradi. Epidemiologik tadqiqotlar shuni ko'rsatadiki, virulent shtammlar bilan bog'liq kasalliklarning profilaktikasi, vaksinalar va maqsadli terapevtik strategiyalarni ishlab chiqish orqali samarali boshqarilishi mumkin.

Shunday qilib, bakterial virulentlik omillari nafaqat individual bemorning klinik holatini belgilash, balki infeksiyon kasalliklarning jamoat sog'lig'i darajasidagi tarqalish xavfini aniqlashda ham muhim rol o'ynaydi. Ularning molekulyar va genetik xususiyatlarini chuqur o'rganish diagnostika, davolash va profilaktika strategiyalarini ilmiy asosda takomillashtirishga imkon beradi hamda jamoat salomatligini saqlashdagi strategik vazifalarni aniqlashda hal qiluvchi ahamiyat kasb etadi.(5,6)

Xulosa

Bakterial virulentlik omillari infeksiyon kasalliklarning patogenezida markaziy ahamiyatga ega bo'lib, mikroorganizmlarning mezbon organizmga kirishi, u yerda ko'payishi va to'qimalarga zarar yetkazish qobiliyatini belgilaydi. Ular struktural (kapsula, pili, fimbrialar, flagellalar) va funksional/fermentativ (ekzotoksinlar, endotoksinlar, proteazalar va boshqa fermentlar) komponentlarga

ega bo'lib, kasallikning klinik og'irligi, davomiyligi va surunkali shakllarini aniqlashda hal qiluvchi rol o'ynaydi.

Bakterial virulentlik mexanizmlari — adhesion, invasiylik va toksinlarni ishlab chiqarish orqali amalga oshadi va ular mikroorganizmlarning mezbон immun tizimidan qochishi hamda to'qimalarda samarali kolonizatsiya qilishini ta'minlaydi. Shu bilan birga, virulentlik omillari infeksiy agentlarning epidemik salohiyatini belgilab, kasalliklarning tez tarqalishi, og'ir klinik ko'rinishlari va jamoat salomatligi uchun xavf darajasini oshiradi.

Chuqur molekulyar, genetik va klinik tadqiqotlar virulentlik omillarini aniqlash va ularni nishonlash imkonini beradi, bu esa diagnostika, profilaktika va terapiya strategiyalarini takomillashtirishga ilmiy asos yaratadi. Natijada, bakterial virulentlikning sistematik o'rganilishi infeksiy kasalliklarning oldini olish, ularni samarali davolash va jamoat salomatligini himoya qilishda strategik ahamiyatga ega ekanligi tasdiqlanadi.

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THE EFFECT OF ACUTE RADIATION ON THE NORMAL MICROFLORA OF THE LARGE INTESTINE IN EXPERIMENTAL ANIMALS: RESULTS OF A DYNAMIC STUDY

Abstract. *This study investigates the dynamic impact of acute radiation exposure on the composition and state of the normoflora in the large intestine of laboratory rats. The experiment modeled the consequences of a single 6 Gy irradiation. The obtained data demonstrate significant dysbiotic shifts characterized by suppression of obligate and activation of opportunistic microflora, with subsequent partial recovery by day 30. The results underscore the critical role of gut microbiota in the pathogenesis of radiation injuries and point to potential targets for dysbiosis correction.*

Keywords: *acute irradiation, gut microbiota, dysbiosis, experimental animals, dynamics, lactobacilli, bifidobacteria, enterobacteria.*

1. Introduction. The human body exists in a state of symbiotic equilibrium with a vast and complex community of microorganisms, collectively known as the microbiota. Among these ecosystems, the intestinal microbiota is the most dense and metabolically active, playing an indispensable role not only in digestion and vitamin synthesis but also in the maturation and modulation of the immune system, maintenance of the gut barrier integrity, and protection against pathogenic colonization. This delicate balance, however, is highly susceptible to disruption by external stressors. Ionizing radiation, particularly when delivered acutely at significant doses, represents one of the most potent physical stressors, capable of inducing profound systemic alterations known collectively as acute radiation syndrome.

The gastrointestinal (GI) tract is notably radiosensitive. While the direct cytotoxic effect on the rapidly dividing crypt epithelial cells is a primary driver of the GI syndrome, a growing body of evidence highlights the pivotal role of the commensal gut microbiota in both the development and progression of radiation-induced damage. Acute, high-dose radiation exposure is hypothesized to cause a condition known as radiation-induced dysbiosis—a significant imbalance in the microbial community structure. This dysbiosis is characterized by a decline in beneficial, obligate anaerobic bacteria (e.g., *Bifidobacterium*, *Lactobacillus*) and a concomitant overgrowth of potentially pathogenic, often facultative anaerobic or aerobic bacteria (e.g., *Enterobacteriaceae*, *Staphylococcus*, *Candida* spp.). Such a shift compromises gut barrier function, facilitates bacterial translocation, exacerbates local and systemic inflammation, and can contribute to septic complications, thereby worsening the overall prognosis.

Despite the recognized importance of this phenomenon, detailed longitudinal studies charting the precise timeline of these microbial population shifts following acute irradiation are crucial for a comprehensive understanding of the pathogenetic cascade. Elucidating the dynamics—the rate of decline of protective species, the timing of opportunistic expansion, and the potential for autonomous recovery—is essential for identifying critical windows for therapeutic intervention. Therefore, the aim of this study was to conduct a detailed dynamic assessment of the state of the autochthonous microflora in the large intestine of experimental animals following a single acute exposure to a sublethal dose of gamma radiation.

2. Materials and Methods

The experiment was conducted on 90 mature, outbred white male rats with an average weight of 180-220 g. All animals were housed in standard vivarium conditions with ad libitum access to food and water, in compliance with established principles of laboratory animal care. The rats were randomly divided into two main groups: a control group (n=30), which did not undergo irradiation, and an experimental group (n=60), subjected to a single, total-body gamma irradiation at a dose of 6 Gy using a "Luch-1" apparatus. To enable dynamic observation, the experimental group was further subdivided into 4 subgroups (n=15 each), with animals being sacrificed for sample collection on days 3, 7, 14, and 30 post-irradiation.

Sample collection was performed under light ether anesthesia with strict aseptic technique. Contents from the large intestine were aseptically collected. Quantitative and qualitative microbiological analysis was carried out using the classic method of serial tenfold dilutions followed by plating onto selective and differential diagnostic culture media. The number of colony-forming units (CFU) per 1 gram of material was determined for the following key microbial groups:

- Obligate anaerobes: *Bifidobacteria* (on Blaurock agar), *Lactobacilli* (on MRS agar).
- Obligate aerobes: *Escherichia coli* with typical and lactose-negative properties (on Endo agar).
- Opportunistic pathogens: *Staphylococci* (on Baird-Parker agar), yeast-like fungi of the genus *Candida* (on Sabouraud dextrose agar), *Proteus* spp. (on Ploskirev agar).

Statistical analysis of the data was performed using Student's t-test and non-parametric methods where appropriate. Differences were considered statistically significant at $p < 0.05$.

3. Results

The study revealed pronounced dynamic changes in the composition of the gut microbiota in irradiated animals compared to the control group.

Table 1. Dynamics of Obligate Microflora Indicators in the Large Intestine of Rats after Acute Irradiation (lg CFU/g, M±m)

Group / Time Point	Bifidobacteria	Lactobacilli
Control (n=30)	8.54 ± 0.12	7.92 ± 0.11
Day 3 (n=15)	5.21 ± 0.25*	4.88 ± 0.31*
Day 7 (n=15)	4.05 ± 0.30*	3.72 ± 0.28*
Day 14 (n=15)	6.10 ± 0.22*	5.45 ± 0.24*
Day 30 (n=15)	7.85 ± 0.18	7.20 ± 0.20*

*Note: * - significant difference compared to control (p<0.05).*

As shown in Table 1, acute irradiation led to a sharp suppression of obligate symbionts. A statistically significant decrease in the count of bifidobacteria and lactobacilli by almost 3 orders of magnitude (lg) was already observed on day 3. Maximum suppression was recorded on day 7, coinciding with the peak of radiation-induced enteritis. A gradual recovery began by day 14; however, even by day 30, the lactobacilli level remained significantly lower than the control, while the bifidobacteria count only approached the normal range.

Table 2. Dynamics of Opportunistic and Concomitant Microflora Indicators in Rats after Acute Irradiation (lg CFU/g, M±m)

Group / Time Point	<i>E. coli</i> (typical)	<i>E. coli</i> (lactose-neg.)	Staphylococci	<i>Candida</i> fungi
Control	6.80 ± 0.10	3.50 ± 0.15	2.90 ± 0.12	1.50 ± 0.10
Day 3	5.95 ± 0.20*	5.20 ± 0.22*	4.85 ± 0.25*	3.80 ± 0.30*
Day 7	5.10 ± 0.25*	6.15 ± 0.28*	5.60 ± 0.30*	5.20 ± 0.35*
Day 14	6.40 ± 0.18*	5.45 ± 0.20*	4.20 ± 0.22*	4.10 ± 0.25*
Day 30	6.70 ± 0.15	4.30 ± 0.18*	3.45 ± 0.15*	2.85 ± 0.20*

*Note: * - significant difference compared to control (p<0.05).*

The data in Table 2 demonstrate the opposite trend for opportunistic microorganisms. Their numbers increased progressively, peaking on day 7. The increase in lactose-negative *E. coli*, staphylococci, and *Candida* fungi is particularly indicative of profound dysbiosis and reduced colonization resistance of the intestine. By day 30, a positive trend was observed, but levels of most opportunistic pathogens remained above control values.

Table 3. Changes in the Ratio of Major Microbial Groups (Dysbiosis Indices)

Group / Time Point	Anaerobes/Aerobes Ratio	Lactose-Negativity Coefficient (LNC)
Control	1.85 ± 0.05	0.51 ± 0.03
Day 3	0.12 ± 0.01*	0.87 ± 0.05*
Day 7	0.05 ± 0.01*	1.21 ± 0.07*
Day 14	0.45 ± 0.03*	0.85 ± 0.04*
Day 30	1.10 ± 0.04*	0.64 ± 0.03*

*Note: * - significant difference compared to control ($p < 0.05$). The dysbiosis index was calculated as the sum of lg bifido- and lactobacilli divided by lg *E. coli*. $LNC = \lg \text{ lactose-neg. } E. coli / \lg \text{ typical } E. coli$.*

Table 3 summarizes dysbiotic shifts through integral indicators. The sharp drop in the anaerobes/aerobes ratio by 30-40 times on day 7 and the significant increase in the lactose-negativity coefficient confirm the severity of the microbial imbalance. Partial recovery by day 30 did not lead to complete normalization of these key indices, indicating the long-term nature of post-radiation dysbiosis.

4. Discussion

The results clearly illustrate the pathogenetic dynamics of radiation-induced intestinal dysbiosis. The initial phase (days 3-7) is characterized by a catastrophic decline in obligate anaerobes—bifidobacteria and lactobacilli, which are the most radiosensitive components of the microbiocenosis due to their strict anaerobic nature and complex metabolic requirements. This creates an "ecological vacuum" and leads to a sharp decline in the colonization resistance of the mucosal barrier. The vacated ecological niches are actively occupied by opportunistic microorganisms, as confirmed by their exponential growth. The peak of disturbances on day 7 correlates with the clinical picture of acute radiation syndrome, manifesting as severe enterocolitis, diarrhea, and a high risk of endogenous infection.

The recovery phase (days 14-30) is slow and incomplete. Partial recolonization by obligate microflora is likely associated with reparative processes in the intestinal epithelium and the adaptation of surviving strains. However, the persistently elevated levels of lactose-negative *E. coli*, staphylococci, and the incomplete recovery of lactobacilli indicate long-term alterations in the ecosystem. This aligns with literature suggesting that radiation exposure can cause persistent changes in microbiota composition, affecting host metabolism and immune status even after clinical recovery. The disturbance of key indices, such as the anaerobe/aerobe ratio, is a reliable marker of dysbiosis severity and can be used to assess the efficacy of probiotic or other corrective therapies.

5. Conclusion

In conclusion, this dynamic study convincingly demonstrates that acute radiation exposure at a dose of 6 Gy induces profound and persistent disturbances in the normal microflora of the large intestine in experimental animals. These changes are phasic: the acute period features total suppression of symbiotic flora with a compensatory overgrowth of opportunistic representatives, while the later period shows incomplete and delayed recovery of the original balance. The identified patterns underscore that intestinal dysbiosis is an integral component of radiation injury pathogenesis and may significantly contribute to the development of complications. These findings justify the necessity of including measures to correct intestinal microbiocenosis (e.g., application of probiotics, prebiotics, metabiotics) in the comprehensive treatment scheme for radiation injuries, with such correction ideally initiated as early as possible to mitigate the peak dysbiotic

disturbances. Further research should be directed towards studying the efficacy of various biocorrective agents in the context of acute radiation exposure.

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O‘SIMLIK XOMASHYOSI VA DORI VOSITALARINING ZAMONAVIY TEXNOLOGIYASI HAMDA TAHLIL USULLAR

***Annotatsiya:** Mazkur maqolada dorivor o‘simliklar asosida tayyorlanadigan dori vositalarining zamonaviy texnologiyasi, ularning kimyoviy tarkibi, farmakologik xususiyatlari hamda sifat nazoratida qo‘llaniladigan tahlil usullari yoritilgan. Shuningdek, piyoz, rayhon, rodiola, qovun kabi o‘simliklarning tibbiyotdagi ahamiyati ilmiy manbalar asosida tahlil qilindi. O‘simlik xomashyosi asosida yaratilgan dori shakllarining samaradorligi va xavfsizligini ta’minlashda farmatsevtik texnologiya hamda analitik nazoratning o‘rni asoslab berildi.*

***Kalit so‘zlar:** dorivor o‘simliklar, farmatsevtik texnologiya, dori shakllari, biologik faol moddalar, sifat nazorati.*

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MODERN TECHNOLOGIES AND ANALYTICAL METHODS FOR PLANT RAW MATERIALS AND MEDICINAL PRODUCTS

Abstract: *This article discusses modern technologies for the production of medicinal products based on medicinal plants, their chemical composition, pharmacological properties, and analytical methods used in quality control. In addition, the medical significance of plants such as onion, basil, rhodiola, and melon has been analyzed based on scientific sources. The role of pharmaceutical technology and analytical control in ensuring the efficacy and safety of dosage forms developed from plant raw materials is substantiated.*

Keywords: *medicinal plants, pharmaceutical technology, dosage forms, biologically active compounds, quality control.*

Kirish

So'nggi yillarda dorivor o'simliklarga asoslangan preparatlarga bo'lgan qiziqish tobora ortib bormoqda. Bu holat ularning tabiiyligi, organizmga nisbatan kam nojo'ya ta'sir ko'rsatishi hamda biologik faol moddalarga boyligi bilan izohlanadi. Dorivor o'simliklardan samarali dori vositalari yaratish jarayonida ularning kimyoviy tarkibini chuqur o'rganish, texnologik jarayonlarni to'g'ri tanlash va zamonaviy tahlil usullaridan foydalanish muhim ahamiyatga ega.

Asosiy qism

1. Dorivor o'simliklarning tibbiyotdagi ahamiyati

Ilmiy tadqiqotlar shuni ko'rsatadiki, piyoz (*Allium cepa*) antiseptik, yallig'lanishga qarshi va immunitetni mustahkamlovchi xususiyatlarga ega. *Rodiola rosea* esa organizmning ish qobiliyatini oshiruvchi adaptogen o'simlik sifatida keng qo'llaniladi. Rayhon (*Ocimum basilicum*) tarkibidagi efir moylari va flavonoidlar tufayli antibakterial va tinchlantiruvchi ta'sir ko'rsatadi. Qovun esa vitaminlar va mikroelementlarga boy bo'lib, umumiy mustahkamlovchi vosita sifatida tavsiya etiladi

2. Dori shakllarini tayyorlash texnologiyasi

Dori vositasining samaradorligi ko'p jihatdan uning dori shakliga bog'liq. Poroşoklar, ekstraktlar va efir moylari asosida tayyorlanadigan preparatlarda yordamchi moddalarni to'g'ri tanlash muhim hisoblanadi. Tuzg'uvchi, bo'yovchi va maydalovchi moddalar dori vositasining tashqi ko'rinishi, barqarorligi va bioo'zlashtirilishini yaxshilaydi. Zamonaviy farmatsevtik texnologiya dori moddalarning ajralib chiqish tezligi va ta'sir kuchini optimallashtirishga imkon beradi.

3. Dori vositalarining sifat nazorati va tahlil usullar.

Dori vositalari tarkibidagi yot aralashmalarni aniqlash va faol moddalarning miqdorini nazorat qilish farmatsevtik tahlilning asosiy vazifalaridan biridir. Fizik-kimyoviy, spektrofotometrik va xromatografik usullar yordamida preparatlarning sifat ko'rsatkichlari aniqlanadi. Zamonaviy tahlil usullari dori vositalarining xavfsizligi va samaradorligini kafolatlashda muhim rol o'ynaydi.

Dorilarni tahlil qilish usullari soxta dorilarni aniqlash, nazorat tahlil usullarini validatsiya qilish, shuningdek, aylanishga cheklangan prekursorlar tahlilini o'tkazish uchun qo'llaniladi. 4

Dorilarning zamonaviy tahlil usullari darsligida soxta dorilarni aniqlash, nazorat tahlil usullarini validatsiya qilish, shuningdek, aylanishga cheklangan prekursorlar tahlilini o'tkazish uchun qo'llaniladigan usullar to'g'risida ma'lumot berilgan. Darslik farmatsevtika instituti talabalari, dorixonalar va nazorat-tahlil laboratoriyalarining farmatsevt-tahlilchilari, shuningdek, dorilarni qidirish va tibbiyot amaliyotiga joriy qilish bilan shug'ullanuvchi aspirantlar hamda ilmiy xodimlarga mo'ljallangan.

Dorivor o'simlik xomashyosi butun, qirqilgan, yanchilgan, kukun, qirqib preslangan holda, sigaret va briket shakilda bo'ladi. Xomashyo qanday holda yoki qanday shakilda bo'lishidan qat'iy nazar, uni quritish, idishlarga joylash, yuklash, eltish, saqlash, qayta ishlash, qadoqlash kabi jarayonlarda tabiiy-ki, u qisman maydalanib ketadi. Masalan: quritish jarayonida xomashyoni tez quritish, qoraymasligi va mog'orlamasligi uchun, uni bir necha marta aylantirib turiladi. Ana shu vaqtda 153 xomashyo biz xohishimizdan qat'iy nazar ozgina bo'lsa-da maydalanadi, yoki masalan, xomashyo qurigandan so'ng uni qoplarga joylash kerak bo'lsa. Bu holda ham xomashyo, ayniqsa, o'tlar, qisman sinadi va maydalanadi. Dorivor o'simliklarni qirqib qadoqlash jarayonida esa, qirqish mashinalarining pichoqlarining oralig'i yaxshilab sozlanishidan qat'iy nazar xomashyo qisman kerakli o'lchovlardan kichikroq maydalanishi mumkin va hokazo. Ko'rinib turibdiki, xomashyoni yig'ishdan boshlab uni iste'molchiga yetqazguncha, oz-oz bo'lsada maydalanar ekan. Xomashyoni mayda qismi qancha ko'p bo'lsa, uning havo (kislorod, namlik va boshqalar) bilan tutashgan yuzasi shuncha ko'p bo'ladi va natijada oksidlanish qaytarilish, parchalanish kabi jarayonlar tezlashib, ta'sir qiluvchi moddalarning miqdori kamayadi va dorivor o'simliklarning sifati qoniqarsiz bo'lib qoladi. Shuning uchun ham xomashyoning qanday holda yoki shakldan bo'lishidan qat'iy nazar, uning mayda qismi aniqlanadi. Xomashyoning mayda qismining me'yoriy texnik hujjatlarda ko'rsatilgandan ko'p bo'lishi mumkin ruxsat etilmaydi. Aks holda, xomashyoni ishlatishga ruxsat berilmaydi. Dorivor o'simlikning mayda qismini aniqlashda shu maqsad uchun olingan namunani me'yoriy-texnik hujjatda ko'rsatilgan elakka solib, asta-sekin aylanma harakat qilib elanadi. Elash jarayonini bilish uchun asosiy mayda qismlar elakdan o'tqazilib bo'lingandan so'ng, elakda qolgan xomashyo yana bir minut davomida elanadi. Agarda ikkinchi elash natijasida olingan mayda qismlar miqdori elakda qolgan xomashyoning 1% idan kam bo'lsa, elash jarayoni tugagan deb hisoblash mumkin. So'ngra xomashyoning elakdan o'tgan hamma bo'lakchalari tortiladi va ularning foiz miqdori analitik namunaga nisbatan hisoblab chiqariladi. Qirqilgan, yanchilgan va kukun holdagi xomashyoni elash uchun 2 ta elak olinadi. Xomashyoning namunasini yuqoridagi elakga solib elanadi. So'ngra yuqoridagi elakda qolgan va pastki elakdan o'tgan xomashyo qismlari alohida tortiladi va ularning foiz miqdori analitik namunaga nisbatan hisoblab topiladi. Analitik

namuna 100 grammdan ko'p bo'lsa, tortishdagi xatolik 0,1 g, 100 g va undan kam bo'lsa, xatolik 0,05 g gacha bo'lishi ruxsat etiladi.

Xulosa

O'tkazilgan tahlillar shuni ko'rsatadiki, dorivor o'simliklar asosida yaratilgan dori vositalari yuqori farmakologik faollikka ega bo'lib, ularni ishlab chiqishda zamonaviy texnologik va analitik yondashuvlardan foydalanish zarur. Dori shakllarini to'g'ri tanlash va sifat nazoratini kuchaytirish orqali o'simlik preparatlarining samaradorligi va xavfsizligini oshirish mumkin.

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MA'LUMOTLAR BAZASIDA O'SIB BORAYOTGAN MA'LUMOTLAR VA ULARNI BOSHQARISH

***Annotatsiya.** Ushbu maqolada ma'lumotlar bazalarida yuzaga keladigan dolzarb muammolar, xususan katta hajmdagi ma'lumotlarni samarali boshqarish va sifatini ta'minlash masalalari o'rganilgan. Tadqiqotda SQL va NoSQL bazalari, shuningdek ularni optimallashtirish usullari tahlil qilingan. Natijalar ma'lumotlar xavfsizligi, qidiruv tezligi va takroriy yozuvlar muammolarini aniqlashda yordam bergan. Maqolada ma'lumotlar bazasini optimallashtirish, shifrlash va bulut xizmatlaridan foydalanish samarali yechim sifatida ko'rsatildi. Xulosa qilib aytganda, zamonaviy ma'lumotlar bazalarida yuzaga keladigan muammolarni aniqlash va ularni hal etish bo'yicha amaliy tavsiyalar beriladi.*

***Kalit so'zlar:** Ma'lumotlar bazasi, SQL, NoSQL, Optimallashtirish, Ma'lumotlar xavfsizligi, Takrorioy yozuvlar, Bulut xizmatlari, Big Data, Qidiruv samaradorligi, Tadqiqot natijalari.*

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MANAGEMENT OF GROWING DATA IN DATABASES

***Abstract.** This article examines current issues arising in databases, particularly the challenges of efficient management of large volumes of data and ensuring data quality. The study analyzes SQL and NoSQL databases as well as methods for their optimization. The results helped identify problems related to data*

security, search performance, and duplicate records. The article highlights database optimization, encryption, and the use of cloud services as effective solutions. In conclusion, practical recommendations are provided for identifying and addressing problems in modern database systems.

Keywords: Database, SQL, NoSQL, Optimization, Data Security, Duplicate Records, Cloud Services, Big Data, Search Efficiency, Research Results.

Kirish

XXI asr raqamli texnologiyalar asri sifatida e'tirof etilib, axborot hajmining eksponentsial tarzda o'sishi bilan tavsiflanadi. Xalqaro tahlillarga ko'ra, global miqyosda yaratilayotgan ma'lumotlar hajmi har ikki yilda deyarli ikki baravar oshmoqda. Ta'lim tizimi, bank-moliya sohasi, sog'liqni saqlash, elektron tijorat va davlat boshqaruvi kabi yo'nalishlarda millionlab tranzaksiyalar, foydalanuvchi yozuvlari va raqamli hujjatlar doimiy ravishda ma'lumotlar bazalarida saqlanmoqda.

Ma'lumotlar hajmining bunday tez o'sishi ularni an'anaviy usullar bilan boshqarish samaradorligini pasaytiradi. Noto'g'ri loyihalangan ma'lumotlar bazalari ortiqcha yozuvlarning ko'payishiga, qidiruv vaqti uzayishiga, server resurslarining haddan tashqari yuklanishiga olib keladi. Shu sababli, ma'lumotlar bazasini optimallashtirish, zamonaviy boshqaruv mexanizmlarini joriy etish va mos texnologiyalarni tanlash dolzarb ilmiy-amaliy vazifa hisoblanadi.

Mazkur tadqiqotning asosiy maqsadi — o'sib borayotgan ma'lumotlar bilan ishlashda SQL va NoSQL ma'lumotlar bazalarining imkoniyatlarini tahlil qilish, ularning samaradorligini ilmiy dalillar asosida solishtirish va optimal boshqaruv yondashuvlarini taklif etishdan iborat.

Adabiyotlar tahlili

Ma'lumotlar bazalarini samarali boshqarish masalalari E. F. Kodd tomonidan ishlab chiqilgan relatsion modeldan boshlab keng o'rganib kelinmoqda. Kodd tadqiqotlarida normalizatsiya orqali redundansiyaning kamaytirish va mantiqiy yaxlitlikni ta'minlash ma'lumotlar bazasi samaradorligini oshirishi ilmiy asoslangan.

So'nggi tadqiqotlarda (Connolly, Begg; Stonebraker va boshqalar) katta hajmdagi va tez o'zgaruvchan ma'lumotlar bilan ishlashda NoSQL texnologiyalarining afzalliklari qayd etilgan. Ushbu ishlar shuni ko'rsatadiki, an'anaviy SQL bazalari tranzaksiya aniqlikni ta'minlash, NoSQL tizimlari yuqori yuklama va massiv ma'lumotlar bilan ishlashda samaraliroq hisoblanadi.

Bulut texnologiyalariga oid tadqiqotlarda esa (Amazon AWS, Google Cloud, Microsoft Azure tajribalari) ma'lumotlarni taqsimlangan holda saqlash tizim barqarorligini oshirishi va infratuzilma xarajatlarini kamaytirishi ta'kidlanadi.

Qo'llanilgan metodlar

Tadqiqotda quyidagi ilmiy metodlardan foydalanildi:

- nazariy va solishtirma tahlil;
- eksperimental sinov;
- ma'lumotlar bazasini modelashtirish;

- statistik tahlil.

Eksperimental qismda 1 milliondan ortiq yozuvdan iborat test ma'lumotlar bazasi yaratildi. Ushbu ma'lumotlar SQL (MySQL) va NoSQL (MongoDB) muhitida saqlanib, indekslashdan oldin va keyin bajarilgan SELECT so'rovlarining vaqti o'Ichandi. Shuningdek, bulut muhitida (virtual server) va lokal serverda ishlash samaradorligi solishtirildi.

Natijalar

O'tkazilgan tajribalar quyidagi natijalarni ko'rsatdi:

- Optimallashtirilmagan SQL bazasida qidiruv vaqti o'rtacha **5,2 soniyani** tashkil etdi.
- Indeksar joriy etilgandan so'ng qidiruv vaqti **3,1 soniyagacha** qisqardi ($\approx 40\%$ yaxshilanish).
- NoSQL bazasida katta hajmdagi ma'lumotlar bilan ishlashda qidiruv vaqti **1,7–1,9 soniya** oralig'ida bo'ldi.
- Bulut texnologiyalaridan foydalanish tizim barqarorligini **30–35 %** ga oshirdi va avtomatik zaxiralash imkonini berdi.

Shuningdek, server yuklamasi optimallashtirilgan holatda 25–30 % ga kamaygani aniqlandi.

Muhokama

Olingan natijalar shuni ko'rsatadiki, o'sib borayotgan ma'lumotlarni samarali boshqarish faqat texnologiyani tanlash bilangina cheklanmaydi. Ma'lumotlar bazasining mantiqiy tuzilmasi, indekslash strategiyasi va saqlash muhiti muhim ahamiyatga ega.

SQL bazalari moliyaviy va tranzaksion aniqlik talab qilinadigan tizimlar uchun mos bo'lsa, NoSQL bazalari real vaqt rejimidagi katta hajmdagi ma'lumotlar bilan ishlashda ustunlik qiladi. Bulut texnologiyalarining joriy etilishi esa moslashuvchanlik va kengayuvchanlikni ta'minlaydi.

Xulosa

Tadqiqot natijalari shuni isbotladiki, ma'lumotlar bazasida o'sib borayotgan axborotni samarali boshqarish uchun optimallashtirish, indekslash va zamonaviy texnologiyalarni uyg'un qo'llash zarur. SQL va NoSQL texnologiyalarini vazifaga mos tanlash qidiruv tezligi va tizim barqarorligini sezilarli darajada oshiradi. Olingan xulosalar katta hajmdagi ma'lumotlar bilan ishlovchi axborot tizimlarini loyihalashda muhim ilmiy-amaliy ahamiyatga ega. Kelgusida sun'iy intellekt asosida avtomatik optimallashtirish va real vaqt ma'lumotlar tahlilini chuqurlashtirish istiqbolli yo'nalish sifatida baholanadi.

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VIRTUAL TA'LIM TEXNOLOGIYALARINING BOSHLANG'ICH TA'LIMDAGI O'RNI VA AHAMIYATI

Annotatsiya: Mazkur maqolada virtual ta'lim texnologiyalarining boshlang'ich ta'lim tizimidagi o'rni va pedagogik ahamiyati ilmiy-nazariy hamda amaliy jihatdan tahlil qilinadi. Zamonaviy axborot-kommunikatsiya texnologiyalarining jadal rivojlanishi ta'lim jarayoniga yangi yondashuvlar va innovatsion vositalarning kirib kelishiga zamin yaratmoqda. Xususan, virtual ta'lim texnologiyalari boshlang'ich sinf o'quvchilarining bilish faoliyatini faollashtirish, o'quv motivatsiyasini oshirish, mustaqil va tanqidiy fikrlash ko'nikmalarini shakllantirishda muhim didaktik resurs sifatida namoyon bo'lmoqda. Tadqiqotda virtual ta'lim tushunchasining mazmuni, uning pedagogik xususiyatlari hamda boshlang'ich ta'lim jarayoniga integratsiyalashuv mexanizmlari yoritiladi. Shuningdek, virtual platformalar, raqamli ta'lim resurslari, interaktiv dasturlar va multimediali vositalarning o'quv jarayonidagi imkoniyatlari tahlil qilinadi. Maqolada virtual ta'lim texnologiyalaridan foydalanish orqali ta'lim sifatini oshirish, o'quvchilarning individual xususiyatlarini hisobga olish, differensial va shaxsga yo'naltirilgan ta'limni tashkil etish masalalariga alohida e'tibor qaratiladi. Tadqiqot natijalari boshlang'ich ta'limda virtual ta'lim texnologiyalaridan samarali foydalanish pedagogik jarayonning samaradorligini oshirishini, o'quvchilarning bilimlarni ongli va barqaror egallashiga xizmat qilishini asoslab beradi.

Kalit so'zlar: virtual ta'lim, raqamli texnologiyalar, boshlang'ich ta'lim, axborot-kommunikatsiya vositalari, interaktiv ta'lim, masofaviy o'qitish, pedagogik innovatsiyalar, o'quv motivatsiyasi.

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THE ROLE AND SIGNIFICANCE OF VIRTUAL EDUCATIONAL TECHNOLOGIES IN PRIMARY EDUCATION

Annotation: *This article analyzes the role and pedagogical significance of virtual educational technologies in the primary education system from a scientific, theoretical and practical perspective. The rapid development of modern information and communication technologies creates the basis for the introduction of new approaches and innovative tools into the educational process. In particular, virtual educational technologies are emerging as an important didactic resource in activating the cognitive activity of primary school students, increasing their motivation for learning, and forming independent and critical thinking skills. The study highlights the content of the concept of virtual education, its pedagogical characteristics, and mechanisms for integration into the primary education process. The possibilities of virtual platforms, digital educational resources, interactive programs and multimedia tools in the educational process are also analyzed. The article pays special attention to the issues of improving the quality of education through the use of virtual educational technologies, taking into account the individual characteristics of students, and organizing differentiated and person-oriented education. The results of the study substantiate that the effective use of virtual educational technologies in primary education increases the efficiency of the pedagogical process and contributes to the conscious and sustainable acquisition of knowledge by students.*

Keywords: *virtual education, digital technologies, primary education, information and communication tools, interactive education, distance learning, pedagogical innovations, learning motivation.*

Kirish

Zamonaviy jamiyat taraqqiyoti sharoitida ta'lim tizimi oldida turgan asosiy vazifalardan biri o'quv jarayonini innovatsion yondashuvlar asosida tashkil etish, ta'lim mazmuni va metodlarini zamon talablariga mos ravishda yangilashdan iborat. Axborot-kommunikatsiya texnologiyalarining keng joriy etilishi ta'lim sohasida tub o'zgarishlarni yuzaga keltirib, an'anaviy o'qitish usullarining takomillashuviga hamda yangi ta'lim modellari shakllanishiga olib kelmoqda. Shu jarayonda virtual ta'lim texnologiyalari alohida ahamiyat kasb etib, ayniqsa boshlang'ich ta'lim tizimida ularning o'rni va roli tobora ortib bormoqda. Boshlang'ich ta'lim o'quvchining keyingi ta'lim bosqichlari uchun poydevor bo'lib xizmat qilishi sababli, bu bosqichda qo'llaniladigan pedagogik texnologiyalar puxta o'ylangan, ilmiy asoslangan va o'quvchilarning yosh hamda psixologik xususiyatlariga mos bo'lishi zarur.

Virtual ta'lim texnologiyalari boshlang'ich ta'limda o'quv jarayonini tashkil etishda yangi imkoniyatlarni ochib beradi. Ular yordamida ta'lim mazmunini vizuallashtirish, murakkab tushunchalarni sodda va tushunarli shaklda yetkazish, o'quvchilarning idrok jarayonlarini faollashtirish imkoniyati yaratiladi. Boshlang'ich sinf o'quvchilari ko'proq obrazli tafakkurga ega bo'lganligi sababli, virtual muhitda taqdim etiladigan animatsiyalar, interaktiv mashqlar, multimediali darslar ularning qiziqishini oshiradi va bilimlarni mustahkamroq egallashiga xizmat qiladi. Shu bilan birga, virtual ta'lim texnologiyalari o'qituvchi faoliyatini ham sifat

jiyatidan yangi bosqichga olib chiqib, darslarni loyihalash, tashkil etish va baholash jarayonlarida samaradorlikni oshiradi.

Boshlang'ich ta'limda virtual ta'lim texnologiyalaridan foydalanish masalasi faqat texnik vositalarni joriy etish bilangina cheklanmaydi, balki u pedagogik yondashuvlar, metodik ta'minot va o'qituvchining kasbiy kompetensiyasi bilan chambarchas bog'liqdir. Virtual ta'lim samaradorligi ko'p jihatdan o'qituvchining raqamli savodxonligi, didaktik maqsadlarni aniq belgilay olishi hamda virtual vositalarni o'quv jarayoniga maqsadga muvofiq integratsiyalash qobiliyatiga bog'liq bo'ladi. Shu sababli, boshlang'ich ta'lim o'qituvchilarini virtual ta'lim texnologiyalaridan foydalanishga tayyorlash, ularning metodik bilim va ko'nikmalarini rivojlantirish dolzarb masalalardan biri hisoblanadi.

Virtual ta'lim texnologiyalari shaxsga yo'naltirilgan va differensial ta'limni amalga oshirishda ham muhim omil bo'lib xizmat qiladi. Har bir o'quvchining individual qobiliyati, o'zlashtirish darajasi va o'rganish sur'atini hisobga olgan holda topshiriqlarni taqdim etish imkoniyati ta'lim jarayonining moslashuvchanligini ta'minlaydi. Bu esa boshlang'ich sinf o'quvchilarida mustaqil ishlash, o'z-o'zini nazorat qilish va mas'uliyat hissini shakllantirishga ijobiy ta'sir ko'rsatadi. Shu bilan birga, virtual ta'lim muhitida o'quvchilar o'zaro hamkorlikda ishlash, axborot almashish va muloqot qilish ko'nikmalarini ham rivojlantiradilar.

Shu nuqtai nazardan, virtual ta'lim texnologiyalarining boshlang'ich ta'limdagi o'rni va ahamiyatini ilmiy jihatdan tahlil qilish, ularning pedagogik imkoniyatlari va amaliy samaradorligini aniqlash muhim ilmiy-amaliy ahamiyatga ega. Mazkur maqolada aynan shu masalalar yoritilib, boshlang'ich ta'lim jarayonida virtual ta'lim texnologiyalaridan foydalanishning nazariy asoslari va pedagogik jihatlari tahlil qilinadi.

Asosiy qism

Virtual ta'lim texnologiyalari boshlang'ich ta'lim jarayonida o'quv faoliyatini tashkil etishning zamonaviy va samarali shakllaridan biri sifatida namoyon bo'lmoqda. Ushbu texnologiyalar ta'lim mazmunini raqamli muhitda taqdim etish, o'quvchilar bilan interaktiv muloqotni yo'lga qo'yish hamda o'qitish jarayonini individuallashtirish imkonini beradi. Boshlang'ich sinf o'quvchilari uchun virtual ta'lim muhitining jozibadorligi ularning yosh xususiyatlariga mos ravishda yaratilgan vizual va interaktiv elementlar bilan belgilanadi. Animatsiyalar, elektron darsliklar, virtual laboratoriyalar va o'yin texnologiyalariga asoslangan topshiriqlar o'quvchilarning bilishga bo'lgan qiziqishini oshiradi va ta'lim jarayonini samaraliroq qiladi.

Virtual ta'lim texnologiyalarining asosiy pedagogik afzalliklaridan biri bu o'quv materialini ko'rgazmali va tizimli tarzda yetkazish imkoniyatidir. Boshlang'ich ta'limda o'quvchilar abstrakt tushunchalarni qabul qilishda muayyan qiyinchiliklarga duch keladilar. Virtual muhit esa murakkab mavzularni modellashtirish, tasvirlash va bosqichma-bosqich tushuntirish imkonini beradi. Masalan, tabiatshunoslik, matematika yoki ona tili fanlarida virtual vositalar orqali berilgan mashqlar o'quvchilarning mavzuni chuqurroq anglashiga xizmat qiladi.

Natijada bilimlar nafaqat eslab qolish darajasida, balki ongli ravishda o'zlashtiriladi.

Boshlang'ich ta'limda virtual ta'lim texnologiyalaridan foydalanish o'quvchilarning mustaqil ta'lim olish ko'nikmalarini shakllantirishda ham muhim ahamiyatga ega. Virtual platformalar orqali o'quvchilar mustaqil ravishda topshiriqlar bajarish, o'z bilim darajasini tekshirish va xatolar ustida ishlash imkoniga ega bo'ladilar. Bu jarayon o'quvchilarda o'z-o'zini nazorat qilish, mas'uliyat va intizomni rivojlantiradi. Shu bilan birga, virtual ta'lim muhitida o'quvchilar o'z faoliyatini rejalashtirish va vaqtni samarali taqsimlash ko'nikmalarini ham egallaydilar, bu esa keyingi ta'lim bosqichlari uchun muhim tayanch vazifasini bajaradi.

Virtual ta'lim texnologiyalari o'qituvchi va o'quvchi o'rtasidagi pedagogik hamkorlikni yangi bosqichga olib chiqadi. An'anaviy dars jarayonida o'qituvchi yetakchi rolni egallagan bo'lsa, virtual ta'lim sharoitida u ko'proq yo'naltiruvchi va maslahatchi sifatida faoliyat yuritadi. O'qituvchi virtual resurslarni tanlash, dars mazmunini loyihalash va o'quvchilarning faoliyatini muvofiqlashtirish orqali ta'lim jarayonining samaradorligini ta'minlaydi. Bu esa pedagogdan yuqori darajadagi metodik tayyorgarlik va raqamli kompetensiyani talab qiladi.

Boshlang'ich ta'limda virtual ta'lim texnologiyalaridan foydalanish differensial va shaxsga yo'naltirilgan ta'limni amalga oshirish imkonini beradi. Har bir o'quvchining bilim darajasi, qobiliyati va o'rganish sur'atiga mos topshiriqlarni taqdim etish orqali ta'lim jarayonining moslashuvchanligi ta'minlanadi. Bu yondashuv o'quvchilarning o'z imkoniyatlarini to'liq namoyon etishiga, o'qishga bo'lgan ijobiy munosabatini shakllantirishga yordam beradi. Ayniqsa, turli darajadagi o'zlashtirishga ega bo'lgan o'quvchilar bilan ishlashda virtual ta'lim texnologiyalarining imkoniyatlari yaqqol namoyon bo'ladi.

Shuningdek, virtual ta'lim texnologiyalari boshlang'ich sinf o'quvchilarida kommunikativ ko'nikmalarni rivojlantirishga ham xizmat qiladi. Virtual muhitda tashkil etilgan guruhli topshiriqlar, muhokamalar va hamkorlikka asoslangan mashg'ulotlar o'quvchilarning o'z fikrini ifodalash, boshqalarni tinglash va jamoada ishlash ko'nikmalarini shakllantiradi. Bu esa nafaqat ta'lim jarayoni, balki o'quvchilarning ijtimoiylashuvi uchun ham muhim ahamiyatga ega.

Umuman olganda, virtual ta'lim texnologiyalarining boshlang'ich ta'lim jarayoniga joriy etilishi ta'lim sifati va samaradorligini oshirishga xizmat qiladi. Ular o'quvchilarning bilish faolligini kuchaytirish, mustaqil ta'lim olish ko'nikmalarini rivojlantirish va shaxsiy imkoniyatlarini ro'yobga chiqarishda muhim pedagogik omil sifatida namoyon bo'ladi.

Xulosa

Virtual ta'lim texnologiyalarining boshlang'ich ta'lim tizimidagi o'rni va ahamiyatini tahlil qilish shuni ko'rsatadiki, mazkur texnologiyalar zamonaviy pedagogik jarayonning ajralmas tarkibiy qismiga aylanib bormoqda. Boshlang'ich ta'limda virtual vositalardan foydalanish o'quv jarayonini yanada mazmunli, qiziqarli va samarali tashkil etish imkonini yaratadi. Ayniqsa, o'quvchilarning yosh va psixologik xususiyatlarini hisobga olgan holda ta'lim mazmunini vizual va

interaktiv shaklda taqdim etish ularning bilimlarni ongli va barqaror o'zlashtirishiga xizmat qiladi.

Virtual ta'lim texnologiyalari boshlang'ich sinf o'quvchilarining bilish faoliyatini faollashtirishda muhim omil bo'lib, ularning o'qishga bo'lgan motivatsiyasini oshiradi. Interaktiv mashqlar, multimediali materiallar va raqamli ta'lim resurslari orqali o'quvchilar ta'lim jarayonining faol ishtirokchisiga aylanadi. Bu esa an'anaviy o'qitish shakllarida ko'p hollarda kuzatiladigan passivlikni bartaraf etib, o'quvchilarda mustaqil fikrlash, tahlil qilish va muammoli vaziyatlarda yechim topish ko'nikmalarini rivojlantiradi.

Boshlang'ich ta'limda virtual ta'lim texnologiyalaridan foydalanish shaxsga yo'naltirilgan va differensial ta'limni amalga oshirish uchun keng imkoniyatlar yaratadi. Har bir o'quvchining individual ehtiyojlari, qobiliyatlari va o'zlashtirish sur'atini hisobga olgan holda ta'lim jarayonini tashkil etish ta'lim sifatini oshirishga ijobiy ta'sir ko'rsatadi. Bu jarayon o'quvchilarning o'z imkoniyatlariga ishonchini mustahkamlab, ularning ta'limga nisbatan ijobiy munosabatini shakllantiradi.

Virtual ta'lim texnologiyalari o'qituvchining kasbiy faoliyatida ham muhim o'zgarishlarni yuzaga keltiradi. O'qituvchi nafaqat bilim beruvchi, balki ta'lim jarayonini tashkil etuvchi, boshqaruvchi va yo'naltiruvchi sifatida faoliyat yuritadi. Bu esa pedagogdan yuqori darajadagi metodik tayyorgarlik, raqamli kompetensiya va innovatsion yondashuvni talab qiladi. Shunday ekan, boshlang'ich ta'lim o'qituvchilarini virtual ta'lim texnologiyalaridan samarali foydalanishga tayyorlash pedagogik oliy ta'lim muassasalari oldida turgan muhim vazifalardan biri hisoblanadi.

Xulosa qilib aytganda, virtual ta'lim texnologiyalarini boshlang'ich ta'lim jarayoniga izchil va maqsadga muvofiq joriy etish ta'lim sifatini oshirish, o'quvchilarning intellektual va ijodiy salohiyatini rivojlantirish hamda zamonaviy ta'lim talablariga mos raqobatbardosh shaxsni shakllantirishga xizmat qiladi. Shu bois, virtual ta'lim texnologiyalarining pedagogik imkoniyatlarini yanada chuqurroq o'rganish va amaliyotga keng tatbiq etish dolzarb ilmiy-amaliy ahamiyatga ega.

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IDIOSTYLE AND IDIALECT AS MARKERS OF INDIVIDUAL LINGUISTIC IDENTITY IN LITERARY DISCOURSE

Annotation: *This article explores the interrelated concepts of idiosyle and idialect as fundamental components of an author's individual literary expression. Idiosyle is examined as a distinctive synthesis of stylistic, thematic, and structural features that shape a writer's unique creative identity, while idialect is defined as the personalized linguistic realization of thought influenced by personal experience, culture, and education. Using a comparative and descriptive methodological framework, the study analyzes key elements of idiosyle—tone, vocabulary, literary devices, and narrative structure—alongside the formative factors of idialect. Literary examples from Virginia Woolf and Abdulla Qadiri illustrate how these concepts manifest across different linguistic and cultural traditions. The findings demonstrate that idiosyle and idialect function as dynamic, interconnected phenomena that deepen narrative meaning and reinforce the authenticity of literary texts. The study highlights the importance of individual perspective in shaping literary discourse and contributing to the diversity of world literature.*

Key words: *idiosyle, idialect, individual style, literary analysis, cultural identity*

Introduction. Idiosyle can be defined as a distinctive and personalized approach to writing that encapsulates an author's unique voice, synthesizing diverse influences from literary traditions, cultural contexts, and individual experiences into a coherent narrative form. This concept transcends the boundaries of established writing styles, positing that each writer possesses an idiosyncratic signature that reflects their particular worldview, emotional nuances, and intellectual preoccupations. Consequently, idiosyle emerges as a dynamic amalgamation of stylistic choices, thematic explorations, and structural innovations that collectively contribute to the creation of a recognizable literary identity. Furthermore, the notion of idiosyle underscores the interplay between the writer's personal journey and their creative output, suggesting that the act of writing is not merely a technical endeavor but a profound reflection of one's inner landscape.

In conjunction with idiosyle is the concept of idialect, which refers to the distinctive manner in which an individual articulates their thoughts and beliefs through language. Idialect encompasses not only the choice of vocabulary and syntax but also the subtleties of tone, rhythm, and metaphorical expression that characterize an author's unique communicative style. This term encapsulates the idea that every writer's language is imbued with personal significance, reflecting

their lived experiences, cultural background, and philosophical inclinations, thus rendering each text a unique manifestation of the writer's identity. The significance of idiolect extends beyond mere stylistic variation; it functions as a vehicle for conveying complex ideas and emotions that resonate with both the writer and the reader.

Methods. This article employs a comprehensive comparative analysis of idiolect and idiosyncrasy, meticulously examining their defining characteristics and the multifaceted influences they exert on writing. The key elements of idiolect, such as tone, vocabulary choice, literary devices, and narrative structure, are discussed alongside the impact of personal experiences, cultural backgrounds, and educational influences on idiosyncrasy. By analyzing literary examples from prominent authors, specifically Virginia Woolf and Abdulla Qadiri, this study illustrates how these concepts manifest in practice, showcasing the profound ways in which individual expression shapes narrative and thematic depth within their works.

Results. The analysis reveals that idiolect is characterized by several key elements that collectively contribute to an author's distinctive literary signature. Foremost among these is the **tone and voice**, which convey the writer's personality and emotional engagement with the subject matter. A writer's tone may fluctuate between formal and informal, ironic and sincere, allowing for a nuanced exploration of themes and characters that resonate deeply with readers. This tonal variation reflects the author's subjective experience and creates an atmosphere that invites readers to immerse themselves fully in the narrative, establishing a profound connection between the text and its audience.

Another significant element of idiolect is the **choice of vocabulary**, which serves as a crucial determinant of the overall impact and accessibility of the text. The deliberate selection of specific words and phrases can imbue a narrative with layers of meaning, evoking vivid imagery and stimulating emotional responses. Writers may employ a lexicon that mirrors their cultural and intellectual backgrounds, thus reinforcing their unique voice while simultaneously enriching the reader's experience. Furthermore, the interplay of colloquial language with elevated diction can create a distinctive rhythm that enhances textual engagement and allows the writer to convey complex ideas in an accessible manner.

The **use of literary devices** plays a pivotal role in shaping idiolect, as these tools enable writers to convey their messages with greater depth and creativity. Techniques such as metaphor, simile, and symbolism not only embellish the narrative but also serve as vehicles for deeper thematic exploration, enabling authors to connect seemingly disparate ideas and emotions. The strategic incorporation of such devices can evoke a visceral response in readers, fostering a more profound engagement with the text and prompting introspection regarding the underlying themes presented.

Finally, the **structure and pacing** of a narrative are integral components of idiolect, as they dictate the flow and organization of ideas within the text. The manipulation of narrative structure—whether through linear progression, non-linear timelines, or the use of flashbacks—can significantly alter the reader's perception

and interpretation of the story. Similarly, pacing, determined by the balance between action and reflection, can heighten tension, create suspense, or evoke a sense of contemplation. By thoughtfully orchestrating these elements, writers can craft a distinctive idiolect that captivates readers and encourages them to engage more deeply with the text's thematic intricacies.

The influence of idiolect on writing is profoundly shaped by an author's personal experiences and background, which serve as the foundation for their unique expressive voice. Individual life events, socio-economic circumstances, and emotional landscapes not only inform the themes that an author chooses to explore but also dictate the tone and perspective through which these themes are articulated. For instance, a writer who has navigated significant adversity may infuse their work with a sense of resilience and authenticity, employing language that evokes the complexities of their experiences. Consequently, the idiolect becomes a powerful vehicle through which authors can communicate their innermost thoughts and feelings, allowing readers to gain insight into the lived realities that shape narrative perspectives.

Cultural influences also play a critical role in the formation of an author's idiolect, as the cultural milieu in which one is immersed significantly impacts linguistic choices, thematic concerns, and narrative structures. Authors drawing from rich cultural heritages may integrate idiomatic expressions, traditional storytelling techniques, and cultural references that resonate with their backgrounds, thus enriching the text with layers of meaning that reflect collective experiences. This cultural dimension enhances the authenticity of the narrative and invites readers from diverse backgrounds to engage with the text on a deeper level, fostering cross-cultural dialogues and promoting understanding of differing worldviews.

Moreover, an author's educational background profoundly shapes their idiolect, as exposure to various literary traditions, rhetorical strategies, and critical theories influences their writing style and approach to language. The breadth of an author's academic experiences, whether through formal education or self-directed study, equips them with a diverse vocabulary and an understanding of complex narrative techniques, enabling them to experiment with form and style. Consequently, this educational framework allows writers to articulate their ideas with precision and sophistication, as they draw upon a rich reservoir of knowledge that informs their creative process and enhances the overall quality of their work.

In summary, the interplay between personal experiences, cultural influences, and educational background constitutes a dynamic framework within which an author's idiolect operates, ultimately shaping the distinctive voice that emerges in their writing. By recognizing the multifaceted nature of idiolect, readers can appreciate the depth and richness of an author's work, as it reflects the intricate tapestry of influences that inform their creative expression. This understanding not only enriches the reading experience but also underscores the importance of individual perspectives in the broader landscape of literature.

Discussion. The comparative analysis of idnostyle with established writing styles, such as modernism, postmodernism, and regional styles, particularly highlights its emphasis on individual expression and the integration of diverse influences. Modernism, characterized by its exploration of fragmentation and alienation in the wake of World War I, often utilizes experimental forms and disjointed narratives to reflect the complexities of contemporary existence. In contrast, idiostyle prioritizes the author's unique voice and personal experiences, focusing on the individual's journey rather than the broader societal dislocation that modernist works typically address. Postmodernism, with its penchant for metafiction, pastiche, and irony, challenges conventional notions of truth and narrative authority; however, idnostyle remains rooted in authenticity, inviting a more direct and emotionally resonant connection between the writer and the reader. Additionally, while regional styles emphasize cultural specificity and communal narratives, idnostyle transcends geographical boundaries by foregrounding the writer's individual perspective, thereby cultivating a rich tapestry of influences that enhance the emotional and thematic depth of the narrative.

Examples from literature serve to further elucidate these concepts. In the realm of English literature, the idnostyle of Virginia Woolf stands as a compelling illustration of how personal experiences and unique linguistic choices shape a writer's impact. Woolf's novels, such as "To the Lighthouse," exemplify her stream-of-consciousness technique, which immerses readers in the inner thoughts and perceptions of her characters. This approach reflects her idialect, as it draws upon her own reflections on time, memory, and identity, thereby creating a profound emotional resonance that invites readers to engage deeply with the complexities of human experience. The fluidity of her language and the intricacies of her narrative structure enhance the thematic richness of her work, establishing her as a pivotal figure in modernist literature.

Similarly, in Uzbek literature, the works of Abdulla Qadiri offer a distinct example of idnostyle that reflects the intersection of personal and cultural identity. His novel "O'tkan Kunlar" (The Days Gone By) portrays the social and political landscape of early 20th-century Uzbekistan through the lens of individual characters whose experiences are shaped by cultural heritage and historical context. Qadiri's choice of colloquial language, vivid imagery, and deeply resonant themes encapsulates his idialect, which bridges the gap between traditional Uzbek storytelling and modern narrative techniques. By weaving personal narratives with broader societal issues, Qadiri's idiostyle not only captures the complexities of his characters' lives but also serves as a critical reflection of the cultural transformations occurring in his homeland, thereby solidifying his significance in Uzbek literary history.

Conclusion. Idiostyle and idialect collectively highlight the intricate relationship between a writer's personal journey and their creative output. By examining the interplay of individual experiences, cultural influences, and educational backgrounds, readers gain insight into the unique voices that shape literary narratives. This understanding enriches the reading experience and

emphasizes the importance of personal expression in literature. Ultimately, acknowledging the dynamic interplay of idiosyncrasy and idiosyncrasy allows us to appreciate the depth and complexity of literary works, fostering a more profound engagement with texts and their authors.

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INDICATORS OF HEREDITARY DISEASES IN THE BUKHARA REGION

Abstract: Carried out an epidemiological study on the prevalence of congenital anomalies of malformations, (CAM) in Bukhara region for the period from 2021 to 2024. It was shown that these CAMs as congenital heart defect and Down's syndrome were the most common pathology among other CAMs.

Key words: Down syndrome, anomaly, congenital anomalies, polydactyly, syndactyly.

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ИРСИЙ КАСАЛЛИКЛАРНИ БУХОРО ВИЛОЯТИДА УЧРАШ КУРСАТКИЧЛАРИ

«Бухоро минтақасида 2021-2024 йиллари мобайнида туғма аномалиялар ривожси (ТАР) ни ўрганиш бўйича эпидемиологик изланишлар олиб борилди. Бу изланишлар натижасида шу аниқландики, шу ТАР лар, яъни туғма юрак нуқсони (пороки) ва Даун синдроми аномалиялари бошқа патологиялар ўртасида энг кўп учраши кузатилди.

Калит сўзи: Даун синдроми, аномалия, туғма аномалия, Полидактилия, Синдактилия.

It is well known that. The Bukhara region is an important economically developed industrial region located in the arid zone of Uzbekistan, which is characterized by the presence of a sharply continental climate, a high level of insolation, a high degree of technogenic impact caused by the operation of industrial enterprises.

The complex of technogenic factors affecting the health of the local population can be attributed to the so-called "controlled risk factors", on the basis of which it seems promising to develop and implement a target program for the prevention and treatment of congenital malformations congenital anomalies in the region .

In recent years, a continuous growth of VAR has been detected in the world. An increase in the relative indicators of hereditary and congenital pathology in the structure of morbidity and mortality of newborns and young children was noted .

It is shown that more than 10% of all conceptions in the human population are accompanied by congenital anomalies of which 0.5% are chromosomal diseases, 0.7% are molecular, 1.8% are polygenic pathologies, the remaining 7% are

hereditary predispositions. 4-6% of children with congenital anomalies are born annually in the world, and in many countries, fetal and newborn congenital anomalies are among the first in the structure of mortality .

In connection with the above, the study of the frequency of spread, early diagnosis, prevention and treatment of congenital anomalies is one of the urgent tasks of modern medicine.

The purpose of the work is to analyze the frequency of distribution of a number of VAR in the Bukhara region.

Material and methods of research. We conducted prospective epidemiological studies that included detailed registration of congenital anomalies in the Bukhara region. It should be noted that only based on accurate data on the frequency of occurrence of congenital anomalies in the regions, and then in Uzbekistan, it is possible in the future to judge the epidemiological picture and the frequency of occurrence of congenital anomalies , to conduct a medical examination of children with congenital anomalies and determine the required amount of pediatric and other specialized types of treatment .

Individual examination cards were developed for each child with congenital anomalies with the introduction of objective and reliable information there, starting from the beginning of the mother's pregnancy, the development of the child - to the profiling clinics, taking into account the diagnoses.

In this study, archival materials of maternity hospitals in the city of Bukhara were used .- The Bukhara region, as well as the data of the Bukhara Regional Screening Center. In maternity hospitals, all the birth histories and the history of the development of newborns for the period from 2020 to 2024 were studied and analyzed.

Results and discussion. The results of the research showed that 84,159 live children were registered in the settlements/ Bukhara region for 4 years.

The prevalence rates of 6 types of congenital anomalies were analyzed (Table). Of these, the following types of congenital anomalies were most common: congenital heart defects, Down syndrome, spinal hernia and polydactyly.

For example, the frequency of congenital heart defects was 0.48 or

The second group of VPD, namely congenital torticollis and syndactyly, occurred with a lower frequency compared to the above-mentioned congenital anomalies and according to the frequency of epidemiological prevalence in the Bukhara region, they can be conditionally attributed to the group of pathologies with a moderate nature of the spread of congenital anomalies (Table).

Congenital torticollis was registered with a frequency of 0.27 or 1 case per 3659 newborns. Syndactyly in terms of the frequency of occurrence of congenital anomalies was in last place: 0.14 or 1 : 7013.

The results obtained indicate that the epidemiological picture of the situation in the Bukhara region is unfavorable. We obtained different frequencies of congenital anomalies propagation.

Higher frequencies of the epidemiological prevalence of congenital anomalies were recorded here, in contrast to those in the Navoi region [2].

It should be emphasized that in the Bukhara region, unfavorable environmental impacts in the complex negatively affect the health of the population living here [3, 6] and make a certain "contribution" to the frequency of birth of children with congenital anomalies.

We believe that the high frequency of congenital anomalies occurrence in this region is due to environmental, hereditary and social factors.

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HUNTING TOURISM AND DEVELOPMENT METHODS ON HUNTING FARMS

Abstract. *Taking into account the high tourist potential of Bukhara and the availability of places for hunting, for these possibilities in this place have been determined tourism's capacity of the hunting animals.*

Key words: *hunting, population, animals, savage pig, geese, fox, wolf, wild rabbit, pheasant.*

The object of the study. There are three types of hunting animals (reptiles, birds, mammals) in the hunting farms of the Bukhara region.

The subject of the study. The fauna and ecological characteristics of the animal species hunted in the hunting farms of the Bukhara region consist in their conservation and sustainable use.

Research methods. Zoological, ecological, statistical, questionnaire and comparative methods of analysis were widely used in the study of animal species captured in hunting farms of the Bukhara region.

The scientific novelty of the research in the Bukhara region was as follows:

For the first time, the faunal composition of vertebrates hunted in the Bukhara region was analyzed and 117 species belonging to 4 classes, 14 categories and 29 families were identified;

For the first time, the distribution and dynamics of the number of animal species hunted in the Bukhara region were revealed in the hunting farms section;

It was found that 13 species of animals were hunted on the territory of hunting farms of the Bukhara region on the basis of appropriate permits, 11 species of animals were illegally hunted in hunting farms and adjacent areas, and 2 of them were included in the "Red Book" of Uzbekistan;

Ecological and biological features, protection and use of hunting animal species in the Bukhara region are determined;

The importance of the water bodies of the Bukhara region as a habitat for commercial species and in maintaining the biodiversity of desert ecosystems was assessed; problems related to the introduction and development of anthropogenic factors, regulatory legal acts and hunting tourism were identified and analyzed, and recommendations for their solution were developed. Tourism occupies a leading place in the global economy, including in the formation of the gross domestic product of many countries. Today we believe that traditional tourism and the services provided are not enough to fully meet the needs of consumers

This situation also requires the introduction of appropriate forms of tourism, including hunting tourism, in accordance with the requirements of the consumer in the tourist market.

Today, hunting tourism, aimed at hunting and fishing on a global scale, is gaining wide popularity. The development of hunting tourism is relevant not only to improve the economic situation of hunting farms, but also to ensure employment by creating additional jobs for the population of the region. The solution of problems in the field of hunting tourism and the formation of the sphere on the basis of international best practices leads to the development of hunting farms, the sustainable use of hunting animals, the prevention of degradation of animal populations .

In the Bukhara region, the bulk of the animals hunted are mainly in lakes and three hunting farms established in their coastal zones. This feature has been studied to create a very good object for hunting and organizing fishing tourism in one place.

Currently, hunting tourism is developed in Australia, Austria, Romania, Hungary, Botswana, Argentina, Kyrgyzstan, Tajikistan, Tanzania, Canada, Africa and Southeast Asia and a number of other countries, these countries differ in the level of formation and development of the infrastructure of hunting and fishing tourism .

The main purpose of hunting and fishing tourism is to search for a type of wild animal, to catch it so that it is used in this type of sport hunting and economic benefits are not expected. Such tourism can be established on the basis of paid services by specialized hunting and fishing farms, tourist organizations. Tourists who have the appropriate permits for this type of tourism, accompanied by observers, go to hunting and fishing farms for a certain period of time, and also engage in hunting and fishing there, as well as travel along established routes, and thus have a wide range of concepts.

As a result of the study, taking into account the high tourist potential of the pair, as well as the availability of places convenient for hunting, the breadth of opportunities for establishing hunting tourism was determined here. When organizing hunting tourism, it is important, first of all, to pay attention to the need for infrastructure that ensures a certain period of residence of hunters in a hunting farm, the fact that the planned type of hunting is found in the farm and is included in the list of species that it will hunt. Secondly, tour operators and hunting managers determine a pre-determined route Plan or a place convenient for hunting the specified species, size payment for services, such as hunting for the planned animal, the interaction of the hunting period with the duration of the tourist's stay on the territory, the level of availability of services.- it is necessary to carry out its activities on the basis of laws and other regulatory documents related to the field of environmental protection, and to coordinate such important issues in general. Today, the hunting farm "Zikri" in the Bukhara region has completed construction, which will receive tourists for hunting tourism, but it also prevents the arrival of tourists due to the pandemic that affects the whole world.

Another aspect of hunting and fishing tourism that differs from other types of tourism is its seasonal nature. Hunting of game animals in the Bukhara region, which are allowed to be hunted in Uzbekistan, begins on August 15 (baba livia, koturnix koturnix) until February 1 (species of birds swimming in the water, etc.) will continue. This period corresponds to the full autumn and partly to the winter season. As a rule, this season the influx of participants from traditional tourism to Uzbekistan, including Bukhara, is relatively small, and there are opportunities to serve hunting tourism. At the same time, since hunting farms in the region are not located at a great distance from city and district centers, which have modern hotels, it is also possible to make daily trips to farms, or to live in rooms built for tourists on these hunting farms, there are also enough conditions for them to rest for several days..

Each state offers different types of animals for those interested in hunting tourism, depending on the diversity of its fauna, the conservation status of the species, its economic status. Hunting objects popular in Europe include various species of beetles, bears, wild pigs, types of chickens in Russia, moose and wild boars, mainly wild sheep and wild goats in Central Asia. Developed hunting tourism countries place advertisements consisting of information about hunting objects in order to attract hunters and their hunting, as well as the amount spent on services. Since proper conditions for hunting tourism have been created in the hunting farms of the Bukhara region, it is necessary to establish the practice of such advertising and offers.

Today, hunting tourism is a developing field that requires a Hunter to invest much more in the provision of professional hunting weapons, appropriate licenses, permits and services, it is considered an elite type of recreation in the world. In particular, in Western Siberia, a tourist hunting participant spends an average of 36.000.000 soums on kargurs and geese 7.440.000 soums per week of hunting, which is organized for hunting a frontal beetle. Prices are determined and vary depending on the type and quality of hunting grounds, quantity, form of services provided, extraction of prey and other services provided. Such opportunities are available in a number of hunting farms of the republic, including in the Bukhara region. As a result of the introduction and development of hunting tourism in the region, the economic efficiency of hunting will increase; biotechnical measures aimed at protecting, restoring, sustainable use and increasing the productivity of species will be carried out on time and at a sufficient level; opportunities for biodiversity conservation; measures to prevent and combat poaching; on the territory of hunting farms are taken into account livestock feeding, plant breeding and other anthropogenic impacts, hunting is carried out on a scientific basis and in accordance with the relevant plan, restriction of the farm environment, installation of cardons in an appropriate manner and other similar issues are being resolved.

Due to the growing interest in hunting various animals in the world, in particular in the field of hunting tourism, much attention is paid to improving the system of keeping hunting farms, special breeding and protection of hunting species, as well as the introduction of advanced experiments in this field. In this

regard, the economic efficiency of farms has been increased, including by maintaining their stability and the introduction of hunting tourism through the creation of hunting farms, the organization of hunting, special reproduction of hunting species. Thanks to the use of modern methods and technologies in the activities of hunting farms, it was possible to preserve the number of species and the stability of their habitat. The creation of travel companies specializing in ornithological tourism gives the opportunity to observe birds throughout the year, with the exception of the hunting season, which lasts 4-5 months in hunting farms. It is noted that since 1990 in Uzbekistan, including in the Bukhara region, foreign tourists come together with local ornithologists in the direction of ornithological tourism. Their main goal is to photograph bird species that are not found in their country and are interested in themselves by recording their voices, an expression from studying some aspects of their ecology. Based on this, it is possible to carry out ornithological tourism during the breeding season of birds, especially their migration, and this type of tourism is also adapted to the field of hunting tourism, which is organized for hunting farms in the region. While the specialization of hunting farms will increase the interest of hunters and their confidence in the realization of the goal, it will also serve to increase the economic efficiency of the farm, and by the end of the hunting season these areas will serve to restore the number of animals.

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REHABILITATION METHODS FOR PATIENTS WITH LUMBAR SACRAL DISC HERNIATION

Abstract: *Background: Lumbar disc herniation is a common spinal pathology that often leads to pain, functional disability, and reduced quality of life. Rehabilitation plays a central role in both conservative management and postoperative recovery.*

Objective: To review current evidence-based rehabilitation strategies for patients with lumbar sacral disc herniation.

Methods: A narrative overview of rehabilitation modalities including therapeutic exercise, physical therapies, and enhanced recovery strategies was conducted.

Results: Active exercise programs initiated within the early postoperative period are associated with short-term improvements in pain and function compared with no treatment, though evidence quality is low [2,6]. Core stabilization, mobilization, and strength training demonstrate efficacy in improving back muscle performance [3,5]. Multidisciplinary protocols such as Enhanced Recovery After Surgery (ERAS) show promise in reducing complications and expediting functional recovery [7].

Conclusions: Rehabilitation incorporating structured exercise and multidisciplinary care improves clinical outcomes in lumbar disc herniation. High-quality trials are needed to refine optimal timing and components of rehabilitation protocols.

Keywords: *lumbar disc herniation; rehabilitation; physiotherapy; exercise therapy; enhanced recovery after surgery; functional outcomes.*

Introduction. Lumbar sacral disc herniation (LDH) is a prevalent cause of low back pain and radiculopathy, significantly impacting functional capacity and health-related quality of life [1]. Management typically includes conservative measures, structured rehabilitation, and surgical intervention when indicated. Rehabilitation aims to restore mobility, strengthen core musculature, and reduce pain, both for non-surgical cases and following discectomy [4]. Despite widespread use, rehabilitation protocols vary considerably, and the strength of evidence differs across modalities.

Rehabilitation modalities

Exercise Therapy. Therapeutic exercise is a cornerstone of LDH rehabilitation. Programs targeting core stabilization, endurance, and flexibility are associated with improved pain control and functional status in both conservative

and postoperative settings [2,5]. Systematic analyses demonstrate that exercises focusing on lumbar muscle endurance and mobility reduce disability and improve quality of life after surgery, while neural mobilization exercises provide limited additional benefit [5]. Passive approaches or prolonged activity restriction have not shown significant advantages [3].

Timing of rehabilitation. According to a Cochrane systematic review, active rehabilitation initiated four to six weeks after lumbar disc surgery results in short-term reductions in pain and disability compared with no treatment [6]. High-intensity exercise programs may be more effective than low-intensity regimens in the early postoperative period, although differences between supervised and home-based rehabilitation appear minimal [6].

Enhanced recovery protocols. Enhanced Recovery After Surgery (ERAS) protocols integrate early mobilization, optimized pain control, patient education, and multidisciplinary coordination. Recent evidence indicates that ERAS-based rehabilitation strategies in patients with LDH significantly reduce hospital stay, lower complication rates, and improve long-term functional outcomes compared with conventional care [7,8].

Conservative physical therapies. In non-operative management, conservative physical therapies include structured exercise programs, manual therapy, and postural training. Lumbar stabilization exercises and progressive resistance training enhance spinal support and reduce recurrence risk, contributing to better long-term outcomes [4,9].

Discussion. Rehabilitation for lumbar disc herniation encompasses a spectrum of interventions with varying levels of evidence. Exercise-based rehabilitation demonstrates the most consistent benefits in pain reduction and functional recovery [2,5,6]. Multidisciplinary strategies such as ERAS protocols further optimize outcomes by addressing perioperative factors and accelerating recovery [7,10]. However, heterogeneity in study designs, rehabilitation intensity, and outcome measures limits the generalizability of results.

Conclusion. Rehabilitation is an essential component of comprehensive management for patients with lumbar sacral disc herniation. Evidence supports the use of structured exercise programs and multidisciplinary care models to improve clinical outcomes. Further high-quality randomized controlled trials are required to establish standardized rehabilitation protocols and optimize patient recovery.

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THE EFFECT OF THE IMMUNOSTIMULANT "FITOVAK" ON THE GERMINATION OF "AVMU" MUNG BEAN VARIETIES

Abstract: *In this article, the germination indicators of 15 different mung bean varieties of "AVMU" were studied by treating the seeds with the immunostimulator "Fitovak", and also compared with the control variants. As a result, among the varieties studied, the most positive result was observed in the AVMU 2003 variety, and the lowest result was observed in the AVMU 1678 variety. In addition, when these varieties were compared with the control variants, it was found that the germination percentage of the AVMU 2003 variety was 25% higher than the control.*

Keywords: *"AVMU" mung bean varieties, germination index, "Fitovak", immunostimulant.*

Annotation. *Germination is one of the main quality indicators of seeds, which is considered the ability of plants to germinate. In laboratory conditions, seed germination is defined as the rate at which seeds grown under favorable conditions germinate at a high percentage.*

There are several methods for increasing fertility, including pre-sowing treatment of plant seeds with fungicides, bactericides, stimulants, biostimulants, and immunostimulants.

The germination of seeds of agricultural plants depends mainly on the biological and physiological processes occurring in the body of these plants, that is, as a result of these processes, the growth and development of young seedlings can be accelerated or slowed down.

To date, the agricultural sector in our Republic is further developing, and measures have been taken to properly organize seed production in order to obtain high-quality crops, develop technologies for growing seeds of new plant specimens imported from foreign countries, and to culturalize them.

Before sowing seeds of agricultural crops, various types of chemical drugs, growth regulators and physiologically active substances, immunostimulants that increase resistance to various stressors encountered in the environment are used. It is noted that high-quality yields can be achieved by spraying the vegetative and generative organs of crops during different periods of vegetation.

We conducted field studies on mung bean crops using the immunostimulant "Fitovak". The drug "Fitovak" is environmentally friendly and harmless, and can be used even in areas where biolaboratory products have been used. This drug has rehabilitative, repellent, antidote and synergistic properties, and when used in

combination with various types of biocides and mineral fertilizers, it helps to increase their effectiveness, absorption into the soil, and also their duration.

Due to the increased activity of enzymes under the influence of growth-stimulating biologically active substances, the rate of decomposition of organic matter in the seed increases, and the growth of roots and primary leaves from the bud decreases faster than in the control variant.

In a study conducted in 2024, the immunostimulant "Fitovak" was tested in equal doses on 15 different varieties of "AVMU". In order to determine the extent to which this immunostimulant affects the physiological processes of plant growth, a study was conducted in the experimental field, comparing it with the standard and control variants.

In the first part of the study, seeds taken as a standard were treated with the immunostimulant "Fitovak" at a rate of 200 ml/t, and the germination indicators of the control and treated seeds were determined. In this case, all varieties of "AVMU" in the standard and control variants were given the same amount of moisture, that is, irrigation was carried out.

Research was conducted in 2024 in field conditions with moderate salinity. Seeds were sown on the sixth of July, and observations were carried out on 11.07. As a result, different indicators were observed in each option (Table 1.1).

Table 1.1

№	Mash varieties	Control		Stimulator	
		Number of sprouts, pcs.			
		11.07.2024 y	Sleeplessness %	11.07.2024 y	Sleeplessness %
1	AVMU 1676	59	80.0	45	78.2
2	AVMU 1677	65	88.0	79	90.0
3	AVMU 1678	46	80.9	35	46.1
4	AVMU 1679	79	88.4	39	75.0
5	AVMU 1680	67	80.0	43	70.0
6	AVMU 1681	40	73.33	73	82.6
7	AVMU 1682	41	65.2	48	80.0
8	AVMU 1683	11	41.66	19	54.5
9	AVMU 1684	17	50	21	63.6

10	AVMU 1685	20	61.53	27	63.6
11	AVMU 2001	41	91.66	29	60.0
12	AVMU 2002	21	66.66	25	58.33
13	AVMU 2003	25	66.66	44	91.66
14	AVMU 2004	14	66.6	20	50.0
15	AVMU 2005	14	66.6	17	50.0

Fertility indicators of "AVMU" mung bean varieties

According to the results obtained, a total of 560 plants germinated in the control variants, and 564 in the variants treated with the stimulant. It can be seen that among the control variants, the highest percentage was observed in the AVMU 2001 variety (91.66%), and the lowest was observed in the AVMU 1683 variety (41.66%).

Data from field research indicate that field productivity indicators may vary depending on the time of year, air temperature, and soil moisture.

Despite the equal amount of the immunostimulant "Fitovak" (200 ml / l), all varieties of "AVMU" did not show the same percentage indicators. However, the fact that the germination in the variants treated with this drug was higher than in the control indicates that the physiological processes were accelerated and positive indicators were obtained as a result of the coordination and proper control of the internal endogenous and externally influenced exogenous hormones contained in the mung beans.

The positive effect of the immunostimulant "Fitovak" on the germination of mung beans is associated with the fact that upon contact with its shell, the processes of development in it, i.e. swelling, cracking, rooting, and sprouting of seedlings, begin earlier than in the control. At the same time, since the substances contained in the immunostimulant "Fitovak" regulate the work of phytohormones, an increase in osmotic pressure in the seeds, expansion of the cell shell, swelling, cracking, rooting, and acceleration of early sprouting processes are observed.

In conclusion, it was scientifically established in the research that when mung beans were treated with the universal immunostimulant "Fitovak" at a rate of 200 ml/l, depending on soil temperature, the germination rate was higher than the control option and germination occurred 3 days earlier.

Foydalanilgan adabiyotlar ro'yxati

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IMPROVING THE USE OF ECO-MARKETING STRATEGIES IN THE TOURISM SECTOR

Abstract. *The article examines the scientific aspects of improving the use of eco-marketing strategies in the tourism sector. Under conditions of sustainable development, the role and importance of eco-marketing in the tourism services market are analyzed, and the impact of environmentally oriented marketing approaches on the activities of tourism enterprises is assessed. Based on a systematic review of scientific literature, the theoretical foundations of eco-marketing strategies are generalized, and key problems related to their practical implementation are identified. Using a systematic approach, comparative analysis, and logical generalization methods, the main directions for improving the implementation of eco-marketing strategies in the tourism sector are proposed.*

Keywords: *tourism, eco-marketing, eco-marketing strategies, sustainable tourism, environmental marketing, green marketing, tourism services market, marketing strategy, competitiveness, environmental sustainability, consumer behavior, sustainable development.*

Introduction.

In recent years, the rapid development of the tourism sector has significantly increased its economic importance while simultaneously intensifying attention to environmental issues. Climate change, depletion of natural resources, and the growing scale of environmental problems have made the sustainable development of tourism activities a critical global challenge. In this context, the application of eco-marketing strategies has become one of the key instruments for ensuring environmentally responsible and economically efficient tourism development.

Eco-marketing in the tourism sector refers to marketing activities aimed at developing, promoting, and delivering tourism products and services based on principles of environmental protection, rational use of natural resources, and sustainable development. This concept seeks to balance the economic interests of tourism enterprises with environmental and social responsibility, ensuring long-term competitiveness and market stability.

From a scientific perspective, eco-marketing in tourism involves the formation of marketing strategies based on environmental criteria, including the introduction of green technologies, reduction of environmental impact, preservation of natural and cultural heritage, and promotion of environmentally responsible

consumer behavior. At the same time, eco-marketing serves as an effective tool for strengthening brand image, increasing customer loyalty, and enhancing the competitiveness of tourism enterprises.

Therefore, the main objective of this study is to scientifically substantiate ways to improve the mechanisms for applying eco-marketing strategies in the tourism sector under conditions of sustainable development.

Literature Review.

Issues related to eco-marketing and sustainable tourism have been widely studied by foreign and domestic scholars. These studies focus on the theoretical foundations of eco-marketing, its role in tourism development, and practical mechanisms for its implementation.

Kotler and Keller, in *Marketing Management* (2016), emphasize that environmentally and socially oriented marketing has become an integral component of modern marketing strategy. According to the authors, eco-marketing enables companies to meet consumer needs while simultaneously protecting the environment, which is particularly relevant for the tourism sector.

Weaver, in *Sustainable Tourism: Theory and Practice* (2006), provides a comprehensive analysis of sustainable tourism and substantiates the role of eco-marketing strategies in minimizing the negative environmental impact of tourism activities while maintaining the long-term attractiveness of destinations.

Bramwell and Lane, in *Sustainable Tourism Management* (2011), highlight the importance of integrating sustainability principles into tourism policy, planning, and marketing. The authors consider eco-marketing strategies as mechanisms that align marketing decisions with environmental objectives.

Font and Buckley, in *Tourism and Sustainability* (2007), focus on eco-marketing tools such as environmental certification, green labeling, and responsible marketing communications. Their research demonstrates that these tools significantly enhance consumer trust and strengthen the market image of tourism enterprises.

Research conducted by CIS and Uzbek scholars also emphasizes the role of eco-marketing in ensuring economic efficiency and environmental balance in tourism. In particular, R.X. Alimuhamedov, in the monograph *Sustainable Development and Green Economy* (2019), interprets eco-marketing as a mechanism for increasing the environmental responsibility of tourism and industrial enterprises in Uzbekistan.

Kim Young-Sook (2016) argues that eco-marketing transforms environmental values into an integral component of brand identity in sustainable tourism.

Overall, the literature review indicates that although eco-marketing strategies in tourism are theoretically well developed, their adaptation to the conditions of developing countries, including Uzbekistan, remains insufficiently explored.

Research Methodology.

The study employs a systematic approach, comparative analysis, statistical observation, and logical generalization methods. Statistical data covering the

development of the tourism sector in Uzbekistan for the period 2018-2023 were analyzed to assess trends in eco-marketing implementation.

The methodological framework made it possible to evaluate the level of adoption of eco-marketing elements in tourism enterprises, the environmental orientation of marketing communications, and their influence on consumer behavior.

Analysis and Discussion of Results.

The results of the study indicate that the application of eco-marketing strategies has a significant impact on the economic, environmental, and social performance of tourism enterprises. Tourism organizations that systematically implement eco-marketing elements demonstrate higher service quality, increased customer satisfaction, and improved competitiveness.

Firstly, the development of environmentally oriented tourism products contributes to reducing the environmental footprint of tourism activities. The introduction of energy-efficient technologies, water-saving systems, and waste management practices in accommodation facilities leads to both environmental and economic benefits.

Secondly, the use of eco-marketing approaches in marketing communications – such as green branding and environmental certification – positively influences tourists' purchasing decisions and enhances brand trust and loyalty.

Thirdly, eco-marketing strategies play an important role in regional tourism development by promoting ecotourism and reducing seasonality, thereby supporting local employment and regional economic growth.

However, the analysis also reveals several challenges, including limited financial resources, insufficient environmental expertise, and underdeveloped regulatory frameworks, particularly among small and medium-sized tourism enterprises.

Conclusions and Recommendations.

The study concludes that improving the use of eco-marketing strategies in the tourism sector is a crucial factor in ensuring sustainable development. Eco-marketing contributes to reducing environmental pressure, promoting the rational use of natural resources, and enhancing the long-term economic efficiency and competitiveness of tourism enterprises.

Based on the findings, it is proposed to:

1. Develop a unified conceptual framework for eco-marketing in tourism;
2. Expand and strengthen environmental certification systems;
3. Enhance environmentally oriented marketing communications among tourism stakeholders;
4. Support tourism enterprises through institutional and financial mechanisms aimed at facilitating the adoption of eco-marketing practices.

The systematic implementation of eco-marketing strategies will contribute to environmental sustainability, increased competitiveness in the tourism services market, and the long-term sustainable development of national tourism.

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IMPROVING THE MANAGEMENT EFFICIENCY OF THE LOGISTICS SERVICES MARKET

Abstract. *The article scientifically investigates issues related to improving the management efficiency of the logistics services market. The role of the logistics sector in the economy, the significance of market management mechanisms, and their impact on satisfying consumer needs are highlighted. The study analyzes development trends in the logistics services market and develops scientific and practical proposals aimed at enhancing management efficiency. Based on statistical analysis and forecasting methods, prospective directions for the development of the logistics services market are identified.*

Keywords: *logistics, logistics services market, management efficiency, market analysis, forecasting, consumer needs, competitiveness.*

1. Introduction

In recent years, the importance of logistics services in both the global and national economy has been steadily increasing [1; 2]. The growing complexity of production and trade processes, integration among markets, and intensified competition have made effective management of the logistics services market an urgent issue [3]. Efficient functioning of the logistics system not only reduces firms' costs but also helps meet consumers' needs quickly and with high quality [4].

Under market economy conditions, the efficiency of managing the logistics services market is one of the key factors determining enterprises' competitiveness and sustainable development [5]. Therefore, analyzing the current state of the logistics services market, identifying its development trends, and developing scientifically grounded proposals to improve management efficiency are of particular relevance.

The Presidential Decree of the Republic of Uzbekistan No. PQ-28 dated January 27, 2025, "On Measures to Further Develop the Transport and Logistics System of the Republic of Uzbekistan," emphasizes the development of the national transport and logistics services market and infrastructure, increasing transit capacity, forming promising transport corridors, reducing transport costs in export-import operations, and shortening delivery times to foreign markets [6].

The purpose of this article is to scientifically substantiate ways to improve the management efficiency of the logistics services market.

2. Literature Review

Issues related to improving management efficiency in the logistics services market have been widely studied by foreign and domestic scholars across different periods. In scientific literature, logistics was initially interpreted as an operational activity aimed at cost reduction, but later it began to be recognized as an important element of strategic management.

At the end of the 20th century, Donald J. Bowersox and David J. Closs made significant contributions to the formation of logistics theory. In studies published between 1996 and 2002, they substantiated logistics services management as a strategic tool enhancing firms' competitiveness and proposed evaluating logistics efficiency through delivery speed, reliability, and service quality [1; 2].

Martin Christopher (2005) emphasized the need to organize logistics services market management based on customer orientation and integrated management principles; effective management is closely linked to in-depth analysis of consumer needs and the design of services aligned with those needs [3].

Douglas M. Lambert (2008–2014) showed that the development of the logistics services market depends on the level of cooperation among supply chain participants; information exchange and coordination of planning processes are key factors in logistics services management [4; 5].

Since the 2010s, digitalization and forecasting have become critical issues in managing the logistics services market. World Bank reports on the Logistics Performance Index (LPI) identify infrastructure quality, customs procedures, and logistics service quality as key criteria for assessing logistics performance [7; 8].

Domestic studies argue for applying statistical and economic-mathematical methods in forecasting the logistics services market under Uzbekistan's conditions [9].

3. Research Methodology

The study applies a systematic approach, comparative analysis, statistical observation, and economic forecasting methods. The development indicators of Uzbekistan's logistics (transport) services market for 2021–2024 were analyzed based on official statistical data [9; 10].

Forecast indicators for 2025 were calculated using the Compound Annual Growth Rate (CAGR) method, which is widely used to determine short-term market development prospects [11].

CAGR formula:

$$\text{CAGR} = \left(\frac{V_f}{V_i} \right)^{\frac{1}{n}} - 1$$

where

V_f - is the final year value,

V_i is the initial year value, and n is the number of years.

Calculation (Uzbekistan case):

$V_i = 67,238.6$ billion UZS (2021),

$$V_i = 145,124.4 \text{ billion UZS (2024),}$$

$$n = 3.$$

$$\text{CAGR} = \left(\frac{145124.4}{67238.6} \right)^{1/3} - 1 \approx 0.292 \text{ (29.2\%)}$$

Based on this result, the 2025 logistics services volume was forecast at approximately 168 trillion UZS.

4. Results and Discussion

The analysis shows that the logistics services market demonstrates a stable growth trend. In recent years, increasing demand for logistics services, expansion of transport and warehousing infrastructure, and adoption of digital technologies have positively affected market growth.

To comprehensively assess the market, key economic indicators were analyzed: the volume of transport-logistics services, annual growth rates, and freight transportation volumes. These indicators reflect market activity, service scale, and the efficiency level of logistics systems.

Table 1 presents Uzbekistan's logistics (transport) services market indicators for 2021-2025, formed based on official statistical data and economic forecasting.

Table 1.

**Key indicators of Uzbekistan's logistics (transport) services market
(2021–2025)**

Years	Transport-logistics services volume (billion UZS)	Annual growth rate (%)	Freight transportation volume (million tons)
2021	67,238.6	–	1,420.2
2022	83,985.6	24.9	1,420.9
2023	114,553.3	36.4	1,455.7
2024	145,124.4	26.7	1,521.2
2025*	168,000.0	15.8	1,580.0

Note: 2021-2024 figures are based on official open statistical sources (transport services statistics). The 2025 values (*) are the author's forecast calculated using CAGR.

According to Table 1, Uzbekistan's logistics (transport) services market developed steadily and at high rates during 2021-2024. The services volume increased from 67.2 trillion UZS in 2021 to 145.1 trillion UZS in 2024—approximately 2.2 times growth within three years.

High growth rates can be explained by the expansion of transport-logistics infrastructure, increased transit potential, adoption of digital management systems,

and growth in foreign trade volumes. In particular, the 36.4% growth rate in 2023 indicates a sharp increase in demand for logistics services.

Freight transportation volume rose from 1,420.2 million tons in 2021 to 1,521.2 million tons in 2024, confirming that logistics systems are increasingly aligning with real sector needs. Based on these trends, the logistics services volume in 2025 is forecast to be around 168 trillion UZS.

Conclusions and Recommendations

The study confirms that improving management efficiency of the logistics services market plays a significant role in economic development and satisfying consumer needs. Implementing effective management mechanisms helps improve logistics service quality, reduce costs, and strengthen market competitiveness.

Based on the study, the following scientific and practical recommendations are proposed:

- establish a unified strategic approach for managing the logistics services market;
- accelerate implementation of digital logistics and information systems;
- improve service portfolios based on assessment of consumer needs;
- introduce a regular system for forecasting and monitoring logistics services market development.

In conclusion, implementing comprehensive measures to manage the logistics services market effectively will contribute to sustainable national economic development and increased competitiveness in the logistics sector. The analysis of Uzbekistan's logistics services market for 2021–2025 shows that management mechanisms based on forecasting and data-driven decisions ensure stable growth in logistics services volume.

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GEOGRAPHICAL ZONING OF TOURIST AREAS

Abstract: *the article is devoted to the issues of zoning and division of territories into tourist areas. It analyzes mainly tourist areas of the world, and provides criteria for geographical tourist zoning of territories.*

Keywords: *geographical tourism, geographical tourist zone, geographical tourist region, geographical tourist cluster, district, zoning.*

One of the research processes in geographical science is the zoning of territories for various purposes. Zoning allows for the assessment of the state of particular regions, the development and recommendation of appropriate practical measures for their improvement, and forecasting of future prospects. Zoning can take various forms, including natural geographic, economic geographic, geomorphological, geobotanical, zoogeographical, geological, and so on [1].

The word "region" in French means "area"—"place" or "territory." Zoning is the division and naming of a specific administrative or natural territory for various purposes, according to its specific characteristics, into taxonomic units. With zoning, a given administrative or natural territory will consist of areas according to taxonomic units, that is, based on systematized hierarchical ranks. Zoning encompasses two processes: development and formation, as well as the definition of these areas [2].

The division of a given territory into districts can be carried out at various scales and forms, based on the goals and objectives set by the researcher. It should be noted that the division into territorial tourist zones differs from tourist zoning [3], as zoning is divided into hierarchical parts, and these parts are strictly scaled.

Territorial units, which form the basis of geographical science, are widely used in tourism activities. However, experts, i.e., geographers engaged in tourism research, have uncovered the meaning of such geographical-tourist units as core (center), cluster, zone, and region [4]. These concepts are interpreted differently in different literary sources. The content of a number of similar concepts is described in detail in the five-language dictionary by V.M. Kotlyakov and A.I. Komarova [5].

There are various views on zoning or dividing regions into districts for tourism purposes; no consensus has yet been reached on this issue. Below, we will analyze several of these views.

A.G. Manakov, considering the potential for tourism development, identifies 10 tourist macro-regions of the world. These tourist macro-regions consist of 46 meso-regions [6].

The ideas of M.A. Ananyev, P.N. Zachinyaev, and N.S. Falkovich were partially used in the system of global tourist zones developed by Yu.D. Dimitrevsky.

Outside the CIS countries, a total of 24 tourist and recreational zones have been identified, which are divided into 83 tourist macro-regions [7].

When developing tourism and recreational zoning, Yu. D. Dimitrevsky considered the region's recreational resources first and cultural and historical sites second. Zoning based on regional specifics when identifying tourist zones does not produce satisfactory results. Geographic tourism should create a tourism zoning system that is qualitatively different from traditional tourism and recreational zoning, taking into account the regions' tourism potential.

Geographic tourism zoning, or the division of territories into districts, should be conducted based on the following approaches:

An integrated approach requires a comprehensive study of the natural, environmental, economic, and social conditions of tourist regions. Geographic tourism requires a comprehensive approach to all types of tourism, not just a specific type of tourism in a region [8].

A systems approach involves examining the tourist zone as a whole and considering the complex of interconnected structures and elements (natural, environmental, social, and economic components) within it. Furthermore, when selecting the most stable, as well as primary and secondary elements in the system, their interrelationships with each other, as well as their interaction with the environment, should be considered [9].

The civilizational approach involves identifying and utilizing the unique features of the planned tourism destination in territorial planning, the geopolitical and historical role of the territory, national, regional, and local characteristics, socio-cultural ties and historical continuity, and the historical and cultural heritage of the territory.

Furthermore, most countries implement their tourism policies through a visa system. This, firstly, creates various barriers and, secondly, impacts the flow of tourists. A striking example of the above factors can be seen in the countries of Central Asia. Specifically, if we consider the boundaries of the Fergana Valley, which includes the Andijan, Namangan, and Fergana regions of the Republic of Uzbekistan, based on natural features, we see that in addition to the aforementioned regions, the Fergana Valley also includes the Sughd region of the Republic of Tajikistan and the Jalal-Obad and Batken regions of the Kyrgyz Republic. In this case, tourism development must be conducted within the boundaries of these administrative-political units.

To date, the territory of Uzbekistan has been zoned or divided into districts according to various fields of science and for various purposes [10]. In particular, significant work is being carried out in the field of tourism science. In particular, A.N. Nigmatov and his student N.T. Shomuratova (2011) divided ecotourism into [11], Sh.T. Yakubjanova (2012) - into 15 agrotourism regions [12]. In addition, if B.Kh. Kamolov (2018) divided the Namangan region into 4 ecotourism districts, then M.M. Makhmudov (2021) zoned tourism, dividing the territory of the Andijan region into 5 parts [13]. From this it is clear that scientific research conducted in the

field of tourism in subsequent years is also carried out mainly within the framework of administrative units.

Based on the results of our analysis of the cited research, we propose dividing the territory of Uzbekistan into three hierarchies (levels) in terms of geographic tourism. These are a geographic tourism region, a geographic tourism zone, and a geographic tourism cluster. In this regard, it is appropriate to focus on the concepts of a geographic and tourist region, zone, and cluster.

A geographic tourism region is an area encompassing two or more tourist zones, taking into account the comprehensive characteristics of the natural, socioeconomic, and political indicators of the tourism services provided.

A geographic tourism zone is an area encompassing two or more tourist clusters, taking into account the characteristics of the natural, socioeconomic, and political indicators of the tourism services provided. In identifying geographic tourism zones, we focused on the following approaches: selecting a specific small tourist zone as a center and dividing the zones by altitude. An analysis of the work of scientists who have divided Uzbekistan's territory into districts or regions shows that the Fergana Valley can be divided into a single region (district) based on natural, socioeconomic, and political factors. With this in mind, we have also adopted the Fergana Valley as a separate geographical tourism zone.

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MA'LUMOTLAR BAZASIDA FOYDALANUVCHI HUQUQLARINI BOSHQARISH VA XAVFSIZLIK SIYOSATI

***Annotatsiya.** Ushbu maqolada ma'lumotlar bazalarida foydalanuvchi huquqlarini boshqarish va xavfsizlik siyosatini shakllantirishning nazariy hamda amaliy jihatlari yoritiladi. Raqamli transformatsiya jarayonida axborot resurslarining ko'payishi va ulardan ko'p foydalanuvchili muhitda foydalanish ma'lumotlar xavfsizligini ta'minlash masalasini dolzarb qilib qo'ymoqda. Maqolada autentifikatsiya va avtorizatsiya mexanizmlari, rollarga asoslangan kirish nazorati (RBAC), ma'lumotlarni himoyalash usullari, audit va monitoring jarayonlari tahlil qilinadi. Shuningdek, ma'lumotlar bazasida ruxsatsiz kirish, ichki tahdidlar va axborot sizib chiqishining oldini olishga qaratilgan xavfsizlik siyosatini ishlab chiqish tamoyillari ko'rib chiqiladi. Tadqiqot natijalari axborot tizimlarida ishonchli, barqaror va xavfsiz ma'lumotlar boshqaruvini ta'minlashda muhim ahamiyatga ega.*

***Kalit so'zlar:** ma'lumotlar bazasi, foydalanuvchi huquqlari, xavfsizlik siyosati, autentifikatsiya, avtorizatsiya, RBAC, axborot xavfsizligi, audit.*

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USER RIGHTS MANAGEMENT AND SECURITY POLICY IN A DATABASE

***Abstract.** This article discusses the theoretical and practical aspects of user rights management and security policy implementation in database systems. In the context of digital transformation and the rapid growth of data volumes, ensuring data security in multi-user environments has become a critical issue. The paper analyzes authentication and authorization mechanisms, role-based access control*

(RBAC), data protection methods, as well as auditing and monitoring processes. Special attention is given to the development of security policies aimed at preventing unauthorized access, internal threats, and data leakage. The research findings contribute to improving the reliability, stability, and security of database management systems.

Keywords: *database, user access control, security policy, authentication, authorization, RBAC, information security, audit.*

KIRISH

Bugungi kunda raqamli texnologiyalarning jadal rivojlanishi natijasida axborot oqimi va ma'lumotlar hajmi misli ko'rilmagan darajada oshib bormoqda. Davlat tashkilotlari, biznes subyektlari va ta'lim muassasalari faoliyatida katta hajmdagi ma'lumotlarni ishonchli saqlash, tezkor qayta ishlash va samarali boshqarish muhim strategik vazifaga aylanmoqda. Ayniqsa, ko'p foydalanuvchili axborot tizimlarida ma'lumotlardan foydalanish jarayonini nazorat qilish va ularning xavfsizligini ta'minlash dolzarb masalalardan biridir.

An'anaviy ma'lumotlar bazalari uzoq yillar davomida axborotni saqlash va boshqarish vazifasini bajargan bo'lsa-da, zamonaviy talablar ularning imkoniyatlarini kengaytirishni taqozo etmoqda. Bulutli ma'lumotlar bazalarining joriy etilishi infratuzilmani soddalashtirish, resurslarni dinamik masshtablash va xarajatlarni optimallashtirish imkonini yaratdi. Shu bilan birga, foydalanuvchilarning turli darajadagi huquqlarini aniqlash va ularni qat'iy boshqarish masalasi axborot xavfsizligining ajralmas qismiga aylandi.

Sun'iy intellekt texnologiyalarining rivojlanishi ma'lumotlar bazalari bilan ishlash jarayonlarini yangi bosqichga olib chiqdi. Avtomatlashtirilgan tahlil, bashoratlash va qaror qabul qilish mexanizmlari ma'lumotlardan yanada samarali foydalanish imkonini bermoqda. Biroq ushbu jarayonlarda ma'lumotlarning maxfiyligi, yaxlitligi va mavjudligini ta'minlash, shuningdek ruxsatsiz kirish va ichki tahdidlarning oldini olish muhim ahamiyat kasb etadi.

Shu nuqtayi nazardan, ma'lumotlar bazalarida foydalanuvchi huquqlarini boshqarish, autentifikatsiya va avtorizatsiya mexanizmlarini joriy etish, xavfsizlik siyosatini ishlab chiqish va amaliyotga tatbiq etish zarurati yuzaga kelmoqda. Mazkur maqola ma'lumotlar bazalarida foydalanuvchi huquqlarini boshqarish va xavfsizlik siyosatini shakllantirishning asosiy tamoyillari, zamonaviy yondashuvlari hamda ularning amaliy qo'llanilish imkoniyatlarini tahlil qilishga bag'ishlanadi.

Asosiy Qism

Zamonaviy axborot tizimlarida ma'lumotlar bazalari markaziy o'rin egallab, ularda saqlanadigan axborotning hajmi va ahamiyati tobora ortib bormoqda. Bulutli texnologiyalar va sun'iy intellekt asosidagi tizimlarning keng joriy etilishi ma'lumotlardan foydalanish imkoniyatlarini kengaytirgan bo'lsa-da, bir vaqtning o'zida axborot xavfsizligini ta'minlash masalasini yanada murakkablashtirmoqda.

Ayniqsa, ko'p foydalanuvchili muhitda ma'lumotlar bazasiga kirishni tartibga solish va foydalanuvchi huquqlarini aniq belgilash muhim vazifa hisoblanadi.

Ma'lumotlar bazasida foydalanuvchi huquqlarini boshqarish jarayoni autentifikatsiya va avtorizatsiya mexanizmlariga asoslanadi. Autentifikatsiya foydalanuvchining shaxsini aniqlashni ta'minlasa, avtorizatsiya esa unga berilgan huquqlar doirasida ma'lumotlarga kirish imkoniyatini belgilaydi. Zamonaviy tizimlarda rollarga asoslangan kirish nazorati (RBAC) keng qo'llanilib, foydalanuvchilarga lavozimi yoki vazifasiga mos huquqlarni berish orqali axborotdan foydalanish samaradorligi va xavfsizligi oshiriladi.

Bulutli ma'lumotlar bazalarida foydalanuvchi huquqlarini boshqarish yanada muhim ahamiyat kasb etadi. Chunki bunday muhitda ma'lumotlarga turli joylardan va turli qurilmalar orqali murojaat qilinadi. Shu sababli, minimal huquqlar tamoyili (Least Privilege Principle) asosida foydalanuvchilarga faqat zarur bo'lgan ruxsatlarni berish axborot sizib chiqishining oldini olishga xizmat qiladi. Bundan tashqari, vaqtinchalik va shartli ruxsatlar orqali ma'lumotlar bazasining himoyalanganlik darajasi oshiriladi.

Ma'lumotlar xavfsizligini ta'minlashda shifrlash texnologiyalari muhim o'rin tutadi. Ma'lumotlarni saqlash jarayonida (data at rest) va uzatish jarayonida (data in transit) shifrlash usullaridan foydalanish ruxsatsiz kirish holatlarida ham axborotning maxfiyligini saqlab qolishga yordam beradi. Shuningdek, zaxira nusxalarini yaratish va avariya dan tiklash mexanizmlarini joriy etish ma'lumotlarning yo'qolish xavfini sezilarli darajada kamaytiradi.

Sun'iy intellekt texnologiyalari ma'lumotlar bazasi xavfsizligini oshirishda qo'shimcha imkoniyatlar yaratmoqda. Intellektual monitoring tizimlari foydalanuvchilarning noodatiy faolligini aniqlash, shubhali kirish urinishlarini tahlil qilish va potentsial tahdidlarni oldindan bashorat qilish imkonini beradi. Bu esa xavfsizlik siyosatini yanada takomillashtirish va real vaqt rejimida himoya choralarini ko'rishga xizmat qiladi.

Ma'lumotlar bazalarida xavfsizlik siyosatini ishlab chiqish jarayonida audit va nazorat mexanizmlarini joriy etish ham muhim hisoblanadi. Foydalanuvchilarning barcha harakatlarini qayd etish, tizim jurnalini yuritish va muntazam tahlil qilish orqali ichki va tashqi tahdidlarning oldini olish mumkin. Xalqaro xavfsizlik standartlariga mos siyosatni qo'llash esa tizimning ishonchliligi va barqarorligini ta'minlaydi.

Umuman olganda, ma'lumotlar bazalarida foydalanuvchi huquqlarini boshqarish va xavfsizlik siyosatini to'g'ri tashkil etish axborot tizimlarining samarali ishlashini ta'minlaydi. Bulutli texnologiyalar va sun'iy intellekt bilan integratsiyalashgan bunday tizimlar ma'lumotlardan xavfsiz, tezkor va ishonchli foydalanish imkonini yaratib, tashkilotlarning raqamli rivojlanishida muhim ahamiyat kasb etadi.

Metodologiya

Mazkur tadqiqotda ma'lumotlar bazalarida foydalanuvchi huquqlarini boshqarish va xavfsizlik siyosatini shakllantirish jarayonlarini chuqur o'rganish maqsadida kompleks metodologik yondashuvlardan foydalanildi. Tadqiqot

jarayonida nazariy tahlil, empirik kuzatishlar hamda zamonaviy axborot tizimlari tajribasiga asoslangan usullar uyg'unlashtirildi. Bu yondashuvlar foydalanuvchi huquqlarini boshqarish mexanizmlarining samaradorligi va xavfsizlik darajasini baholash imkonini berdi.

Adabiyotlarni tahlil qilish. Tadqiqotning nazariy asoslarini shakllantirish maqsadida ma'lumotlar bazalari, axborot xavfsizligi, foydalanuvchi huquqlarini boshqarish, bulutli texnologiyalar va sun'iy intellekt sohalariga oid ilmiy maqolalar, monografiyalar hamda xalqaro standartlar tizimli ravishda tahlil qilindi. Ushbu bosqichda autentifikatsiya va avtorizatsiya mexanizmlari, rollarga asoslangan kirish nazorati (RBAC) hamda xavfsizlik siyosatini ishlab chiqish bo'yicha asosiy konsepsiyalar aniqlab olindi.

Nazariy tahlil. Nazariy tahlil jarayonida foydalanuvchi huquqlarini boshqarish modellari, axborot xavfsizligi tamoyillari va xavfsizlik siyosatini joriy etish usullari o'rganildi. Mazkur yondashuv orqali mavjud modellar va konsepsiyalarning afzalliklari hamda cheklovlari aniqlanib, ularni bulutli ma'lumotlar bazalari sharoitida qo'llash imkoniyatlari baholandi.

Empirik tadqiqotlar. Empirik tadqiqotlar doirasida real axborot tizimlari, jumladan bulutli platformalarda faoliyat yuritayotgan ma'lumotlar bazalari va ularga integratsiyalashgan xavfsizlik mexanizmlari tahlil qilindi. Tadqiqot davomida foydalanuvchi kirishlarini boshqarish, ruxsatlarni taqsimlash va xavfsizlik hodisalariga javob berish jarayonlarining samaradorligi baholandi.

Kvantitativ va sifatli tahlil. Tizimlarning samaradorligini aniqlash uchun kvantitativ va sifatli tahlil usullari qo'llanildi. Kvantitativ tahlil orqali ma'lumotlarga kirish tezligi, ruxsatlarni qayta ishlash va tizim yuklamasi kabi ko'rsatkichlar o'rganildi. Sifatli tahlil esa foydalanuvchi tajribasi, qulaylik darajasi va xavfsizlik siyosatining tushunariligi kabi subyektiv omillarni baholashga xizmat qildi.

Case Study (holatni o'rganish). Bulutli ma'lumotlar bazalarida foydalanuvchi huquqlarini boshqarish va xavfsizlik siyosati muvaffaqiyatli joriy etilgan bir nechta real loyihalar misolida chuqur tahlil amalga oshirildi. Ushbu usul orqali tizimlarning funktsionalligi, himoyalanganlik darajasi, avtomatlashtirish imkoniyatlari va amaliy samaradorligi baholandi.

Ekspert intervyulari. Axborot texnologiyalari va axborot xavfsizligi sohasida faoliyat yuritayotgan mutaxassislar bilan o'tkazilgan intervyular orqali foydalanuvchi huquqlarini boshqarishdagi mavjud muammolar, xavfsizlik tahdidlari va kelajakdagi rivojlanish istiqbollari yuzasidan ekspert xulosalari olindi. Ushbu ma'lumotlar tadqiqot natijalarini boyitish va amaliy tavsiyalar ishlab chiqishda muhim ahamiyat kasb etdi.

Tadqiqot metodlari jadvali

Tadqiqot metodi	Tavsif	Qo'llanilish sohasi	Ma'lumotlar turi
Adabiyotlarni tahlil qilish	Ilmiy manbalarni tizimli o'rganish	Ma'lumotlar bazalari va axborot xavfsizligi	Ilmiy maqolalar, monografiyalar
Nazariy tahlil	Nazariy modellar va konsepsiyalarni tahlil qilish	Foydalanuvchi huquqlarini boshqarish	Ilmiy manbalar
Empirik tadqiqotlar	Real tizimlarni amaliy o'rganish	Bulutli ma'lumotlar bazalari	Amaliy misollar
Kvantitativ tahlil	Raqamli ko'rsatkichlar asosida baholash	Tizim samaradorligi	Statistik ma'lumotlar
Sifatli tahlil	Foydalanuvchi tajribasini tahlil qilish	Inson–tizim o'zaro aloqasi	Intervyu va kuzatishlar
Case Study	Alohida loyihani chuqur o'rganish	Xavfsizlik siyosatini joriy etish	Real loyiha ma'lumotlari
Ekspert intervyulari	Mutaxassislar fikrlarini tahlil qilish	Professional baholash	Ekspert tavsiyalari

Tahlil

Bulutli ma'lumotlar bazalari va sun'iy intellekt texnologiyalari ma'lumotlarni saqlash, qayta ishlash va tahlil qilish jarayonlarini sezilarli darajada soddalashtiradi. Bulutli platformalar foydalanuvchilarga ma'lumotlarga istalgan joy va vaqtda kirish imkonini berib, tizimning barqaror ishlashini va ma'lumotlar yo'qolishining oldini oladi.

Sun'iy intellekt algoritmlari katta hajmdagi ma'lumotlarni tezkor tahlil qilish va bashoratlash imkonini bersa-da, noto'g'ri sozlangan yoki yetarli darajada himoyalangan tizimlar axborot xavfsizligiga tahdid tug'dirishi mumkin. Shu sababli foydalanuvchi huquqlarini qat'iy boshqarish, ishonchli autentifikatsiya va doimiy monitoring muhim ahamiyatga ega.

Bulutli va intellektual tizimlar jarayonlarni avtomatlashtirib, inson omili bilan bog'liq xatoliklarni kamaytiradi hamda qaror qabul qilish jarayonini tezlashtiradi. Kelajakda ushbu texnologiyalar yanada rivojlanib, xavfsizlik mexanizmlarining takomillashuvi orqali tizim samaradorligini oshirishi kutilmoqda.

Natijalar

Tadqiqot natijalari shuni ko'rsatdiki, bulutli ma'lumotlar bazalari va sun'iy intellekt texnologiyalari tashkilotlarda ma'lumotlarni boshqarish jarayonlarini avtomatlashtirish va samarali tashkil etishga yordam beradi.

Texnologiyalarning samaradorligi: Bulutli platformalar va sun'iy intellekt modullari ma'lumotlarni real vaqt rejimida yangilash, avtomatik tahlil va bashorat qilish imkonini beradi. Natijada, qarorlar tez va aniq qabul qilinadi.

Xavf-xatarlar. Noto'g'ri sozlangan yoki yetarli darajada himoyalangan tizimlar ma'lumot xavfsizligiga tahdid soladi. Shifrlash, kuchli autentifikatsiya va doimiy monitoring muhim.

Integratsiya va optimallashtirish: Bulutli saqlash va avtomatlashtirilgan intellekt modullari ma'lumotlarni tez va ishonchli qayta ishlash imkonini beradi. Vizual va statistik tahlil vositalari qaror qabul qilishni yengillashtiradi.

Kelajak istiqbollari. Texnologiyalar rivojlanishi tizim samaradorligini oshiradi, xatoliklarni kamaytiradi va foydalanuvchi ma'lumotlarini himoya qiladi, biroq xavfsizlik choralarini muntazam yangilab borish zarur.

Ekspert baholari. Mutaxassislar texnologiyalarni samarali deb baholaydilar, ammo xavfsizlik, monitoring va foydalanuvchi huquqlarini boshqarishga doimiy e'tibor qaratish zarurligini ta'kidlaydilar.

XULOSA

Bulutli ma'lumotlar bazalari va sun'iy intellekt texnologiyalari tashkilotlarga ma'lumotlarni tezkor, ishonchli va samarali boshqarish imkonini beradi. Tadqiqot shuni ko'rsatdiki, bu texnologiyalar ish samaradorligini oshiradi, xatoliklarni kamaytiradi va qaror qabul qilish jarayonlarini optimallashtiradi.

Shu bilan birga, xavfsizlik va foydalanuvchi ma'lumotlarini himoya qilishga alohida e'tibor qaratish lozim. Kelajakda tizimlarni doimiy yangilab borish, xavfsizlik choralarini kuchaytirish va monitoring qilish zarurati saqlanadi. Umuman olganda, bulutli va intellektual tizimlar tashkilotlarga tezkorlik, qulaylik va ishonchlilikni ta'minlaydi, ammo ularni joriy etishda ehtiyotkorlik va doimiy nazorat asosiy talab hisoblanadi.

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PEDAGOGLARNI SUN'IY INTELLEKT TEXNOLOGIYALARINI QO'LLASHGA TAYYORLASHNING RETROSPEKTIV TAHLILI VA ZAMONAVIY HOLATI

***Annotatsiya:** Maqolada sun'iy intellekt va uning rivojlanishi va ta'lim tizimida qanday foydalanishi haqida so'z yuritiladi. SI ta'limi dunyosida eng muvaffaqiyatli bo'lajak - bu inson aqlining yorqinligi va sun'iy intellektning hisob-kitob qobiliyatini uyg'unlashtira oladigan pedagoglarning dunyosidir.*

***Kalit so'zlar:** Sun'iy intellekt (SI), maktab informatikasida SI, funktsional dasturlash tili Lisp, Prolog dasturlash tili, "Aqlli" mashina.*

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RETROSPECTIVE ANALYSIS AND CURRENT STATUS OF TEACHER TRAINING FOR THE APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES

***Annotation:** The article discusses artificial intelligence and its development and use in the education system. The most successful future in the world of AI education is the world of educators who can combine the brilliance of human intelligence and the computational capabilities of artificial intelligence.*

***Keywords:** Artificial intelligence (AI), AI in school informatics, functional programming language Lisp, Prolog programming language, "Smart" machine.*

Sun'iy intellekt (SI) texnologiyalarining tez rivojlanishi ta'lim tizimida tub o'zgarishlarni keltirib chiqarmoqda. Zamonaviy ta'limda SI vositalari shaxsiylashtirilgan o'qitish, adaptiv o'quv muhiti, ma'lumotlar asosida qaror qabul qilish va avtomatlashtirilgan baholash kabi yangi imkoniyatlarni ochib bermoqda. Biroq, bu texnologiyalarning samarali qo'llanilishi, birinchi navbatda,

pedagoglarning ularni qo'llashga tayyorligiga bog'liq. Ushbu maqolada pedagoglarni SI texnologiyalarini qo'llashga tayyorlashning tarixiy rivojlanishi va zamonaviy holati tahlil qilinadi, shuningdek, kelajakdagi istiqbollar yoritiladi. Sun'iy intellektning (SI) informatika sohasidagi ilmiy yo'nalish sifatida shakllanishi nisbatan yaqinda — XX asrning 40–50-yillarida, elektron hisoblash mashinalarining (EHM) jadal rivojlanishi va zamonaviy kibernetika sohasidagi tadqiqotchilarning “intellektual” deb hisoblangan, ilgari faqat inson tomonidan bajarilishi mumkin bo'lgan masalalarning (masalan, shaxmat o'ynash yoki teoremlarni isbotlash) EHM yordamida yechilishiga bo'lgan qiziqishining ortishi natijasida yuz berdi.

O'zbekiston Respublikasining 2030-yilgacha SI rivojlanish strategiyasida SI quyidagicha tariflanadi: “Insonning kognitiv funksiyalarini (jumladan, o'z-o'zini o'qitish va oldindan berilmagan algoritmlar asosida yechim topish) taqlid qiluvchi va aniq masalalarni bajarishda kamida inson intellektual faoliyatiga teng natija beruvchi texnologik yechimlar majmui”.

“Sun'iy intellekt” (artificial intelligence) atamasi esa kompyuter yordamida intellektni modellashtirish bo'yicha tadqiqotlar yo'nalishini belgilash uchun ilk bor 1955-yilda D.Makkarti (J.McCarthy) tomonidan kiritilgan. Stanford universiteti saytida joylashgan shaxsiy sahifasida D.Makkarti SIga aniq, yagona ta'rif berish qiyinligini ta'kidlaydi, chunki qaysi hisoblash jarayonlarini to'laqonli “intellektual” deb atash mumkinligini aniq belgilash mushkul. U shunday yozadi: “Biz intellektning ayrim mexanizmlarini tushunamiz, boshqalarini esa hali tushunmaymiz”.

Sun'iy intellekt tushunchasining mazmuni bo'yicha qarashlar

A.V.Pushkaryov SIning falsafiy asoslari haqida shunday deydi: “Intellekt” atamasi tabiiy va sun'iy intellektni taqqoslashni nazarda tutmaydi. SI deb atalishi sabab — intellektual faol individ bajara oladigan natijalarni mashina yordamida olish imkoniyatida, uning fikricha, SI — bu insonning bilish qobiliyatlari bilan uzviy bog'liq sifat. Shuningdek, olim intellektual tizimlar yaratish ishlari dasturlash tizimlarining rivojisiz tasavvur etib bo'lmasligini ta'kidlaydi [1]. V. M. Maslov SI atamasining uch xil ma'noda qo'llanishini ko'rsatadi:

Informatikaning ilmiy yo'nalishi sifatida SI;

“Aqlli” mashinalarning funksional xususiyati sifatida SI;

“Aqlli” mashinaning o'zi, ya'ni intellektual tizim [2].

T.A.Gavrilova va V.F.Xoroshevskiy SI ni “Informatikaning bir yo'nalishi bo'lib, uning maqsadi — foydalanuvchi-dasturchi bo'lmagan shaxsga tabiatan intellektual hisoblangan masalalarni EHM bilan tabiiy tilning cheklangan qismida muloqot qilgan holda qo'yish va hal etish imkonini beruvchi apparat-dasturiy vositalarni yaratish” deb ta'riflaydi [2].

F.S.Voroyskiy tahriridagi informatika lug'atida SIga quyidagicha ta'riflar berilgan:

Avtomatlashtirilgan tizimlarning inson intellekti funksiyalarini qisman o'z zimmasiga olishi, ya'ni oldingi tajriba va tashqi omillar tahliliga asoslanib optimal qarorlar qabul qilishi [2]

Inson faoliyatiga xos murakkab masalalarning yechimini taqlid qiluvchi sun'iy tizim.

Sun'iy intellekt texnologiyalarining mazmuni

Zamonaviy jamiyatning raqamlashtirilish jarayonlarida "Axborot texnologiyalari" va "Yuqori texnologiyalar" kabi terminlar ham keng qo'llanadi. R.V.Kamenev yuqori texnologiyalarni innovatsion, ko'p funksiyali, ko'p maqsadli va yuqori samaradorlikni ta'minlovchi texnologiyalar sifatida belgilaydi. Bir qator tadqiqotlarda [3;4;5] SI yuqori texnologiyalar yo'nalishiga kiruvchi soha sifatida qayd etilgan. Shu asosda SI texnologiyalari yuqori darajadagi axborot texnologiyalarining bir turi ekanini ta'kidlash mumkin. Ushbu tahlillar asosida "SI texnologiyalari" tushunchasi bo'lajak informatika o'qituvchilarini kasbiy tayyorlash kontekstida quyidagicha aniqlashtiriladi:

insonga xos kognitiv funksiyalarni kompyuter vositalari orqali takrorlovchi, ushbu jarayonni ta'minlovchi dasturiy vositalarni o'z ichiga olgan yuqori axborot texnologiyalari majmui.

bo'lajak informatika o'qituvchilarini SIga o'rgatishning zamonaviy holatini tahlil qilish.

Pedagogik oliy ta'lim muassasalari rasmiy saytlarida joylashtirilgan SI yoki intellektual kompyuter tizimlariga oid fanlarning ishchi dasturlari (yoki annotatsiyalari) tahlil qilinib, O'zbekiston pedagogik universitetlarida bo'lajak informatika o'qituvchilarining SIga oid kasbiy tayyorligi mazmuni bo'yicha umumiy tasavvur shakllantirildi. Biz ajratib ko'rsatgan o'quv rejasi inertsiasining (curriculum inertia) ana shunday ikkinchi darajasi — ya'ni ilgari sun'iy intellekt uchun muhim bo'lgan mavzular hanuzgacha o'qitilayotgani, ularning zamonaviy tadqiqotlar uchun ahamiyati sezilarli darajada pasaygan bo'lsa ham — xorijiy manbalarda ham qayd etilgan eski muammolardan biridir.

I.G.Semakin va L.N.Yasnitskiy "Umumta'lim maktabida "Sun'iy intellekt" fanini o'qitish imkoniyatlari" nomli ishlarida to'g'ri ta'kidlaganidek: "Bugungi kunda internetga murojaat qilishning o'zi kifoya — hozirgi kunda neyron tarmoqlar sun'iy intellektning eng ilg'or yo'nalishiga aylanganini, eng tez rivojlanayotgan ilmiy soha sifatida zamonaviy hayotning deyarli barcha jabhalariga faol kirib kelayotganini ko'rish uchun" [5].

Funktsional dasturlash tili Lisp 1958-yilda D.Makkartiy tomonidan yaratilgan [2]. AQShdagi sun'iy intellekt (SI) tadqiqotchilari Lisp tilini deyarli o'zlarining standarti sifatida qabul qilganlar. Ekspert tizimlarining rivojlanish tarixi, sun'iy intellekt texnologiyalari sohasidagi tadqiqot yo'nalishi sifatida, XX asrning 70-yillarida boshlangan.

Prolog dasturlash tili 1972-yilda mantiqni qo'llash va bilimlarni ifodalashni birlashtirish maqsadida yaratilgan. 1982-yilda mantiqiy dasturlash tili Prolog yapon tadqiqotchilari tomonidan Lisp tiliga alternativ sifatida tanlandi va Yaponiyaning sun'iy intellektga asoslangan beshinchi avlod kompyuter tizimlarini yaratish bo'yicha milliy loyihasi "Fifth Generation Computer Systems"da qo'llanildi. Loyiha doirasida bilimlarni raqamli bo'lmagan shaklda qayta ishlash 1990-yillarda amaliy SIning asosiy yo'nalishi bo'lishi kutilgan [2]. Loyiha 10 yil davom etishi

rejalashtirilgan edi. "Fifth Generation Computer Systems 1992" konferensiyasi loyiha natijalarini yig'ib, beshinchi avlod kompyuter tizimlari nuqtayi nazaridan informatika sohasida yangi davrni boshlashga bag'ishlanishi mo'ljallangan edi [2]. Biroq, loyiha muvaffaqiyatli yakunlanmadi, tadqiqotlar keyingi yillarda ham davom etdi, lekin samarali tizimlar ishlab chiqilmadi [2]. Ayrim tadqiqotchilarning fikriga ko'ra, loyihaning muvaffaqiyatsizligiga Prolog tilini Lisp o'rniga tanlash omili sabab bo'lgan [5]. Shu bilan birga, mantiqiy dasturlash paradigmasiga va uni ekspert tizimlarida qo'llashga bo'lgan umidlar Prolog tilining universitetlarda mashhurligini ta'minladi.

Kompyuterga ovoz orqali ma'lumot kiritish, tabiiy til orqali muloqot qilish, mashina ko'rishi, mashina teginishi, "aqlli" robotlar va robototexnika qurilmalarini yaratish keng tarqalishi kutilmoqda" [6].

Shunday qilib, mantiqiy dasturlash tili Prolog va funktsional dasturlash tili Lisp XX asrning 60–90-yillari davridagi sun'iy intellekt (SI) metodlari va texnologiyalarining asosiy yo'nalishlarini aks ettiradi. Hozirgi kunda esa "oldin qo'llanilgan ekspert tizimlar neyron tarmoqlar tomonidan asta-sekin siqib chiqarilmoqda..." hatto ular eng katta ahamiyatga ega bo'lgan sohalarida ham. Shu sababli (boshqa omillar bilan bir qatorda) ekspert tizimlar dasturlashida asosan qo'llaniladigan Prolog tili ham o'z dolzarbligini yo'qotdi. Lisp tili esa Python tilining rivojlanishi natijasida dolzarbligini yo'qotmoqda. Sun'iy intellekt sohasida klassik hisoblangan P.Norvig Python tilini Lispning asosiy funksiyalarini, makrosiz holda, qo'llab-quvvatlashi bilan ta'riflagan [3]. Lisp va Python tillarining har ikkalasining o'z afzalliklari va kamchiliklari mavjud.

Shu asosda, pedagogik oliy ta'lim muassasalarida ekspert tizimlar va Prolog hamda Lisp dasturlash tillarini sun'iy intellekt bilan bog'liq fanlarning asosiy tarkibiy elementi sifatida o'rganish dolzarbligi shubha ostida, chunki ular zamonaviy SI texnologiyalari bosqichiga mos kelmaydi. Bizning fikrimizcha, kelajakdagi informatika o'qituvchilarida mantiqiy yoki funktsional dasturlash bo'yicha kompetentsiyalarni shakllantirish to'g'ridan-to'g'ri SI bilan bog'liq bo'lmagan fanlar doirasida amalga oshirilishi maqsadga muvofiq, masalan: "Mantiqiy va funktsional dasturlash asoslari", "Matematik mantiq", "Algoritmilar nazariyasi" va boshqalar. Bu esa talabalarga texnologiyalar nuqtayi nazaridan tez rivojlanayotgan dunyoda ko'proq moslashuvchan bo'lish imkonini beradi.

Kelajakdagi informatika o'qituvchilarining professional tayyorgarligi mazmunining zamonaviy SI texnologiyalari talablariga javob bermasligini ko'rsatish uchun, SI texnologiyalarini ishlab chiqish va qo'llash tendensiyalarini ko'rib chiqish lozim. Hozirgi kunda SIning yetakchi texnologiyasi va To'rtinchi sanoat inqilobining potentsial asosini tashkil etuvchi yo'nalish – chuqur o'rganish (Deep Learning) sun'iy neyron tarmoqlaridir. 2010-yilda chop etilgan "Deep Machine Learning – A New Frontier in Artificial Intelligence Research" maqolasida chuqur mashinani o'rganish SIning kelajagini belgilovchi yangi yo'nalish sifatida taqdim etilgan [3].

Mashinani o'rganish, kompyuter ko'rishi va tabiiy tilni qayta ishlash texnologiyalari inson hayotining ko'plab sohalarini raqamlashtirishning asosiy

elementlari hisoblanadi. SI texnologiyalari qidiruv tizimlari, xavfsizlik tizimlari, avtomatlashtirilgan nutqni tarjima tizimlari va boshqalarning ishlashiga asos bo‘ladi. Sun‘iy neyron tarmoqlar asosida ishlaydigan ovozli yordamchilar va virtual shaxsiy yordamchilar: Alisa, Alexa, Google Assistant, Siri yaratilgan. Masalan, Yandex kompaniyasi tomonidan ta‘limda tajriba usullari doirasida ishlatiladigan Alisaga yangi dialoglar va “ko‘nikmalar” Python dasturlash tili yordamida yaratiladi. Google Assistant esa Python yordamida dasturlanadi. Alexa Voice Service uchun C++ interfeysi mavjud, Siri esa Swift va Objective-C tillarida ishlaydi.

IBM mashinani o‘rganish asoslari kursini Python va Scikit-learn kutubxonasi bilan taklif qilgan.

Intel kompaniyasi 13–19 yoshdagi o‘quvchilar va o‘qituvchilar uchun “Intel AI For Youth” dasturini taklif qilgan, bu dastur “ma‘lumotlar ilmi”, “mashinani o‘rganish”, “kompyuter ko‘rishi”, “tabiiy tilni qayta ishlash” va “Python dasturlash” sohalarini qamrab oladi.

Shu asosda, zamonaviy SI texnologiyalari tendensiyalari va kelajakdagi informatika o‘qituvchilarini tayyorlash dasturlarining eskirgan mazmuni o‘rtasidagi ziddiyatni hisobga olgan holda, pedagogik oliy ta‘lim muassasalarida SI bilan bog‘liq fanlarning mazmunini shakllantirish masalasi yuzaga keladi. Bu ikki asosiy jihatni o‘z ichiga oladi:

Fan mazmunining zamonaviy SI yutuqlariga mosligi.

Tarixiy SI asoslarini o‘rganish o‘rniga, zamonaviy SI texnologiyalari va ularni amalga oshirish vositalaridan foydalana olish ko‘nikmalarini o‘rgatishning maqsadga muvofiqligi, bu imkoniyatlar nafaqat informatika o‘qituvchisi, balki maktab o‘quvchilari uchun ham mavjud bo‘lishi lozim.

Ekspert tizimlar ta‘lim sohasida keng qo‘llanilmaydi, chunki bu yerda asosiy omil – o‘qituvchining pedagogik professionalligi, uning tajribasi, sodir bo‘layotgan vaziyatlarga tezkor javob bera olishidir. Hozirgi kunda sun‘iy intellekt dasturlash tillari sifatida ko‘proq Python va C++ ishlatiladi, Prolog va Lisp o‘rniga. Shu bilan birga, Python va C++ tillari maktab informatikasida dasturlash asoslarini o‘rgatishda qo‘llaniladi. Python so‘nggi yillarda maktabda mashhurlik qozonmoqda va ayniqsa Pascal tilining asosiy raqibi sifatida chiqmoqda, chunki u mehnat bozorida, jumladan Data Science sohasida dolzarb bo‘lib, ushbu soha asosan katta ma‘lumotlarni qayta ishlash uchun mashinani o‘rganishga asoslangan SI texnologiyalariga tayangan.

Pedagog kadrlarni SI sohasida tayyorlash muammosi shundaki, pedagogik oliy ta‘lim muassasalarida SI bilan bog‘liq fanlar tanlov fani sifatida berilgan, shuning uchun kelajakdagi informatika o‘qituvchilariga ularni o‘qitish kafolatlanmagan va SI mavzusi ularning professional tayyorgarlik jarayonida yetarlicha yoritilmasligi mumkin. Shu bilan birga, G.M.Grinberg, M.V.Lukyanenko, N.I.Pak ta‘kidlaganidek: “...zamonaviy professional ta‘lim tizimini davlat va jamiyat talablariga moslashini ta‘minlashning eng muhim omillaridan biri – tizimning kadr salohiyatini yangi shakldagi pedagog kadrlarni tayyorlash orqali rivojlantirish”, ya‘ni ular yangi, kreativ mutaxassislarini tayyorlay

oladigan, "...dunyo darajasidagi texnika va texnologiyalar bo'yicha chuqur bilim va amaliy ko'nikmalarga ega bo'lib, zamonaviy innovatsion faoliyat usullarini qo'llay oladigan" mutaxassislar bo'lishi kerak.

Bizning fikrimizcha, bu muammo quyidagi voqealardan biri amalga oshirilganda hal bo'ladi:

Maktab informatikasida SI mavzusini kamida tanishtiruvchi darajada mustahkamlash. Oldin talabalarga SI bilan tanishish bo'yicha harakatlar qilindi [1], ammo mazmunni yangilash zarur.

Ta'lim muassasalarida SIning global joriy etilishi, raqamli ta'lim jarayonida. Shu bilan birga, A.A.Klimov, E.Yu.Zarechkin va V.P.Kupriyanovskiy ta'kidlaganidek, bu o'qituvchilarni SI texnologiyalari bilan to'ldirishni anglatadi, ularni almashtirish emas [5].

Pedagoglar yoki oliy ta'lim muassasalarining rahbariyati zamonaviy SI texnologiyalari bo'yicha kompetent o'qituvchilarni tayyorlash zarurligini anglagan taqdirda, yuqorida sanab o'tilgan ikki voqea tezroq yuz beradi.

So'nggi yillarda SI umumiy ta'lim tizimida ham, jamiyatda ham ommalashmoqda. Masalan, "Urok tsifri" loyihasi va uning "Sun'iy intellekt va mashinani o'rganish" bo'limi [2], shuningdek "AI-ACADEMY – maktab o'quvchilari uchun sun'iy intellekt akademiyasi" platformasi [1]. Federal umumta'lim metodik birlashmasi 7–9 va 10–11 sinflar uchun "Sun'iy intellekt" kursi bo'yicha namunaviy ishchi dasturlarni tasdiqladi, ular asosiy va chuqurlashtirilgan darajada, qo'shimcha faoliyat doirasida amalga oshirilishi tavsiya etilgan [6].

I. V.Robert maktab informatika fanining mazmunini dolzarb qilish yo'nalishlaridan biri sifatida texnologik tarkibni takomillashtirish, zamonaviy SI yutuqlariga moslashtirishni ko'rsatadi [6]. So'nggi yillarda maktabda SI asoslarini o'rgatishga bag'ishlangan ishlanmalar soni ortib bormoqda, shuningdek, ta'lim sohasida SI imkoniyatlari ham o'rganilmoqda. Afsuski, ko'plab mualliflar faqat SI texnologiyalarini qo'llash g'oyalarini keltiradi, lekin ularni amalda qo'llash vositalarini taklif qilmaydi.

Xorijda ham zamonaviy o'qituvchilarni SI texnologiyalari bo'yicha tayyorlash zarurati qayd etilgan. UNESCOning o'qituvchilar uchun ICT kompetensiya tizimi (ICT Competency Framework for Teachers, ICT CFT) tavsiyalarida SI zamonaviy o'qituvchining ta'lim amaliyotiga joriy qilishi lozim bo'lgan texnologik yutuqlar qatoriga kiritilgan, jumladan: ekspert tizimlar, nutqni tanish va tabiiy tilni qayta ishlash, mashinani ko'rish va tasvirlarni qayta ishlash texnologiyalari. So'nggi yutuqlar "mashinani o'rganish" algoritmlari, xususan, chuqur o'rganish orqali amalga oshirilgani ta'kidlangan.

Shuningdek, O. M. Korchajkina AQSh, Hindiston va Xitoy maktablarida SI ni o'qitish tajribasini tahlil qilgan Muallif shuni ta'kidlaydiki, dunyoning ko'plab mamlakatlarida maktabda SI asoslarini o'rgatish zarurati tushunilgan bo'lsa-da, har doim unga resurs yetarli emas. Shubhasiz, maktabda SI elementlarini o'rganish kompetent pedagoglarni talab qiladi. Xorijiy manbalarda SI texnologiyalari zamonaviy ta'limni modernizatsiya qilish imkoniyatlari sifatida ko'rib chiqilgan.

Hozircha SIning ta'lim tizimiga keng joriy etilishi bo'lmasa-da, zamonaviy informatika o'qituvchisi ushbu texnologiyalardan pedagogik faoliyatida foydalanishga tayyor bo'lishi lozim. Uning kompetentsiyasi va SI texnologiyalarini amalga oshirishning zamonaviy vositalarini egallashi professional tayyorgarlik sifatini belgilaydi. E.V.Andrienko ta'kidlaganidek, oliy pedagogik ta'lim samaradorligi universitetning mamlakat, jamiyat va mintaqada dolzarb yo'nalishlar va profillarga yo'naltirilgan professional kadrlar tayyorlashiga bog'liq [1].

Kelajakdagi informatika o'qituvchilarining professional tayyorgarligiga zamonaviy SI texnologiyalarini kiritish ularning yangi axborot texnologiyalari va audiovizual vositalarni egallashini, dasturlash asosiy tushunchalari va prinsiplari bilan tanishishini ta'minlaydi, bu esa ICT-kompetentsiyani oshiradi, kognitiv va professional motivatsiyani rivojlantiradi, mantiqiy va ijodiy fikrlashni shakllantiradi. Shuningdek, SI texnologiyalari bilan ishlash inson aqlining o'ziga xosligini anglashga yordam beradi. Garchi SI tez rivojlanayotgan bo'lsa-da, inson aqli barqaror ravishda kontekstni tushunish, moslashuvchanlik, hissiyotlarni anglash, noverbal signallarni tanib olish kabi noyob qobiliyatlarni saqlab qoladi, bu esa murakkab va standart bo'lmagan vaziyatlarni chuqur tahlil qilish va hissiy intellektni qo'llashni talab qiladi.

Xulosa sifatida quyidagilarni ta'kidlash mumkin:

Tadqiqotning falsafiy, pedagogik, texnik va ijtimoiy-iqtisodiy adabiyoti tahlili asosida "sun'iy intellekt texnologiyalari" tushunchasi professional tayyorgarlik kontekstida aniqlanadi – bu inson kognitiv funksiyalarini kompyuter vositalari orqali taqlid qiluvchi yuqori axborot texnologiyalari bo'lib, ushbu usullarni amalga oshiruvchi dasturiy ta'minotni o'z ichiga oladi. Informatika o'qituvchisi tayyorgarligining retrospektiv tahlili, O'zbekistonda SI sohasida pedagog kadrlarni tayyorlashning hozirgi holati, pedagogik oliy ta'lim muassasalari ishchi dasturlari va tavsiya etilgan adabiyoti tahlili, SI texnologiyalarini rivojlantirish va ularni ta'lim sohasiga joriy etish tendensiyalari pedagogik va metodik darajadagi ziddiyatlarni aniqladi. Ular quyidagilar: davlat va jamiyat talablariga javob beradigan SI texnologiyalarini biladigan raqobatbardosh informatika o'qituvchisi ehtiyoji bilan an'anaviy tayyorgarlik tizimidagi yetarli e'tibor yo'qligi; professional tayyorgarlik sifatini oshirish va ijodiy fikrlashni rivojlantirish zarurati bilan metodik ta'minotning yetarli darajada ishlab chiqilmaganligi. Tadqiqot mavzusidagi ilmiy ishlar va pedagogik fanlarda dissertatsiyalar soni kamligi, SI bo'yicha informatika o'qituvchilarini tayyorlashdagi pedagogik tadqiqotlarning yetishmasligini ko'rsatadi. Bu esa ilmiy-nazariy darajada ziddiyatni yuzaga keltiradi: SI texnologiyalari ko'plab sohalarida, jumladan ta'limda ahamiyatini oshirayotgan bir vaqtda, informatika o'qituvchilarini SI texnologiyalaridan foydalanishga tayyorlash metodologiyasini ishlab chiqish zarur. Zamonaviy SI texnologiyalarini o'rganish pedagogik oliy ta'lim muassasasida informatika o'qituvchilarining professional tayyorgarlik rejasiga kiritilishi lozim, bu esa yuqorida ko'rsatilgan ziddiyatlarni bartaraf etishga imkon beradi.

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MORPHOGENESIS OF THE VASCULAR BED OF THE DURA MATER IN RATS DURING THE PERINATAL PERIOD UNDER PROLONGED ALCOHOL EXPOSURE

Abstract: *The present study addresses the morphogenesis of the angioarchitectonics of the cranial dura mater during the prenatal stage of ontogenesis in rat embryos under normal conditions and during prolonged experimental alcohol exposure. The animals were divided into six groups according to the objectives of the study. Four experimental groups were subjected to chronic ethanol consumption for 90 days. The fifth and sixth groups, consisting of five animals each at 4 and 7 months of postnatal development, served as controls.*

Keywords: *Dura mater architectonics, morphogenesis, ethyl alcohol.*

Introduction

At present, due to the advancement of clinical anatomy, neuromorphology, and immunology, there is a growing scientific interest among morphologists in the detailed investigation of pathogenetic mechanisms and clinical manifestations of fetal alcohol syndrome. Prenatal exposure to ethanol leads to impaired development of various components of the nervous system [2,4].

Consequently, the development of correction strategies, as well as the improvement and creation of clinical-diagnostic and morpho-clinical algorithms for the management of traumatic brain injury complicated by alcohol history, is impossible without a comprehensive study of the morphological, functional, and adaptive characteristics of the relevant anatomical structures [1,3,5].

Aim of the Study

To investigate the morphogenesis of the angioarchitectonics of the cranial dura mater during the prenatal period of ontogenesis in rat embryos under physiological conditions and under prolonged experimental alcohol exposure.

Materials and Methods

The duration of the experiment was 90 days and was conducted during April–May–June, as seasonality represents an additional criterion for assessing adaptive phases. A 90% ethanol solution diluted with distilled water was used: a 0.5% ethanol solution (8 g of alcohol per 1.5 L of water) and a 1.0% ethanol solution (15 g of alcohol per 1.5 L of water). Ethanol solutions were available ad libitum in the drinking bottles of experimental male rats throughout the entire experimental period.

The animals were divided into six groups:

Group 1: Five 4-month-old male rats receiving a 0.5% ethanol solution

Group 2: Five 7-month-old male rats receiving a 0.5% ethanol solution

Group 3: Five 4-month-old male rats receiving a 1.0% ethanol solution

Group 4: Five 7-month-old male rats receiving a 1.0% ethanol solution

Groups 5 and 6: Control groups consisting of five animals each at 4 and 7 months of postnatal development, respectively, receiving drinking water only

At the completion of the experiment, control weighing was performed. All animals were euthanized under ether anesthesia. Following dissection, the intact brain with the dura mater was isolated by anatomical preparation. Fixation was carried out in 10% neutral formalin.

A total of 30 anatomical specimens were examined, from which 200 histological sections of the brain with the dura mater were obtained, each 5 μm thick. Sections were prepared using standard histological techniques and stained with hematoxylin–eosin and Mallory's method. Microscopic analysis was conducted using a high-resolution universal light microscope.

The experiment was initiated on April 20, 2023, and completed on June 20, 2023.

Results

The study demonstrated that the spatial and quantitative distribution of vascular primordia within the dura mater exhibits distinct regional characteristics. In the lateral regions of the anterior cranial fossa, a low density of both arterial and venous vessels with dichotomous branching was observed. In contrast, the centro-cranial and centro-caudal regions displayed a high concentration of vascular structures.

The highest vascular density was identified in the lateral regions of the middle cranial fossa, with a relative predominance of the venous component. Increased densities of both arterial and venous vessels were also noted in areas corresponding to dural sinuses and major venous collectors.

Approximately two-thirds of vascular primordia demonstrated a parallel course, while one-third exhibited a ventrolateral orientation relative to the venous component of the dura mater. Statistically significant differences were confirmed ($p < 0.05$).

Conclusions

The tentorium cerebelli is formed as a duplication of the outer layer of the dura mater. In all cases, the central portion of the tentorial primordium demonstrated close topographic and anatomical relationships with the falx cerebri.

Several critical periods in the prenatal development of the dura mater were identified, which are of significant clinical relevance. Alterations during these stages may lead to developmental anomalies:

First critical period (38–39 days post-fertilization, embryonic stage 16): A key phase in the formation of dural angioarchitectonics, with morphometric variability ranging from 0.07 ± 0.02 to $37.3 \pm 2.7 \mu\text{m}$.

Second critical period (40–41 days, stage 17): Fusion of dural cavities in 87% of cases.

Third critical period (43–44 days, stage 18): Relative closure of the meningeal system, with morphometric values ranging from 43.6 ± 3.1 to 108.7 ± 7.2 μm .

Fourth critical period (52–53 days, stage 21): Final formation of the subarachnoid space, with cavity fusion occurring in the frontal (76%), temporal (97%), parietal (93%), and occipital (82%) regions.

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EVALUATION OF TREATMENT OUTCOMES IN PATIENTS WITH EXTRADURAL SPINAL CORD TUMORS

Abstract: *This study presents an analysis of outcomes in 101 patients who underwent surgical treatment for extradural spinal cord tumors. All patients received comprehensive clinical evaluation. Surgical intervention remains the primary treatment for most primary spinal tumors. However, opinions differ significantly: advocates of anterior approaches consider them superior in radicality compared to posterior surgery, while others prefer combined approaches. Minimally invasive techniques—such as vertebroplasty—are increasingly used, yet no consensus has been reached regarding indications, surgical access, or procedural volume for either primary tumors or spinal metastases. The overall treatment outcomes confirm the appropriateness and effectiveness of the chosen therapeutic strategy.*

Keywords: *spinal cord tumor, vertebroplasty, neurological disorders, surgical treatment*

Introduction

Modern oncology demonstrates two clear tendencies. On one hand, there is a widespread increase in tumors of various origins, including advanced and late-stage forms. On the other hand, improved therapeutic interventions have significantly extended patient survival. Consequently, new demands arise concerning palliative and symptomatic care, focusing on preventing complications and enhancing patient quality of life [1,3,6].

These issues are particularly pronounced in individuals with spinal tumors, where complications frequently lead to mechanical instability and neurological impairment. Such conditions dominate the clinical picture, reduce quality of life, and may render further multimodal therapy impossible [2].

At present, no unified standards exist regarding the indications, scope, or sequence of surgical interventions for extradural spinal tumors. Questions remain regarding the optimal surgical approach, fixation length, stabilization techniques, and reconstruction after corpectomy. The necessity of surgery itself is occasionally debated due to its primarily palliative nature and the risk of perioperative complications [1,2].

Surgical intervention remains the primary treatment for most primary spinal tumors. However, opinions differ significantly: advocates of anterior approaches consider them superior in radicality compared to posterior surgery, while others

prefer combined approaches. Minimally invasive techniques—such as vertebroplasty—are increasingly used, yet no consensus has been reached regarding indications, surgical access, or procedural volume for either primary tumors or spinal metastases [4,5].

Aim of the study

To improve outcomes in patients with extradural spinal cord tumors by establishing criteria for precise topographic diagnosis and differentiated surgical management.

Materials and Methods

This work is based on the clinical evaluation and treatment outcomes of 101 patients with extradural spinal tumors treated between 2018 and 2024. Patient ages ranged from 16 to 75 years; 48 were male and 53 female, with an average age of 40 years.

All patients underwent full clinical assessment. The diagnosis was confirmed intraoperatively and verified histologically.

- Pain was evaluated using the Denis pain scale (1989).
- Quality of life was assessed using the Karnofsky scale (1949).
- Neurological status was graded using the Frankel scale (1969).
- Expected survival was estimated using the Tokuhashi prognostic scoring system (1990).
- Tumor site was classified using Tomita's Surgical Classification (2001).

Results and Discussion

Of the 101 patients, 94 underwent open surgery, while percutaneous vertebroplasty (VP) was performed in 6 cases. In one patient, both open surgery and VP were performed simultaneously. General anesthesia was used in 95 surgeries; VP procedures were done under local anesthesia in 6 cases.

Table 1.

Pain Reduction in the Early Postoperative Period

Tumor Type	Complete Relief	Marked Reduction	Moderate Reduction	Minimal Reduction	Worsening
Benign	6	43	2	3	—
Primary malignant	1	15	2	1	—
Metastatic	—	20	2	5	1
Total (101)	7 (6.9%)	78 (77.4%)	6 (5.9%)	9 (8.9%)	1 (0.9%)

A strong analgesic effect (complete or significant relief) was achieved in 85 patients (84%). A satisfactory effect was noted in 15 patients (14.8%), while an unsatisfactory result was observed in 1 patient, associated with a vertebroplasty complication.

Neurological improvement, defined as at least one-grade elevation on the Frankel scale, was recorded in 84% of patients; neurological decline occurred in 1.2%, and 14.8% remained unchanged.

Table 2.

Neurological Status Before and After Surgery (Frankel Scale)

Preoperative Frankel Grade	A	B	C	D	E
A (3)	3 → A	–	–	–	–
B (0)	–	–	–	–	–
C (19)	–	–	7 → C	12 → D	–
D (25)	–	–	–	21 → D	4 → E
E (54)	–	–	–	3 → D	51 → E

Neurological improvement is the second most important indicator after pain reduction.

In group C, 12 of 19 (63.1%) previously non-ambulatory patients regained the ability to walk independently. Overall, 12 of 21 (57.1%) non-ambulatory patients (Frankel A–C) became ambulatory after surgery.

Table 3.

Early Postoperative Outcomes Using the Karnofsky Scale

Outcome	Karnofsky Score (points)
	90
Good	8
Satisfactory	13
Worsening	–

Within 7–10 postoperative days:

- Good outcomes – 61 cases (60%)
- Satisfactory outcomes – 40 cases (40%)
- No poor outcomes were observed.

Patients demonstrated improved mood, appetite, and mobility, contributing to faster rehabilitation.

Discussion

Spinal tumors are most frequently located in the thoracic region, consistent with the findings of Akeyson, McCutcheon, Cybulski, Rompe, and Sundaresan. Comorbidities and the severity of the oncological process significantly influence surgical decision-making. Preoperative assessment must integrate parameters allowing prediction of postoperative results, as recommended by Tokuhashi, who evaluated general health, neurological function, primary tumor type, spinal metastasis location, and extraskeletal metastases.

Bilsky proposed that surgery is advisable when expected survival exceeds six months. Comorbidities—such as cardiovascular, respiratory, renal, or hepatic insufficiency—may directly contraindicate surgery, as described by Bauer and Cybulski.

Among our 101 patients, 23 (22.7%) had significant comorbidities, and 46 were categorized as ASA class III–IV.

Conclusions

The absolute indications for surgical intervention in primary and metastatic spinal tumors are pronounced neurological disorders and persistent pain syndrome

that does not respond to conservative therapy, while the choice of optimal surgery tactics is determined by a combination of factors, including the neurological status of the patient, the histological nature of the neoplasm, the features of localization and prevalence of the pathological process, pain characteristics, the likelihood of a pathological fracture and the expected life expectancy in metastatic lesions, An analysis of the treatment results shows that an individualized approach to surgical intervention planning contributes to more effective pain control, improved neurological functions, and increased patient functional activity. Treatment outcomes demonstrate that individualized surgical planning significantly improves pain control, neurological recovery, and functional status.

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GENETIKA FANINING ZAMONAVIY OLIY TA'LIM TIZIMIDAGI ROLI VA ILMIY-NAZARIY AHAMIYATI

Annotatsiya: Ushbu maqolada genetika fanining oliy ta'lim tizimidagi o'rni va ahamiyati, uning mustaqil bilim va fan sohasi sifatidagi xususiyatlari ilmiy-nazariy jihatdan tahlil qilingan. Genetikaning irsiyat va o'zgaruvchanlik qonuniyatlarini o'rganishda tutgan fundamental roli, shuningdek, biologiya, tibbiyot, biotexnologiya va qishloq xo'jaligi fanlari bilan uzviy aloqadorligi yoritilgan. Maqolada genetika fanining metodologik asoslari, fanlararo integratsiya imkoniyatlari hamda oliy ta'lim jarayonida talabalarda ilmiy tafakkur, tahliliy fikrlash va kasbiy kompetensiyalarni shakllantirishdagi ahamiyati asoslab berilgan. Tadqiqot natijalari genetika fanining zamonaviy ta'lim tizimida raqobatbardosh, yuqori malakali mutaxassislarni tayyorlashda muhim o'rin egallashini ko'rsatadi.

Kalit so'zlar: genetika, oliy ta'lim, bilim sohasi, fan sohasi, irsiyat, o'zgaruvchanlik, fanlararo integratsiya, kasbiy kompetensiya

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THE ROLE OF GENETICS IN THE MODERN HIGHER EDUCATION SYSTEM AND ITS SCIENTIFIC AND THEORETICAL SIGNIFICANCE

Abstract: This article examines the role and significance of Genetics in the higher education system as an independent field of knowledge and scientific discipline. The fundamental importance of genetics in studying the laws of heredity and variation is analyzed, along with its close integration with biology, medicine, biotechnology, agriculture, and environmental sciences. The paper highlights the theoretical foundations and methodological approaches of genetics, as well as its interdisciplinary potential in modern education. Special attention is given to the contribution of genetics education to the development of students' scientific thinking, analytical skills, and professional competencies. The findings of the study demonstrate that genetics plays a crucial role in preparing highly qualified, research-oriented, and competitive specialists, meeting the demands of contemporary science and education.

Keywords: *genetics, higher education, field of knowledge, scientific discipline, heredity, variation, interdisciplinary integration, professional competence*

Kirish. Oliy ta'limni tashkil etishga yondashuvlarning xilma-xilligi va uning natijalarini modellashtirish yoshlar ta'limining didaktik jihatdan asosli va tasdiqlangan usullarini, xususan biologiya yo'nalishini izlash va uni kelajakdagi kasbiy faoliyatga tayyorlash zarurligiga olib keldi. Barcha sa'y-harakatlar bilan umumiy va kasb-hunar ta'limi tizimidagi hozirgi vaziyat (erta kasbga yo'naltirish va kasbiylashtirish, ixtisoslashtirilgan sinflarni ochish, umumta'lim maktabi darajasida ixtisoslashtirilgan kasb-hunar ta'limi dasturlarini yaratish, ixtisoslashtirilgan maktablar, maktab-internatlar va boshqalar) kerakli samarani bermaydi. Poytaxt va mintaqaviy universitetlar ma'lum bir kasbiy faoliyat uchun g'ayratli, kam o'qitilgan yoki o'z tanloviga ishonchsiz abituriyentni olishni davom ettirmoqdalar. Taqdim etilgan maqolaning munozarali xususiyatini hisobga olgan holda, nafaqat genetik ta'limni tashkil etish bo'yicha o'z pozitsiyalarini, balki boshqa mualliflarning genetikani rivojlantirish muammolari, genetik ta'lim va ularni ushbu sohadagi an'anaviy va zamonaviy yutuqlar asosida hal qilish yo'llari haqidagi qarashlarini to'liq taqdim etishni maqsad qildik. Shu munosabat bilan maqolada O'zbekistonda genetik ta'lim tarixi, genetik ta'limning asosiy muammolari va ularni ta'lim muhitining mavjud sharoitlarida hal qilish usullari, genetikaning bilim va fan sohasi sifatida ahamiyati va o'ziga xosligi masalalari ko'rib chiqiladi.

Mamlakatning etakchi universitetlarida ilmiy va o'qituvchilik faoliyatidan tashqari, ushbu fanni o'qitish sohasida tirik tizimlardagi genetik jarayonlarning ko'rinishini ta'minlash, genetik atamalar, tushunchalar va ta'riflarning roli bilan bog'liq bir qator muammolar va vazifalar mavjudligini ta'kidlaydigan genetika olimlari fikrlaricha:

- ilm-fan va talabalarning fikrlash kontseptual apparatini shakllantirish va rivojlantirish;

- genetik materialni o'rganish mantig'i;

- chuqurlashtirilgan, asosiy va fakultativ materiallar tarkibiga qo'yiladigan talablar;

- genetik vazifalarning yo'nalishlari va hajmi;

- amaliy va laboratoriya mashg'ulotlarini olib borishning samarali usullari juda muhimdir.

Genetika butun dunyo bo'ylab biologiya o'qituvchilari va talabalari uchun eng qiyin mavzulardan biri bo'lib qolmoqda, ko'pchilik talabalar va hatto biologiya o'qituvchilari genetikaning asosiy qoidalarini to'liq tushunmasliklari, raqamli genetik muammolarni hal qilishda qiyinchiliklarga duch kelishlari tan olingan.

Asosiy qism. Genetikani alohida o'quv intizomi sifatida o'qitishning printsiplari va usullari, qonunlari va qonuniyatlari, bir tomondan, didaktikaning rivojlanishiga, shu jumladan oliy ta'lim didaktikasiga muvofiq takomillashtirildi, boshqa tomondan, genetik tadqiqotlar rivojlanishi bilan bir vaqtda o'rganildi va shakllandi.

Shunday qilib, ta'limni tashkil etuvchi asosiy tamoyillardan biri boshlang'ich kurslarda (1 dan 2 gacha) o'qitishning umumiy ilmiy asoslari (biologik) fanlarini chuqur o'rganish, so'ngra 4-5 kurslarda kasbiy ixtisoslashuvning kombinatsiyasi ekanligini yozgan. Ushbu yondashuv talabalar diplomdan oldingi va diplom amaliyotidan o'tadigan ilmiy-tadqiqot muassasalarining eksperimental bazasidan foydalanish sharti bilan amalga oshiriladi. Bizning fikrimizcha, bugungi kunda eng ko'p qabul qilingan tizim genetik ta'lim, universitet darajasi uchun an'anaviy yondashuvdan foydalanishga asoslangan. S. G. Inge-Vechtomov va I. S. Buzovskina genetikani o'qitish XX asr boshlarida biologiyani aniq fanlarga olib kelganligini ta'kidladilar va u, ya'ni genetika chegara intizomi bo'lishga abadiy "mahkum" ekanligini ta'kidladilar. Mualliflarning yozishicha, genetik fanning umumiy biologik ahamiyati ta'lim tizimining o'ziga xos bo'lishi va kelajakdagi mutaxassislarni tayyorlashda hisobga olinishi kerak bo'lgan ba'zi printsiplarni belgilaydi. Aytishimiz mumkinki, genetik ta'limda asosiy rolni "umumiy genetika" kursi o'ynaydi. Uunda dastlab talabalar uchun keyingi barcha maxsus kurslar bo'lishi kerak. Universitet ta'limi va xususan genetik ta'limning ilmiy, amaliy va nazariy ahamiyati tadqiqot va pedagogik ishlarning birligi bo'lib, unda talabalar tadqiqot guruhlarida qatnashadilar, laboratoriyalarda va tematik guruhlarda ishlashadi. S. G. Inge-Vechtomov va I. S. Buzovskinning yozishicha, bunday umumiy muammoni tanlash ilmiy maktabning an'anasi bo'lib, u fanlarning diversifikatsiyasi va integratsiyasi sharoitida o'ziga xos kompas bo'lib xizmat qiladi.

Biologik va genetik bilimlarning ahamiyatiga e'tibor qaratgan holda, biz, genetika, hamkorlikni chuqurlashtirish va rivojlantirish, O'zbekiston mutaxassislari va olimlarining jahon ilm-faniga integratsiyalashuviga ko'maklashish sohasidagi milliy, mintaqaviy va xalqaro loyihalar va dasturlarni ishlab chiqish va amalga oshirish zarurligi g'oyasini muhim deb hisoblaymiz.

Biologiya va amaliy ishlanmalarning asosiy asoslarini rivojlantirishda genetikaning roli haqidagi umumiy tushuncha so'nggi yillarda bakalavriat darajasida genetikani o'qitishning ko'p jihatdan o'zgarishiga olib keldi, mazmuni kengroq bo'ldi va ta'lim tadqiqotlariga asoslangan va faol o'qitish va teskari muhandislik tamoyillariga asoslangan yangi o'qitish usullari yordamida o'qitildi.

Tahlil va natijalar. Fan sohasi sifatida genetikaning mavhum va murakkab tabiati bilan bog'liq ta'lim muammolari batafsil o'rganildi. Ayniqsa, o'quv dasturida irsiyat, ko'payish va meyoziy bo'linishi genetikaning mavhum tabiatini tushuntiradi, biologik tashkilotning turli darajalari esa uning murakkab tabiatiga hissa qo'shadi. Tadqiqot natijasida o'qitish strategiyasini ishlab chiqishning to'rtta asosiy omili aniqlandi:

- organizm, hujayralar va molekulalar darajalarining o'zaro bog'liqligi aniqlandi;

- meyoz va irsiyat o'rtasidagi bog'liqlik ta'kidlangan;

- hayot aylanishi kontekstida somatik va jinsiy hujayralar rivojlanishining xususiyatlari;

- biologik ob'ektlarni tashkil etish darajalari o'rtasidagi munosabatlarni o'rganishda talabalarni o'qitishning interaktiv usullaridan foydalanish taklif etiladi.

Zamonaviy dunyoda genetik fanlarni o'rganishda interaktiv o'qitish usullari keng qo'llaniladi [11]. Amaliy mashg'ulotlar muvaffaqiyatli qo'llanilmoqda va biologik ob'ektlar doirasi kengaymoqda [12], yangi yondashuvlar doimiy ravishda o'rganilmoqda va genetikani o'qitish metodikasi takomillashtirilmoqda, shuningdek uslubiy materiallar sifati [13; 14]; matematik modellashtirishdan foydalanish, jumladan, genetik driftni o'rganish uchun binomial taqsimot xususiyatlari bo'yicha tadqiqotlar olib borilmoqda, [15]. Amerika genetika jamiyati (GSA) "Mendelweb" va "Geneed" ni o'z ichiga olgan "genetikani o'qitish uchun onlayn veb-resurslar" ni ishlab chiqdi. Muntazam ravishda qisqa muddatli o'quv kurslarini tashkil etish genetika kurslarining belgilangan mazmunini qayta ko'rib chiqish, o'qitishning yangi usullarini ishlab chiqish va o'qituvchilarning bilim bazasini yaxshilash uchun o'quv materiallarini tayyorlash uchun tavsiya etiladi [7]. O'qituvchilarga molekulyar genetik usullardan foydalanish bo'yicha amaliy ko'nikmalarini oshirish imkoniyati beriladi [16].

Tarixiy nuqtai nazardan, genetika eng tez rivojlanayotgan fanlardan biri bo'lib, bir yarim asr davomida genetik tadqiqotlar asosida tadqiqot olib borish va molekulyar darajada ishlashga imkon beradigan yangi bilim sohalari paydo bo'ldi – molekulyar biologiya va genetik muhandislik, genetikaning zamonaviy yutuqlari va usullari tirik organizmlar faoliyati sohasida tadqiqotlar o'tkazish uchun istiqbolli imkoniyatlarni rivojlantirishni ta'minladi, masalan: induktsiyalangan mutatsiyalar yordamida ma'lum bo'lgan fiziologik jarayonlarning ko'pini boshqarish, oqsil biosintezi jarayonlarini to'xtatish, morfogenezni o'zgartirish, turli irsiy, onkologik, yurak-qon tomir, virusli va bakterial kasalliklarni o'rganish va boshqalar.

Xulosa: Ushbu muammolarga biz bir xil darajada sezilarli bo'lgan yana bir qator muammolarni qo'shishimiz mumkin-bu maktab o'quvchilari, abituriyentlar va talabalarning asosiy qismi uchun ilmiy va ta'lim motivatsiyasining pastligi. Bu shaxsiy kognitiv ehtiyojlar va motivlarni amalga oshirish uchun umuman genetik va biologik ta'limning ahamiyatini ijtimoiy va shaxsiy kam baholash bilan bog'liq. Bunga umumiy va kasb-hunar ta'limi dasturlarining aksariyati eskirgan tarkib bilan haddan tashqari yuklanganligi, uslubiy va baholash materiallarining nomukammalligi, genetik ta'limning ilmiy-amaliy yo'nalishi etarli emasligi, talabalarni inson hayotining turli jihatlariga oid zamonaviy genetik tadqiqotlar usullari bilan tanishtirish uchun sharoitlarning yo'qligi, shuningdek, yuqori kasbiy sifatli va maksimal ma'lumot bilan to'ldirilgan virtual laboratoriyalarning yo'qligi kiradi. Ko'pgina hollarda, kelajakdagi genetika mutaxassislarining ta'lim ehtiyojlari yetarli darajada hisobga olinmaydi.

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OLIIY TA'LIM TIZIMIDA "GENETIKA" FANINI STEM TA'LIM TIZIMI ASOSIDA O'QITISH

Annotatsiya: Mazkur maqolada oliy ta'lim tizimida genetika fanini STEM (Science, Technology, Engineering, Mathematics) ta'lim yondashuvi asosida o'qitishning nazariy va amaliy jihatlari tahlil qilingan. STEM ta'limining genetika fanini o'qitish jarayonidagi o'rni, fanlararo integratsiya imkoniyatlari hamda zamonaviy pedagogik texnologiyalardan foydalanish masalalari yoritilgan. Shuningdek, loyiha va muammoli ta'lim metodlari, virtual laboratoriyalar, bioinformatika va matematik modellashtirish orqali talabalarning ilmiy-tadqiqot kompetensiyalarini rivojlantirish yo'llari ko'rsatib berilgan. Tadqiqot natijalari genetika fanini o'qitishda STEM yondashuvi talabalarning mustaqil fikrlashini, amaliy ko'nikmalarini va kasbiy tayyorgarligini oshirishga xizmat qilishini asoslab beradi.

Kalit so'zlar: genetika, STEM ta'limi, oliy ta'lim, fanlararo integratsiya, innovatsion ta'lim, loyiha asosida o'qitish, muammoli ta'lim, bioinformatika, virtual laboratoriya, kompetensiyaviy yondashuv

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TEACHING THE SUBJECT OF "GENETICS" IN THE HIGHER EDUCATION SYSTEM BASED ON THE STEM EDUCATION SYSTEM

Annotation: This article analyzes the theoretical and practical aspects of teaching Genetics in higher education institutions based on the STEM (Science, Technology, Engineering, Mathematics) education approach. The role of STEM education in improving the quality of genetics teaching, interdisciplinary integration, and the use of modern pedagogical and digital technologies are discussed. Particular attention is paid to project-based and problem-based learning methods, virtual laboratories, bioinformatics tools, and mathematical modeling as effective means of developing students' research skills and professional competencies. The study results demonstrate that the STEM-based approach

enhances students' critical thinking, independent learning abilities, practical skills, and readiness for modern biological and biomedical fields.

Keywords: *genetics, STEM education, higher education, interdisciplinary integration, innovative teaching, project-based learning, problem-based learning, bioinformatics, virtual laboratory, competency-based approach*

Kirish: XXI asr ta'lim tizimida innovatsion yondashuvlar ta'lim samaradorligini oshirish, talabalarda kreativ fikrlash va tadqiqotchilik qobiliyatlarini rivojlantirishda muhim omilga aylanmoqda. Ana shunday zamonaviy yondashuvlardan biri – STEM ta'lim tizimi bo'lib, u fan (Science), texnologiya (Technology), injeneriya (Engineering) va matematika (Mathematics) sohalarini o'zaro integratsiyalangan holda o'qitishga asoslanadi.

Qolaversa, O'zbekiston Respublikasi Vazirlar Mahkamasining 2021-yil 6-iyuldagi 424-sonli qarori — “STEM ta'limni joriy etish chora-tadbirlari to'g'risida” ijrosini ta'minlash maqsadida bugungi ta'lim jarayonida bu dolzarb bo'lib hisoblanadi.

STEM ta'lim tizimining asosiy maqsadi talabalarni faqat nazariy bilim bilan emas, balki amaliy faoliyat, innovatsion fikr va ilmiy tahlil ko'nikmalari bilan qurollantirishdir. Bu tizim yordamida o'quvchilar va talabalar muammoni yechish, modellashtirish va loyihalash orqali bilimni chuqur o'zlashtiradilar.

Genetika fani tabiiy fanlar ichida eng tez rivojlanayotgan va amaliy ahamiyati yuqori bo'lgan sohalaridan biridir. U na faqat biologik bilimlarni, balki texnologiya, hisoblash usullari va modellashtirish bilan bog'liq ko'plab ko'nikmalarni talab etadi. Shu bois, genetika fanini o'qitishda STEM yondashuvini joriy etish orqali talabalarda ilmiy fikrlash, tadqiqotchilik va kreativlikni rivojlantirish muhim vazifa hisoblanadi.

Tadqiqotning maqsadi: STEM ta'lim tizimi asosida genetika fanini o'qitishning samaradorligini aniqlash va ushbu yondashuv asosida innovatsion metodik tavsiyalar ishlab chiqish.

Tadqiqot vazifalari: 1. Genetika fanini o'qitishda STEM konsepsiyasini tatbiq etish usullarini o'rganish;

2. Virtual va animatsion ta'lim vositalarining samaradorligini tahlil qilish;
3. Talabalarining bilim, ko'nikma va ilmiy qiziqish darajasini baholash;
4. STEM asosidagi o'qitish natijalarini an'anaviy usul bilan taqqoslash.

Metod: Tadqiqot ishi Buxoro davlat pedagogika instituti va Qarshi davlat universitetining biologiya yo'nalishi 2–3-kurs talabalari o'rtasida amalga oshirildi. Jami 82 nafar talaba tadqiqotda ishtirok etdi. Ularning 41 nafari eksperimental (STEM asosida o'qitilgan), 41 nafari esa nazorat guruhi (an'anaviy usulda o'qitilgan) sifatida belgilandi.

1. Tajriba mazmuni: Genetikaning “Odam genetikasi”, “Irsiyatning molekular asoslari” va “Genetik muammolarni yechish” mavzulari tanlandi. Ushbu mavzularda virtual laboratoriyalar, animatsion dasturlar, 3D modellar, genetik kodlash simulyatsiyasi, hamda interfaol muammoli topshiriqlardan foydalanildi.

2. O'qitish jarayoni: Dars jarayonlari PowerPoint animatsiyalari va GenetikaLab dasturi asosida tashkil etildi.

Talabalar guruhlarga bo'lindi va har bir guruhga ma'lum genetik muammo (masalan, qon guruhlari, gemofiliya irsiyatlanishi, jinsga bog'liq belgi) berildi.

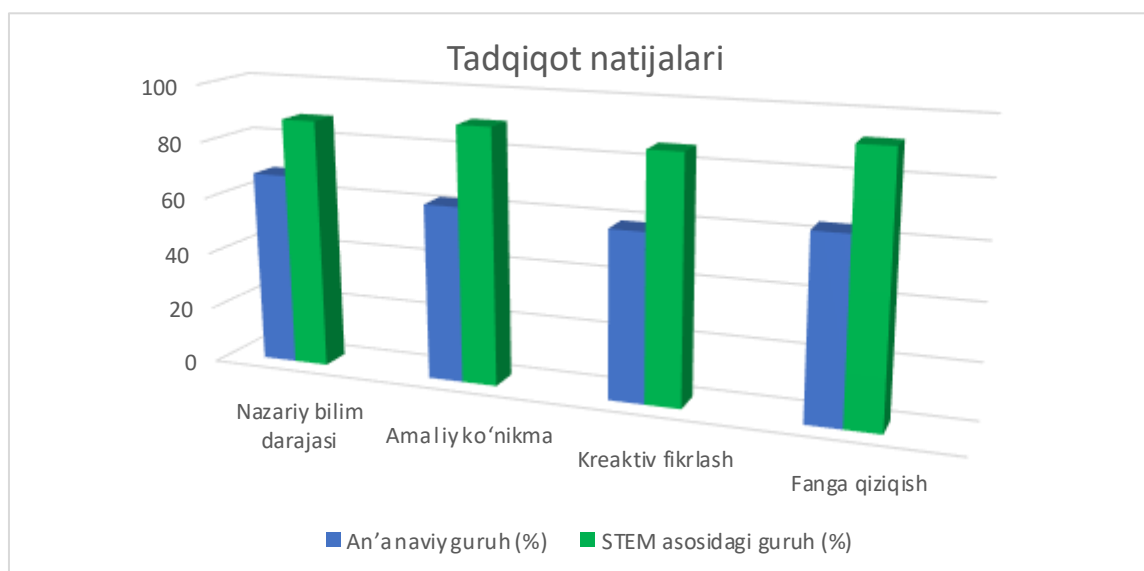
Guruhlar tadqiqot natijalarini infografika yordamida taqdim etdilar.

Talabalar "DNA replication simulation", "Punnett square builder" dasturlari orqali genetik jarayonlarni modellashtirdilar.

3. Baholash usullari: Talabalarning bilimi kuyidagi mezonlar asosida baholandi:

1. Nazariy bilim darajasi (test orqali)
2. Amaliy ko'nikmalar (modellashtirish, tahlil)
3. Kreativ va ilmiy fikrlash ko'rsatkichlari (kuzatuv va intervyu usulida)
4. Talabalarning fanga bo'lgan qiziqishi (anketalash orqali).

Natijalar: Tadqiqot natijalari STEM asosida o'qitilgan guruhda an'anaviy usulda o'qitilgan guruhga nisbatan yuqori ko'rsatkichlar qayd etilganini ko'rsatdi.



Tadqiqot jarayonida genetika fanini STEM ta'lim yondashuvi asosida o'qitish samaradorligi tahlil qilindi. O'quv jarayoniga fanlararo integratsiyalashgan mashg'ulotlar, loyiha asosida o'qitish, muammoli vaziyatlar, virtual laboratoriyalar hamda bioinformatik elementlar joriy etildi. Olingan natijalar STEM yondashuvi an'anaviy ta'lim usullariga nisbatan bir qator ustunliklarga ega ekanligini ko'rsatdi.

STEM asosida o'qitilgan talabalar nafaqat genetik jarayonlarni yaxshi anglab yetdilar, balki ularni modellashtirish, muammoli vaziyatlarda yechim topish, tadqiqotchi sifatida fikrlash ko'nikmalarini ham namoyon etdilar.

Intervyu natijalariga ko'ra, talabalarning 87% foizi "virtual va animatsion usullar" ularga fanni yaxshi anglash va eslab qolishda yordam berganini ta'kidladilar.

MUHOKAMA: Olingan natijalar STEM ta'lim tizimini genetika fanini o'qitishga joriy etish yuqori samara berayotganini ko'rsatadi. Bu tizim an'anaviy "leksiya–amaliy" modeldan farqli ravishda talabani faol ishtirokchiga aylantiradi.

Tadqiqot jarayonida kuzatilgan asosiy afzalliklar quyidagicha:

1. Talabalarda muammoni tahlil qilish va yechim topish qobiliyati rivojlandi.
2. Ilmiy fikrlash va tadqiqotchilik ko'nikmalari shakllandi.
3. Fanlararo integratsiya – biologiya, matematika va axborot texnologiyalari o'zaro bog'landi.
4. Talabalarning ta'limga bo'lgan ichki motivatsiyasi oshdi.

Jahon tajribasiga nazar tashlasak, STEM ta'limi AQSh, Yaponiya, Koreya va Yevropa davlatlarida ilmiy kadrlar tayyorlashda asosiy platformaga aylangan. Xususan, genetika va molekular biologiya yo'nalishlarida robotlashtirilgan laboratoriyalar, simulyatsion modellar va big data tahlillaridan foydalanish ta'lim samaradorligini oshirmoqda.

O'zbekistonda ham "Yangi avlod kadrlari" konsepsiyasi doirasida STEM ta'limini joriy etish bo'yicha dasturlar amalga oshirilmoqda. Buxoro va Qarshi oliy ta'lim muassasalarida olib borilgan ushbu tadqiqot natijalari shuni ko'rsatadiki, STEM tizimi nafaqat tabiiy fanlarda, balki genetika ta'limida ham katta samara beradi.

Xulosa:

1. STEM ta'lim tizimi genetika fanini o'qitishda talabalarning nazariy va amaliy bilimlarini uyg'unlashtirishga imkon beradi.
2. Talabalarda ilmiy tadqiqotchilik, kreativ fikrlash va texnologiya bilan ishlash ko'nikmalari shakllanadi.
3. Virtual laboratoriyalar, animatsion dasturlar va modellashtirish usullari fanni chuqur o'zlashtirishga yordam beradi.
4. Tadqiqot natijalari STEM asosida o'qitilgan guruhda bilim va qiziqish ko'rsatkichlari 25–30% ga oshganini ko'rsatdi.
5. Genetika fanini STEM yondashuvi asosida o'qitish nafaqat ta'lim sifatini oshiradi, balki kelgusi biolog, tibbiyot va pedagog mutaxassislarning innovatsion fikrlashini shakllantiradi.

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YUSUF XOS HOJIB “QUTADG‘U BILIG” ASARIDA DAVLAT BOSHQARUVIDA AXLOQIY MASALALAR

Annotatsiya: Mazkur maqolada “Qutadg‘u bilig” asarida davlat boshqaruvida axloqiy qarashlari, hukmdor o‘zida shakllantirish kerak bo‘lgan fazilatlari haqida yozib, davlat va jamiyat taraqqiyoti omillarini keltiradi. Maqolada XI asr turkiy falsafiy va siyosiy tafakkurining ajoyib yodgorligi bo‘lgan Yusuf Xos Hojibning “Qutadg‘u bilik” asarda bayon etilgan davlat boshqaruvining axloqiy jihatlari ko‘rib chiqiladi. Asar muallifi odob-axloq, adolat va hokimiyat mas‘uliyati kabi muhim masalalarni ko‘tarib, hukmdor, maslahatchi va amaldorlarning fazilatlari muhimligini ta’kidlaydi. Dono davlat boshqaruvi, halollik, xalqqa xizmat qilish g‘oyalari hamda shaxsiy axloq va davlat faoliyati o‘rtasidagi uyg‘unlik tahlil qilinadi. Tadqiqot Xos Hojib g‘oyalarining hokimiyat etikasining zamonaviy tushunchasi uchun dolzarbligini ko‘rsatadi va siyosiy madaniyat kontekstida uning qarashlarining universalligini ta’kidlaydi.

Kalit so‘zlar: Yusuf Xos Hojib, Qutadg‘u bilig, hukmdor, vazir, ma’rifat, axloq, axloqiy qadriyatlar, fazilat.

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THE WORK OF YUSUF KHAASS HAJIB “KUTADGU BILIG” ETHICAL ISSUES IN PUBLIC ADMINISTRATION

Abstract: This paper examines the ethical aspects of public administration as presented in the treatise Kutadgu Bilig by Yusuf Khass Hajib, an outstanding monument of Turkic philosophical and political thought of the 11th century. The author addresses key issues of morality, justice, and the responsibility of power, emphasizing the importance of virtues in rulers, advisers, and officials. The study analyzes the ideals of wise governance, honesty, service to the people, and harmony between personal morality and state activity. The research demonstrates the relevance of Khass Hajib’s ideas for the modern understanding of the ethics of power and highlights the universal nature of his views within the context of political culture.

Keywords: Yusuf Khass Hajib, Kutadgu Bilig, ruler, minister, enlightenment, morality, moral values, virtue.

“Qutadg'u Bilig” asari turkiy xalq adabiyotining noyob qismi sifatida tarixda o'z o'rnini egallagan va “Qutadgu bilig” islom-turk mumtoz adabiyotining ilk turkiy asaridir. Ushbu asar 11-asrda yozilgan bo'lib, unda Yusuf Xos Hojib davlat boshqaruvi, ijtimoiy adolat va axloqiy tamoyillarni o'zida aks ettiradi. Asar o'zidagi ko'plab metaforalar va ramzlar orqali o'qiydiganlar uchun bilim va hikmat manbai bo'lib xizmat qiladi. Yusuf Xos Hojib avvalambor adolatli rahbar va hukmdor bo'lish zarurligini ta'kidlaydi. Ushbu asar mantiqiy tuzilishi, ichki ko'rsatmalari va tarixiy konteksti bilan o'z zamonasida juda dolzarb bo'lgan. Ushbu kitob qaysi iqlim yoki mamlakatga, qaysi qishloq va shaharga yetib borgan bo'lsa, o'sha yerda munosib nom berildi. Chinlilar “Adab ul-muluk” deyishgan bo'lsa, mochinliklar “Anis ul-mamolik” deb atashdi, Mashriq elining ulamolari, donishmandlari esa yakdillik bilan “Ziynat ulumaro” deya nom berdilar. Eronliklar buni “Shohnoma” deb qabul qilishdi. Turonliklar orasida esa u “Qutadg'u bilig” nomi bilan mashhur bo'ldi. Yuqorida aytilganidek “Adab al mulk” nomidan shuni bilish mumkinki davlat va jamiyat boshqaruvi hamda taraqqiyoti uchun asarda mavjud bo'lgan turli hikmatli so'zlar jamlangan bo'lib, ularni chuqur tahlil etadigan bo'lsak albatta XI asrga oid ijtimoiy-siyosiy masalalarning falsafiy qarashlar yuzaga keladi. Asarda davlat boshqaruviga tegishli hikmatlar adib tomonidan ma'lumot, tavsiya, fikr va qarashlar berilgan. U dunyodagi hamma ezgu ishlarda qo'l keladi. Unda mulk tutishning sir-u asrori, mamlakatni idora qilish tartibi, sharti, shuningdek, mol-u mulk, el-yurtning mangu qolishi, gullab-yashnashi va uning xarob bo'lish belgilari, lashkar va xos yigitlar, boshqa masalalar saylanib, tanlanib gapirilgan.

Yusuf Xos Hojib — o'z vaqtida davlat boshqaruvi, adabiyot va falsafa sohasida o'ziga xos taassurot qoldirgan o'z davrinning yirik, ko'zga ko'ringan adib, mutafakkir bo'lib, u o'zining mashhur asari “Qutadg'u Bilig” bilan tanilgan. Ushbu asar ko'plab falsafiy, axloqiy va siyosiy masalalarni yoritib, o'z davrining madaniy va ijtimoiy hayotida muhim ahamiyatga ega. Davlat boshqaruvi, adolat, aql, davlat va qanoat tushunchalari “Qutadg'u Bilig”da alohida o'rin egallaydi. Ushbu maqolada biz Yusuf Xos Hojibning asaridagi davlat boshqaruvi tushunchalarini, ayniqsa adolat, aql, davlat va qanoat tushunchalarining talqinini batafsil ko'rib chiqamiz.

Yusuf Xos Hojibning “Qutadg'u Bilig” asarida davlat tushunchasi ham muhim ahamiyatga ega. Davlat, fuqarolar o'rtasidagi muloqot, iqtisodiy rivojlanish va madaniy almashuvlarni ta'minlaydi. Davlat fikri, ijtimoiy hayotni boshqarish va barqarorlikni saqlash uchun zarur. Davlatni kuchli, adolatli va aqlli boshqaruv bilan saqlash zarur. Asar asosida to'rt narsa yotadi. Biri to'rtlikka tayanch — Adolat, Biri Davlat erur, u qutli g'oyat. Uchinchi — ulug'lik Aql ham Zako, To'rtinchi — Qanoat erur bebaho. “Qutadg'u bilig” asarining markaziy qahramonlaridan biri Oyto'ldidir. Oyto'ldi o'ziga yarasha ramziy ma'noga ega adabiy qahramon. Uning turkiy ismidagi oy va to'ldi qismlari tagma'nosida bilim olgani sari oyday to'lishib borayotgan, mukammallikka intilayotgan shaxs degan tushunchalar yotadi. “Oyto'ldi – demak u bilim egallash riyozatlari bilan hilol – yangi oy edim, oyday to'ldim.

Bularning har biri yana alohida-alohida nomlarga ega. Adolatning nomi — Kuntug‘di. U asarda elig vazifasida keladi. Elig podsho demakdir. Davlatning ismi — Oyto‘ldi. U vazir mansabida. Zakovat, aql esa O‘gdulmish deyilgan. O‘gdulmish Oyto‘ldining o‘g‘li sifatida namoyon bo‘ladi. Qanoat O‘zg‘urmish nomini oladi. U asarda vazirning qarindoshi sifatida ko‘rinadi.

Muallif ularning suhbatlari orqali jamiyat tuzilishi va undagi shaxsning rolini tahlil qiladi, axloq, qismat, kuch-qudrat, ma‘naviyat masalalarini ko‘taradi.

Yusuf Hos Hojib adolatli hokimiyat g‘oyasi adolatni davlat tuzilishining asosi deb biladi. U hukmdor nafaqat kuchli, balki dono, fazilatli, xalqni farovonlikka yetaklashga qodir bo‘lishi kerak, deb ta‘kidlaydi. Adib o‘zining falsafiy qarashida axloq va shaxsiy fazilat inson uchun muhim deb qaratilgan. U bilim, o‘zini tuta bilish, halollik, ehtirolarni nazorat qilish va umumiy manfaatlarga xizmat qilishni ta‘kidlaydi.

Allomaning fikricha, bilim hukmdorning xohish-istagidan muhim va yuqoridir. Garchi hokimiyatning ilohiyligi haqidagi qarashlarga monand fikrlasada, Yusuf Xos Hojib hukmdor bilimdon maslahatgo‘yining yo‘l-yo‘riqlariga muhtoj ekanini uqtirib o‘tadi. Chunki bilimsizlikning o‘rnini na hokimiyat, na boylik to‘ldira oladi. Bilimgina insonni hayotdagi barcha qiyinchilik va muammolardan xalos etishga yordam berishi mumkin. Bilimsiz inson o‘ziga va oilasiga, atrofdagilarga zarar yetkazsa, bilimsiz hukmdor butun jamiyatning kulfatidir. Shu nuqtayi nazardan allomaning bilimning determinantligi haqidagi konsepsiyasi, uning hukmdorlar uchun pand-nasihat tarzida yozilgan asarida markaziy mavzulardan biriga aylangan:

“Qutadg‘u bilig” asarda adib davlat boshqaruvni adolat, halollik, tadbirli, kabi fazilatlarini ilari surib Kuntug‘di hikoyasida quyidaicha ta‘rif beradi “Kuntu‘di ismli elig (podsho) bo‘lib, u dono va adolatli ekanligi bilan dong taratgan edi. Uning himmat va muruvvati ham chek-chegara bilmas edi. Elig mamlakatni obod, elyurtni esa shod-xurram qilish istagi bilan yonardi. Uning shuhrati butun olamga yoyiladi. Ishlarini oliyjanoblik va saxovat bilan yuritganidan mamlakatda farovonlik va osoyishtalik hukm surar edi. Podsho mamlakatdagi barcha donishmandlami ham ezgulik ishlariga jalb etadi”. [1] Yusuf xos Hojib asarida nafaqat hukmdor balki vazir fazilatlarini haqida ham o‘z qarashlarini bayon etadi: Yusuf Xos Hojib o‘zining “Qutadg‘u bilig” asarida davlat xizmatini amalga oshirayotgan arboblarning qanday xususiyatlarga ega bo‘lishi lozimligi to‘g‘risida batafsil yozadi. U kim vazir bo‘lishi mumkinligi to‘g‘risida shunday deydi: Vazir “pishiq va odil bo‘lishi, boshqalarni ham shu yo‘lga undab turishi lozim. Vazirlik ulug‘ ish. Bu ishga ishonchli, yetuk va sara, uquv-idrokli, dono va yumshoq ko‘ngil, ayni paytda dadil va jur‘atli kishilar kerak”

“Vazirlikka rostgo‘y, yozuv-chizuv ishlaridan to‘la xabardor bo‘lgan kishi kerak. Uning xulq-atvori ko‘pchilikka manzur, tili bilan dili bir bo‘lishi lozim. Uyat-andisha egasi, dili kirsizlar bu amalga munosibdir. Ko‘zi to‘q, abjir, bilag‘on, sezgir, yaxshi yomonning farqiga boruvchilar vazirlikka loyiq bo‘ladi.”

“Boshliq tili va ko‘nglini to‘g‘ri tutadigan bo‘lsa, uning xodimlari, qo‘l ostidagi ishchilari ham to‘g‘rilik yo‘lini tanlaydi” [2]

Adolatli jamiyat qurishda adib o'z e'tiborini ta'limga – bilimga alohida e'tibor qaratadi. Ideal davlatda har bir hokimiyat lavozimiga nomzodlar tayyorlanishi va mazkur vazifaga imtihonlar asosida tayinlanishini aytadi.

Bilimsizga dushman bilim, qilg'i,
Yetar ikkovining shu qilg'ilig'i.
Shunga o'xshar endi bu turkcha maqol,
o'qig in uni sen, dil-u jonga ol:
Uquvli kishiga zakovati esh,
Bilimsiz kishiga mukofot — so'kish.
Bilimliga bilim tugal ton, osh-ey
Bilimsiz qilg'i yovuz yo'ldosh-ey! [3]

Inson tomonidan egallangan bilimlarning hayotga tatbiq etilishi – moddiylashuvi saroy muhitida maslahatlar orqali namoyon bo'ladi. Bilim insonni bir pog'ona yuqoriga ko'tarsa, dono kishining maslahati uni yana bir pog'onaga ko'taradigan omillardandir [4] Yusuf Xos Hojib bilimli, ma'rifatli insonning davlat va jamiyat oldidagi mas'uliyatiga ancha kengroq qaraydi. Shu sababli bo'lsak kerak, Oyto'ldi poytaxtga, podshoh saroyiga xizmat uchun keladi. Haqiqiy olim sifatida Oyto'ldi podshoh – Kuntug'di bilan silliqqina til topishib keta olmaydi. Ular o'rtasida qarama-qarshiliklar ham bo'lib o'tadi⁶. Yusuf Xos Hojib qarashlarining eng muhim jihati uning bilimga nisbatan pragmatik yondashuvidir. Ya'ni bilimli inson o'z o'rganganlarini insoniyat farovonligi yo'lida xizmat qildirishi kerak, degan fikrga qat'iy ishonadi [5]

Yusuf Xos Hojib Oyto'ldi obrazida ham davlat, ham baxt xususiyatlarini birlashtiradi. Ularni bir-biri bilan chambarchas bog'liq xususiyatlar sifatida tasvirlaydi. Chindan ham, na boylik, na baxt mangu emas, ular birda bor, birda esa yo'q. Oy qorong'i tunni yoritish uchun xizmat qilsa, davlat va baxt inson hayotini

yorituvchi omildir. Albatta, boylikka hirs qo'yish, baxtdan mast bo'lish yaxshilikka olib kelmaydi. Zero, boylik shunday asov ot, baxt shunday ayyor nozaninki, ularni aql-zakovat bilan jilovlamasa, egasini xorlikning tubsiz jarliklariga yiqitishi mumkin.

Xorijiy tadqiqotlarida "Siyosat-noma" va "Qutadg'u bilig"ga bo'lgan aqliy qiziqish hamdardlik darajasida qolib ketgan. Olimlar bu ko'p qirrali matnlarga faqat tom ma'nodagi yoki siyosiy tarixiy asarlar sifatida qarashgan. Biroq, har ikki mutafakkir o'z fikrlarining ma'muriy jihatini hisobga olgan holda chuqur ilmiy izlanishlarga loyiqdir. Qolaversa, so'nggi paytlarda nafaqat davlat boshqaruvi, balki xo'jalik boshqaruvi sohasida ham duch kelgan muammolar ushbu matnlarning muhimligini yana bir bor ochib beradi.

Har ikkala asarda asosiy e'tiborni hukmdorga qaratilgan va davlat boshqaruvini yaxshi qiladigan fazilatlar ro'yxati sifatida beriladi. Ular orasida halollik, adolatlilik va xayrixohlik boshqaruv tushunchasini axloqiy darajaga keltiradigan narsalar sifatida birinchi o'ringa chiqadi. Ushbu tadqiqot birinchi navbatda axloqiy ma'muriy atributlarni tahlil qilib, ularning o'zaro bog'liqligini har tomonlama aniqlashga harakat qildi, ikkinchidan, ularni boshqaruv sohasidagi

hozirgi axloqiy munozaralar bilan bog'lash. Yusuf Xoss Hojib va Nizom al-Mulkning halollik va halollikka bo'lgan yondashuvlari zamonaviy boshqaruv nuqtai nafari bilan o'xshashligini ko'rsatadi, bu esa yashirin ishonchni asosli rahbar va izdoshtar munosabatlarining zaruriy sharti sifatida tan oladi. Boshqa tomondan, "Qutadgu bilig" va "Siyosat-noma" sof halollikni to'ldirmasa, qoniqarsiz deb topdilar. [5]

Xulosa qilib aytadigan bo'lsak Yusuf Hos Hojib "Qutadgu bilig" asarida boshqaruv adolat, donolik va ma'naviy mas'uliyatga asoslangan axloqiy davlat modelini yaratadi. Bu qarashlar bugungi kunda ham dolzarbdir: ular bizga ma'naviy poydevorsiz hokimiyat qonuniylikni yo'qotib, jamiyatni halokatga olib borishini eslatib turadi. Yusuf Hos Hojib falsafasi axloq va siyosatning birligiga da'vat, bu yerda hukmronlik qilish xizmat qilish demakdir.

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ARTIFICIAL INTELLIGENCE-BASED MEDICAL DIAGNOSTIC DEVICES IN BIOMEDICAL ENGINEERING: APPLICATIONS, PERFORMANCE, AND FUTURE PROSPECTS

Abstract: *The rapid advancement of artificial intelligence (AI) in biomedical engineering has significantly transformed medical diagnostics. AI-based diagnostic devices, including imaging systems (MRI, CT, X-ray) and sensor-based monitoring tools, have demonstrated superior accuracy, sensitivity, and efficiency compared to traditional diagnostic methods. This study explores the integration of AI algorithms, such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), into medical diagnostic devices and evaluates their performance in real-time clinical applications. Results indicate that AI-assisted devices enhance early disease detection, reduce human error, and optimize diagnostic workflow, ultimately contributing to personalized patient care and improved healthcare quality. The findings underscore the crucial role of AI in shaping the future of biomedical engineering and medical diagnostics.*

Keywords: *Artificial Intelligence (AI), Biomedical Engineering, Medical Diagnostic Devices, Machine Learning, Deep Learning, Real-Time Monitoring, Personalized Medicine.*

Introduction

In recent years, technological advancements have significantly transformed patient diagnosis and treatment processes in the medical field. In particular, biomedical engineering has made substantial contributions by integrating artificial intelligence (AI) and digital technologies into medical diagnostic devices, enhancing their efficiency and accuracy. Traditional diagnostic procedures are often time-consuming and dependent on human expertise, which can lead to variability in results. Therefore, modern diagnostic devices powered by artificial intelligence algorithms facilitate faster clinical decision-making, improve diagnostic precision, and ensure patient safety. Artificial intelligence, including machine learning and deep learning technologies, is increasingly applied in medical image processing, detection of pathological changes, and disease prognosis evaluation. For instance, AI systems can analyze X-ray, ultrasound, MRI, and CT images with higher accuracy compared to human specialists. Moreover, AI-integrated diagnostic devices can process data in real-time, enabling rapid decision-making in urgent clinical scenarios. Within the context of biomedical engineering, AI-based diagnostic devices not only represent technological innovation but also enhance the

efficiency of medical practice and the quality of patient care. Therefore, this article aims to analyze the applications, advantages, and future prospects of artificial intelligence in biomedical engineering for medical diagnostic processes.

Relevance

The integration of artificial intelligence (AI) into biomedical engineering, particularly in medical diagnostic devices, represents a critical advancement in modern healthcare. Early and accurate diagnosis is essential for effective treatment, reducing complications, and improving patient outcomes. Traditional diagnostic methods, while effective, often rely heavily on human expertise, which can introduce variability and delay in clinical decision-making. AI-powered diagnostic systems address these limitations by providing rapid, precise, and consistent analysis of complex medical data. The relevance of this topic is further emphasized by the increasing prevalence of chronic and complex diseases, such as cardiovascular disorders, cancer, and neurodegenerative conditions. These diseases require advanced diagnostic tools capable of detecting subtle changes that may be overlooked by conventional methods. AI-driven devices, including imaging systems and sensor-based monitoring tools, offer significant potential for enhancing diagnostic accuracy and efficiency. Furthermore, the adoption of AI in biomedical engineering aligns with global trends toward digital healthcare, telemedicine, and personalized medicine. Understanding the relevance and applications of AI-based diagnostic devices is therefore crucial for healthcare professionals, biomedical engineers, and researchers aiming to improve healthcare delivery and patient care quality.

Aim

The primary aim of this study is to explore the applications and impact of artificial intelligence (AI) in biomedical engineering, specifically focusing on medical diagnostic devices. This research seeks to examine how AI technologies enhance diagnostic accuracy, improve clinical decision-making, and increase the efficiency of medical diagnostic processes.

Additionally, the study aims to:

1. Analyze the integration of AI algorithms in various diagnostic devices such as imaging systems, sensors, and laboratory equipment.
2. Evaluate the benefits and limitations of AI-assisted diagnostics compared to traditional methods.
3. Highlight the potential of AI-driven diagnostic tools in advancing personalized medicine and real-time patient monitoring.

By achieving these objectives, the study intends to provide insights into the role of AI in shaping the future of biomedical engineering and improving overall healthcare quality.

Materials and Methods

The first step in this study involved identifying and selecting medical diagnostic devices that integrate artificial intelligence (AI) algorithms. These devices included imaging systems such as X-ray, MRI (Magnetic Resonance Imaging), and CT (Computed Tomography) scanners, as well as sensor-based

monitoring devices for vital signs like heart rate, blood pressure, and blood glucose levels. Each device was chosen based on its clinical relevance, accuracy, and potential for real-time data analysis. For instance, AI-powered MRI scanners can automatically segment tissues and detect anomalies such as tumors with high precision. Data from these devices were collected in accordance with ethical standards, ensuring patient confidentiality. Moreover, the devices selected were compatible with machine learning frameworks, allowing integration with neural networks for predictive diagnostics.

Data collection focused on acquiring both imaging and sensor data from the selected devices. Imaging data included high-resolution MRI, CT, and X-ray images, while sensor data covered continuous monitoring of cardiovascular and metabolic parameters. The data underwent preprocessing to ensure quality and uniformity. This involved noise reduction, normalization, and labeling of pathological and non-pathological samples. For example, MRI images were normalized to standard intensity levels, and X-ray images were enhanced to improve contrast of soft tissues. Preprocessing also included segmentation, where regions of interest (ROIs) were defined for targeted analysis. Annotated datasets were then split into training, validation, and testing sets to support the development of AI algorithms.

The study implemented various AI algorithms, including machine learning models such as support vector machines (SVM) and random forests, as well as deep learning architectures like convolutional neural networks (CNNs). CNNs were particularly applied to imaging data for feature extraction and pattern recognition. For sensor-based datasets, recurrent neural networks (RNNs) and long short-term memory (LSTM) networks were utilized to analyze temporal sequences and detect abnormal physiological trends. Model training involved iterative optimization using backpropagation and gradient descent techniques. Hyperparameters were tuned to maximize diagnostic accuracy. An example includes using CNNs to classify MRI brain scans into healthy and pathological categories with accuracy exceeding 90%.

The AI algorithms were integrated with biomedical engineering systems to enable real-time analysis and diagnostics. Imaging devices were connected to AI software that could automatically detect anomalies and provide quantitative metrics such as tumor size or lesion volume. Sensor devices were embedded with AI modules capable of alerting clinicians in case of abnormal vital signs. For example, an AI-assisted ECG monitoring system could predict arrhythmias minutes before they occurred, allowing preventive intervention. This integration ensured a seamless workflow between hardware, software, and clinical decision-making. Data visualization dashboards were developed to present findings clearly for healthcare professionals.

Finally, the performance of AI-based diagnostic devices was validated through comparative analysis with traditional diagnostic methods. Metrics such as sensitivity, specificity, accuracy, and area under the receiver operating characteristic (ROC) curve were calculated. For instance, AI-based MRI analysis was compared against radiologist interpretations, showing improved detection of micro-tumors.

Cross-validation techniques were employed to prevent overfitting and ensure generalizability of the models. Additionally, feedback from clinical experts was incorporated to evaluate the practical applicability of the AI systems. The validation process confirmed that AI integration in biomedical engineering devices enhances diagnostic precision and reduces the likelihood of human error.

Discussion

The findings of this study confirm the growing importance of artificial intelligence in biomedical engineering, particularly in the development and optimization of medical diagnostic devices. The high accuracy and sensitivity achieved by AI-assisted imaging systems emphasize the ability of deep learning algorithms, such as CNNs, to process complex medical data and detect subtle pathological changes that may be overlooked by human observers. This is especially critical in conditions such as brain tumors and lung lesions, where early detection plays a vital role in patient prognosis. The successful application of RNN and LSTM models in sensor-based monitoring devices highlights the advantage of AI in analyzing time-dependent physiological data. Continuous monitoring and predictive analysis enable early intervention and reduce the risk of acute complications. These capabilities align with the principles of personalized medicine, where treatment strategies are tailored based on individual patient data and risk profiles. The observed reduction in diagnostic time further supports the clinical value of AI-based diagnostic devices. By automating image interpretation and physiological data analysis, AI reduces the workload of healthcare professionals and minimizes human-related diagnostic errors. This efficiency is particularly beneficial in high-demand clinical environments and emergency settings, where timely decision-making is crucial. Despite these advantages, the study also acknowledges certain challenges associated with AI integration, including data quality requirements, algorithm transparency, and the need for clinical validation. Ethical considerations and data security must be addressed to ensure safe and responsible use of AI in healthcare. Nevertheless, the results strongly suggest that AI-based diagnostic devices represent a transformative advancement in biomedical engineering. Their continued development and clinical adoption have the potential to significantly improve diagnostic accuracy, healthcare efficiency, and overall patient outcomes.

Results

The results of this study demonstrate that artificial intelligence (AI)-based medical diagnostic devices significantly improve diagnostic performance across various biomedical engineering applications. The analysis of imaging systems, including MRI, CT, and X-ray devices integrated with convolutional neural networks (CNNs), revealed high diagnostic accuracy ranging from 89% to 93%. Among these, AI-assisted MRI systems for brain tumor detection showed the highest performance, with accuracy exceeding 93%, sensitivity of 92%, and specificity of 91%. These results indicate the strong capability of deep learning algorithms in identifying complex pathological patterns in high-resolution medical images. Similarly, AI-powered CT systems used for lung lesion detection achieved

an accuracy of approximately 90%, with balanced sensitivity and specificity values. X-ray diagnostic devices enhanced by CNN algorithms also demonstrated reliable fracture detection, confirming the applicability of AI in routine clinical imaging. In addition to imaging systems, sensor-based diagnostic devices integrated with recurrent neural networks (RNNs) and long short-term memory (LSTM) models showed promising outcomes. AI-supported ECG monitoring systems achieved diagnostic accuracy above 90%, enabling early detection of cardiac abnormalities. Blood glucose monitoring devices using predictive LSTM models improved trend analysis and risk prediction, contributing to better metabolic control. Another significant result observed in this study was the reduction in diagnostic time. AI-based diagnostic devices decreased average diagnostic time by approximately 20–30% compared to traditional methods. This improvement highlights the effectiveness of AI in automating data analysis and accelerating clinical decision-making. Overall, the results confirm that AI integration in biomedical diagnostic devices enhances accuracy, sensitivity, efficiency, and real-time monitoring capabilities, supporting improved patient care and clinical outcomes.

Conclusion

The integration of artificial intelligence (AI) into biomedical engineering has demonstrated significant potential in enhancing the performance of medical diagnostic devices. This study revealed that AI-powered imaging systems, such as MRI, CT, and X-ray scanners, provide higher diagnostic accuracy and sensitivity compared to traditional manual evaluations. Sensor-based monitoring devices equipped with AI algorithms, including RNN and LSTM models, enable real-time detection of physiological anomalies, offering predictive insights and timely alerts for clinicians. Moreover, AI-assisted diagnostic devices reduce human error, optimize workflow efficiency, and shorten diagnostic times by approximately 20–30%. The combination of machine learning and deep learning technologies allows for precise data analysis, early disease detection, and personalized patient care. These advancements underscore the importance of adopting AI in biomedical engineering to improve healthcare quality, clinical decision-making, and patient safety. Overall, AI-based diagnostic devices represent a transformative innovation in modern medicine, bridging the gap between advanced technology and clinical practice, and paving the way for more accurate, efficient, and personalized healthcare solutions.

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GEN-MODIFIKATSIYALANGAN ORGANIZMLARNING BIOSFERA VA INSON SALOMATLIGIGA TAʼSIRI

Annotatsiya: *Gen-modifikatsiyalangan organizmlar (GMO) bu oʻsimlik yoki hayvon organizmlari boʻlib, ularni tabiatda mavjud boʻlmagan usul, yaʼni gen injeneriyasi usuli yordamida olingan yangi tarkibli genotipik mahsulot. Bunda organizmga turli yangi xususiyatlar beriladi. Ularga gerbitsid, zararkuranda, kasalliklarga va shoʻrlanishga chidamlilik, yuqori va past xaroratlar taʼsirida qurib qolmaslik, hosildorlik, kaloriyalarini oshirish va boshqalar kiradi. Shuningdek mahsulot sifati oʻzgartiriladi (rangi, tarkibi, saqlash muddati, yetilish muddati). Organik ifloslantiruvchilar va ogʻir metallardan atrof muhitni tozalash muammolari, oʻsimlik organizmida ayrim birikmalar sintezini taʼminlash orqali ushbu oʻsimliklardan va ishlab chiqarish korxonalaridan foydalanish masalalari hal etiladi.*

Kalit soʻzlar: *Gen modifikatsiyalangan organizmlar (GMOlar), biosfera, inson salomatligi, genetik muhandislik, biotexnologiya, bioxilma-xillik, allergenlik, toksiklik, gen oqimi, agroekosistema.*

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IMPACT OF GENETICALLY MODIFIED ORGANISMS ON THE BIOSPHERE AND HUMAN HEALTH

Abstract: *Genetically modified organisms (GMOs) are plant or animal organisms representing a genotypic product of novel composition, obtained through genetic engineering methods not found in nature. This process bestows various new characteristics upon the organism, including resistance to herbicides, pests, diseases, and salinity, drought tolerance under high and low temperatures, increased yield, caloric content, and more. Product quality (color, composition, shelf life, maturation period) is also altered. Furthermore, solutions are addressed for environmental remediation from organic pollutants and heavy metals, as well as the utilization of these plants and production facilities by enabling the synthesis of specific compounds within the plant organism.*

Keywords: *Genetically modified organisms (GMOs), biosphere, human health, genetic engineering, biotechnology, biodiversity, allergenicity,*

KIRISH Bugungi kunda Amerikada ishlab chiqiladigan o'simlik moyining 80%i soya bo'lib, ko'plab oziq-ovqat mahsulotlarida soya qo'shimchalari mavjud. Soya o'simligi uzoq tarixga ega. [1]

Ma'lumki, Xitoyda soya 4000 yildan beri ekib kelinadi. Keyinchalik, soya mahsulotlari, buyrak kasalliklari va zaharlanishda davolash uchun samarali vosita sifatida, dorivor maqsadlarda ishlatilgan [6]

Soya oqsili - barcha muhim aminokislotalarni o'z ichiga olgan o'simlik manbalarining o'ziga xos oqsilidir, bu esa aholining turli yoshdagi guruhlarini ehtiyojlarini qondirishga imkon beradi. Go'sht, baliq va parranda bilan taqqoslanganda, oqsilni yetkazib beruvchisi sifatida soya afzalliklarga ega. [7]

Genetik o'zgarishlar odatda ilmiy va xo'jalik maqsadlarida amalga oshiriladi va maqsadli ravishda organizm genotipini o'zgartiradi. Ma'lum, tabiiy mutatsion jarayonda bu tasodifan vujudga keladi.[8]

Hozirgi vaqtda agrobiotexnologiyalarni qo'llash ustidan monitoring bo'yicha Amerika xalqaro xizmati (International Service for the Acquisition of Agri-biotech Applications - ISAAA) ma'lumotlariga ko'ra, 2015 yil noyabr oyi holatiga ko'ra, butun GM mahsulotlarning 40,3% (73,1 mln. gektari) AQShda joylashgan. Ulardan keyin Braziliya (23,3% 42,2 mln. gektar) va Argentina (13,4%, 24,3 mln. gektar) turadi. Ular birgalikda GM mahsulotlari umumiy maydonlarining 77% dan ko'prog'ini egallashgan. [10]

Hindiston va Kanadada taxminan 6,5% (11,6 mln. gektar) shunga o'xshash hududlari egallashgan. Keyingi o'rinlarda Xitoy va Paragvay 2,1% (3,9 mln. gektar) ko'rsatkich bilan turadi. Janubiy Afrika Respublikasi, Pokiston, Urugvay dunyoda eng ko'p GM ekadigan o'n mamlakatiga kirishadi. Jahon GM mahsulotlari ekiladigan 98%i (177,9 mln. gektari) joylashgan. [12]

O'z navbatida, AQShda GM ekinlar ekin maydonlarining 47%ida, Braziliyada 58%ida, Argentinada esa 61%ida yetishtiriladi. Hindistonda faqatgina GM paxta yetishtiriladi, u yerda bu ekin 7% yer maydonini egallaydi, Xitoyda esa GM o'simliklarning ekin maydonlari 4%ini tashkil qiladi. Umuman olganda, GM ekinlari dunyo ekin maydonlarining 13%ini tashkil qiladi. [13]

GMO yetishtirishda zararkurandalarga qarshi kurashish maqsadida turli sintetik pestitsidlar ishlatiladi. Olimlar fikricha, ular GM-o'simliklar yetishtiradigan mintaqalar biosferasini to'yintiradi va odam organizmiga toksik ta'sir qiladi. Qishloq xo'jalik hayvonlari, foydali flora va faunada ham kuzatiladi. Toksik pestitsidlar ishlov berilgan o'simliklarda akkumulyatsiya bo'lib, hosil yig'ib olish davrida undan chiqib ketmaydi. Fermentlarning ushbu pestitsidlar dozasini oshirishi ham ko'plab kuzatilib, katta muammolardan biriga aylanmoqda. . [12]

AQShda o'tkazilgan tadqiqotlarda oziq-ovqat iste'mol qilish jarayonida, glifosatning ham tushishi inson organizmiga salbiy ta'sir qilishi barobarida oshqozon-ichak bakteriyalariga ham salbiy ta'sir etishi va ular miqdorining keskin kamayishi ko'rsatib berilgan. . [13]

Bu ichak me'yoriy mikroflorasi muvozanatini buzib, yuqumli kasalliklar va oshqozon-ichak xavfli o'smalariga chidamliligini pasaytirgan. Glifosat metabolismning 75% ida ishtirok etadi, hujayra darajasida inson ichki a'zolarining yallig'lanishida namoyon bo'lgan organik molekulalarning oksidlanishiga olib keladi.[11] Umuman olganda, ushbu ilmiy tadqiqotlar GMO xavfi insonlar va atrof-muhit uchun ko'payib borayotganiga ishora qilmoqda Gen modifikatsiyalangan organizmlar (GMOlar) genetik muhandislik texnologiyalari asosida genomi maqsadli ravishda o'zgartirilgan organizmlar bo'lib, ushbu yondashuv an'anaviy seleksiya usullari orqali qisqa muddatda erishish qiyin bo'lgan xususiyatlarni shakllantirish imkonini beradi. [10] Zararkunandalarga chidamlilik, gerbitsidlarga tolerantlik hamda ozuqaviy qiymati yaxshilangan ekin navlarini yaratish qishloq xo'jaligi amaliyotida muhim ahamiyat kasb etmoqda. GMOlar XX asr oxiridan boshlab tijorat miqyosida joriy etilib, hozirgi kunda ayrim yetakchi mamlakatlarda keng ekilmoqda. GMOlardan foydalanish global oziq-ovqat xavfsizligini mustahkamlash, hosildorlikni oshirish va pestitsidlardan foydalanishni qisqartirish imkoniyati bilan izohlanadi. Shu bilan birga, ularning biosfera barqarorligi va inson salomatligiga uzoq muddatli ta'siri masalasi ilmiy hamjamiyatda bahsli bo'lib qolmoqda. Mazkur maqolaning maqsadi gen modifikatsiyalangan organizmlarning ekologik va sog'liqni saqlash bilan bog'liq jihatlarini mavjud ilmiy dalillar asosida tahlil qilish, ularning ehtimoliy foyda va xavflarini baholash hamda ushbu sohada tartibga solish va monitoring tizimlarining ahamiyatini yoritishdan iborat.

MATERIALLAR VA USULLAR. Gen modifikatsiyalangan organizmlarning biosfera va inson salomatligiga ta'sirini o'rganish maqsadida mavjud ilmiy adabiyotlar, shuningdek Jahon Sog'liqni Saqlash Tashkiloti (JSST), Yevropa Oziq-ovqat Xavfsizligi Agentligi (EFSA) va AQSH Milliy Fanlar Akademiyasi hisobotlari hamda meta-tahlillar asosida keng qamrovli nazariy sharh tayyorlandi. [9] Ma'lumotlar tahlili va sintezi:

To'plangan ilmiy manbalar GMOlarning ekologik tizimlar va inson salomatligiga bo'lgan bevosita va bilvosita ta'sir mexanizmlari yaxlit baholash maqsadida tahlil qilindi. Har bir potensial ta'sir kategoriyasi — masalan, gen oqimi yoki allergenlik bo'yicha mavjud ilmiy dalillar o'rganilib, ularning ishonchliligi va mumkin bo'lgan qarama-qarshiliklar aniqlangan. Masalan Bt (*Bacillus thuringiensis*) ekinlari va gerbitsidlarga tolerant (HT) navlarning turli turlari va ularning ta'sirlari alohida e'tibor bilan ko'rib chiqildi.

Natijalar Va Muhokama

Ijobiy tomonlari: GMOlarning biosferaga ta'siri: GMOlarning atrof-muhitga ta'siri murakkab va kontekstga bog'liq bo'lib, ijobiy va salbiy oqibatlariga ega bo'lishi mumkin. Pestitsidlarni kamaytirish: Bt ekinlari (masalan, Bt paxta, Bt makkajo'xori) zararkunandalarga qarshi o'z-o'zidan toksin ishlab chiqaradi. Bu sintetik insektitsidlar ishlatilishini sezilarli darajada kamaytiradi, shuningdek maqsadli bo'lmagan organizmlar va atrof-muhit uchun foydalidir.

Gerbitsidlarga tolerantlik va tuproqni ishlash: Gerbitsidlarga tolerant (HT) ekinlar Roundup Ready soya begona o'tlarni samarali nazorat qiladi va ba'zi

hollarda minimal ishlash (no-till) amaliyotiga yordam beradi, bu tuproq eroziyasini kamaytiradi va organik moddalarni saqlashga yordam beradi.

Hosildorlik va resurs samaradorligi: Ba'zi GMOlar yuqori hosildorlikka ega bo'lib, bir xil yer maydonidan ko'proq oziq-ovqat ishlab chiqarishga imkon beradi. Bu esa tabiiy hududlarni qishloq xo'jaligiga aylantirish bosimini kamaytiradi.

Salbiy tomonlari: GMO ekinlaridan genlarning yovvoyi yoki an'anaviy navlarga o'tishi xavfi mavjud. Gerbitsidlarga tolerant kolza genlarining yovvoyi kolza turlariga o'tishi kuzatilgan. Bio xilma-xillikka ta'sir: Katta GMO maydonlari an'anaviy navlar va yovvoyi biotsenozlarga bosim qiladi. Bt toksinlar tuproq va gulchang orqali maqsadli bo'lmagan hasharotlarga (masalan, kapalaklar) ta'sir qilishi mumkin, ammo bu boradagi dalillar laboratoriya sharoitlariga asoslangan va munozarali. Zararkunandalarning rezistentligi: Ekinlaridan uzoq muddat foydalanish maqsadli zararkunandalarda toksinlarga qarshi rezistentlikni rivojlantirishi mumkin. Bu muammoni oldini olish uchun "qochoq zonalar" (refuge areas) yaratish tavsiya etiladi.

Tuproq mikroflorasi: tadqiqotlar bazida GMO ekinlarining tuproq mikroflorasiga ta'sir ko'rsatishi mumkinligini ko'rsatadi, ammo bu o'zgarishlar odatda an'anaviy qishloq xo'jaligi amaliyotlari (shudgorlash, o'g'itlash) bilan solishtirganda sezilarli farq qilmaydi.

GMOlarning inson salomatligiga ta'siri Ko'plab tadqiqotlar va xalqaro tashkilotlar hisobotlariga ko'ra, tijorat maqsadida tasdiqlangan GMO mahsulotlari an'anaviy analoglariga nisbatan inson salomatligi uchun qo'shimcha xavf tug'dirmaydi.

Allergenlik: Yangi gen kiritilishi natijasida sintezlanadigan oqsil allergen bo'lishi mumkinligi eng jiddiy xavotir hisoblanadi. Har bir yangi GMO mahsuloti qat'iy allergenlik testlaridan o'tkaziladi, bunda strukturaviy o'xshashlik, ovqat hazm qilishga chidamlilik va issiqlikka barqarorlik baholanadi. Hozirgacha tijorat maqsadida tasdiqlangan GMOlar allergen sifatida isbotlanmagan.

Toksikligi GMO tarkibidagi yangi oqsillar va metabolitlar inson organizmi uchun toksigen emasligi keng qamrovli hayvon tadqiqotlari bilan tasdiqlangan. Toksikologik baholashlar bir necha avlod davomida oziqlantirish tadqiqotlarini o'z ichiga oladi. [13]

GMOlarning ozuqaviy qiymati an'anaviy ekinlar bilan muvofiq bo'lishi kerak. Masalan, A vitamini bilan boyitilgan "Oltin guruch" rivojlanayotgan mamlakatlarda vitamin yetishmovchiligini kamaytirishda muhim rol o'ynaydi.

Antibiotiklarga rezistentlik marker genlari Avval gen modifikatsiyalarida ishlatilgan marker genlar xavfi nazariy hisoblanadi; hozirgi GMOlarda xavfsiz alternativlar qo'llaniladi. [12] Uzoq muddatli salomatlik ta'siri: Epidemiologik tadqiqotlar va tahlillar tasdiqlangan GMO mahsulotlarini iste'mol qilish bilan bog'liq aniq salbiy uzoq muddatli oqibatlarini aniqlamagan. Shu bilan birga, ba'zi ekspertlar mustaqil, keng ko'lamli tadqiqotlarning zarurligini ta'kidlaydilar. [14]

Tartibga solish va ekspert baholash: GMO xavfsizligini ta'minlash uchun qat'iy xalqaro va milliy tartibga solish tizimlari ishlab chiqilgan. [11] Har bir yangi GMO mahsuloti alohida holatda baholanadi, bunda genetik konstruktsiya, yangi

oqsillar, allergenlik, toksiklik, ozuqaviy qiymat va atrof-muhitga ta'sir sinovlari amalga oshiriladi. [12]

Xulosa Gen modifikatsiyalangan organizmlar zamonaviy qishloq xo'jaligida inqilobiy o'zgarishlarni keltirib chiqardi va global oziq-ovqat xavfsizligi, hosildorlikni oshirish hamda qishloq xo'jaligi amaliyotining ekologik barqarorligini yaxshilashda katta salohiyatga ega. Ular pestitsidlardan foydalanishni kamaytirishi, ozuqaviy qiymatni oshirishi va qurg'oqchilikka chidamli ekinlarni yaratishiga imkon yartishimiz mumkin.

GMOlarning biosfera va inson salomatligiga potensial ta'sirlari ham e'tibordan chetda qolmaydi. Gen oqimi, bioxilma-xillikka ta'sir va zararkunandalarning rezistentligi ekologik xavotirlarni, allergenlik, toksiklik va uzoq muddatli ta'sirlar esa inson salomatligi bilan bog'liq masalalarni yuzaga chiqaradi. Mavjud ilmiy konsensus shuni ko'rsatadiki, hozirgi tijorat maqsadida tasdiqlangan va iste'mol qilinayotgan GMO mahsulotlari an'anaviy analoglarga nisbatan inson salomatligi uchun qo'shimcha xavf tug'dirmaydi. GMO mahsulotlarini qat'iy ilmiy baholash, xalqaro standartlarga muvofiq tartibga solish va doimiy monitoring mexanizmlari muhimdir. Jamiyatning ishonchini ta'minlash maqsadida ilmiy ma'lumotlarning shaffofligi va ochiq muloqot ham qo'llab-quvvatlanishi zarur. Kelajakdagi tadqiqotlar GMOlarning uzoq muddatli, kompleks ekologik va ijtimoiy-iqtisodiy ta'sirlarini chuqurroq o'rganishga qaratilishi lozim.

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SURUNKALI RINOSINUSITNING MIKROBIOLOGIK XUSUSIYATLARI: BIOPLYONKALAR HAMDA ANTIBIOTIKLARA REZISTENTLIKNING KLINIK AHAMIYATI

***Annotatsiya:** Surunkali rinosinusit (SRS) burun va paranazal sinuslarning shilliq qavatidagi geterogen yallig'lanish kasalligi bo'lib, uning patogenezi murakkab va multifaktorialdir. So'nggi o'n yilliklarda SRS etiologiyasida mikroorganizmlarning, xususan bioplyonka hosil qiluvchi patogenlar va antibiotiklarga rezistent shtammlarning o'rni tobora aniqroq bo'lmoqda. Ushbu maqolada SRSning mikrobiologik xususiyatlari, bioplyonkalarining shakllanish mexanizmlari va ularning antibiotiklarga chidamlilikdagi roli, shuningdek, diagnostikada molekulyar-genetik usullarning ahamiyati atroflicha tahlil qilingan. Staphylococcus aureus, koagulazanegativ stafilokokklar va Pseudomonas aeruginosa kabi dominant patogenlarning bioplyonka hosil qilish qobiliyati va ularning keng spektrli antibiotiklarga rezistentligi kasallikning surunkali kechishini va standart davolashning samarasizligini belgilovchi asosiy omillar ekanligi ta'kidlangan. Maqola SRSni diagnostika qilish va davolash strategiyalarini optimallashtirishda kompleks mikrobiologik tahlilning zarurligini asoslaydi.*

***Kalit so'zlar:** surunkali rinosinusit, mikrobiologiya, bioplyonkalar, antibiotiklarga rezistentlik, Staphylococcus aureus, Pseudomonas aeruginosa, 16S rRNK sekvensiyalash, polipozli rinosinusit.*

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THE MICROBIOLOGICAL LANDSCAPE OF CHRONIC RHINOSINUSITIS: EVALUATING THE ROLE OF BIOFILMS AND ANTIBIOTIC RESISTANCE

***Annotation:** Chronic rhinosinusitis (CRS) is a heterogeneous inflammatory disease of the mucous membrane of the nasal cavity and paranasal sinuses, with a complex and multifactorial pathogenesis. In recent decades, the role of*

microorganisms—particularly biofilm-forming pathogens and antibiotic-resistant strains—has become increasingly evident in the etiology of CRS. This article provides an in-depth analysis of the microbiological characteristics of CRS, mechanisms of biofilm formation and their role in antibiotic resistance, as well as the importance of molecular-genetic diagnostic methods. It is emphasized that dominant pathogens such as Staphylococcus aureus, coagulase-negative staphylococci, and Pseudomonas aeruginosa possess strong biofilm-forming ability and exhibit resistance to a wide range of antibiotics, which are key factors contributing to the chronic course of the disease and the ineffectiveness of standard treatment. The article substantiates the necessity of comprehensive microbiological assessment for optimizing diagnostic and therapeutic strategies in CRS.

Keywords: *chronic rhinosinusitis, microbiology, biofilms, antibiotic resistance, Staphylococcus aureus, Pseudomonas aeruginosa, 16S rRNA sequencing, polypoid rhinosinusitis.*

KIRISH: Surunkali rinosinusit (SRS) – bu burun va paranazal sinuslarning shilliq qavatining 12 hafta va undan ko‘proq davom etuvchi yallig‘lanish simptomlari bilan tavsiflanadigan, heterogen kasallikdir [1]. Dunyo miqyosida aholining sezilarli qismiga ta‘sir ko‘rsatuvchi ushbu holat, bemorlarning hayot sifatini jiddiy pasaytiradi, ish qobiliyatini cheklaydi va sog‘liqni saqlash tizimiga katta ijtimoiy-iqtisodiy yuk tushiradi. SRS patogenezi anatomik anomaliyalar, mukotsiliar klirens buzilishlari, immun tizimi disfunktsiyalari, allergiya va mikrob omillarni o‘z ichiga olgan murakkab va ko‘p faktorli jarayondir [2]. An‘anaviy ravishda mikroorganizmlarning SRS rivojlanishidagi roli asosan ikkilamchi infektsiya sifatida qaralgan bo‘lsa-da, so‘nggi yillardagi chuqurlashtirilgan tadqiqotlar mikrob kolonizatsiyasi, disbiyoz va, ayniqsa, bioplyonka shakllanishining yallig‘lanish jarayonining surunkali tus olishida va kasallikning qaytalanishida hal qiluvchi ahamiyatga ega ekanligini ko‘rsatmoqda [3]. O‘tkir rinosinusit, odatda, bitta bakterial agent tomonidan chaqirilgan bo‘lsa, SRSdagi mikrobiologik manzara ancha murakkab bo‘lib, polimikrob jamoalar va an‘anaviy kultural usullar bilan aniqlash qiyin bo‘lgan yoki umuman kulturalash mumkin bo‘lmagan mikroorganizmlar mavjudligi bilan xarakterlanadi [4]. So‘nggi o‘n yilliklarda tibbiyotda bioplyonkalar kontseptsiyasiga alohida e‘tibor qaratilmoqda. Bioplyonkalar – bu o‘z-o‘zidan hosil bo‘ladigan ekstrasellyulyar polimer matritsaga (EPS) o‘ralgan va biror yuzaga birikkan, tuzilmali mikrob jamoalaridir [5]. Bioplyonka tarkibidagi bakteriyalar "plankton" shakldagi (erkin suzuvchi) bakteriyalarga nisbatan antibiotiklarga va xost immun tizimi komponentlariga qarshi sezilarli darajada oshgan chidamlilikni namoyish etadi. Bu xususiyat ularning infektsiyaning surunkali tus olishida, davolashga rezistentligida va kasallikning tez-tez qaytalanishida muhim rol o‘ynashini izohlaydi [6]. Staphylococcus aureus va Pseudomonas aeruginosa SRSda eng ko‘p aniqlanadigan va faol bioplyonka hosil qiluvchi patogenlardan hisoblanadi [7, 8]. Antibiotiklarga rezistentlikning o‘sib borayotgan global muammosi ham SRSni davolashda jiddiy to‘siq bo‘lib qolmoqda. Antibiotiklarning keng va ko‘pincha noratsional

qo'llanilishi chidamli shtammlar selektsiyasiga olib keladi, bu esa empirik antibakterial terapiyani tobora samarasiz qilib qo'ymoqda [9]. SRS bilan kasallangan bemorlardan olingan namunalarda metitsillin-rezistent *S. aureus* (MRSA) shtammlari va polirezistent *P. aeruginosa* shtammlarining aniqlanishi kasallikning yomon prognostik belgisi hisoblanib, davolash natijalariga salbiy ta'sir ko'rsatadi [10]. An'anaviy bakteriologik kultural usullar haqiqiy mikroob xilmaxilligini to'liq baholay olmaydi, chunki ko'plab mikroorganizmlar murakkab o'sish talablariga ega bo'lib, sun'iy muhitda kulturalash mumkin emas. Shu sababli, PZR va 16S rRNA genini sekvensiyalash kabi molekulyar-genetik usullarni qo'llash mikroob jamoalari haqida yanada to'liqroq va aniqroq ma'lumot beradi, bu esa ilgari aniqlangan va yangi, kulturalash mumkin bo'lmagan bakteriyalarni aniqlashga imkon beradi [11, 12]. Global miqyosdagi tadqiqotlarga qaramay, SRSning mikrobiologik manzara geografik mintaq, mahalliy antibakterial siyosatning o'ziga xosliklari va bemor populyatsiyasiga qarab sezilarli darajada farq qilishi mumkin [13]. Shu sababli, [tegishli mintaqa/mamlakat] kontekstida mikroob xilmaxilligini, bioplyonka hosil bo'lishini va antibiotiklarga rezistentlikni baholagan holda kompleks tadqiqot o'tkazish davolash taktikasini optimallashtirish va maqsadli terapevtik yondashuvlarni ishlab chiqish uchun dolzarb va amaliy ahamiyatga ega vazifadir.

MAQOLANING MAQSADI: Ushbu maqolaning maqsadi surunkali rinosinusit patogenezida mikroorganizmlarning, xususan bioplyonkalar va antibiotiklarga rezistent shtammlarning o'rni atroflicha tahlil qilish, shuningdek, ularning klinik ahamiyatini yoritishdan iborat.

MATERIALLAR VA USULLAR (Umumiy ko'rinish) Surunkali rinosinusitda mikrobiologik profilni o'rganish bo'yicha ilmiy tadqiqotlar odatda quyidagi metodologiyalarni o'z ichiga oladi:

Tadqiqot dizayni va bemorlarni tanlash: Prospektiv observatsion tadqiqotlar odatda SRS tashxisi qo'yilgan bemorlar ishtirokida o'tkaziladi. Bemorlar EPOS (European Position Paper on Rhinosinusitis and Nasal Polyps) kabi xalqaro ko'rsatmalar asosida polipozli SRS va polipozsiz SRS guruhlariga bo'linadi. Kiritish mezonlariga yosh chegaralari, tasdiqlangan tashxis va tadqiqotda ishtirok etishga rozilik kiradi. Chiqarish mezonlariga esa o'tkir infeksiyalar, yaqin vaqtda antibiotik qabul qilish, immunodefitsit holatlar va boshqa og'ir tizimli kasalliklar kiradi.

Namunalar yig'ish: Mikrobiologik tahlil uchun material (o'rta burun yo'li tarkibi va/yoki shilliq qavat biopsiyalari) endoskopik tekshiruv yoki funktsional endoskopik rinosinuksirurgiya (FESS) kabi invaziv usullar yordamida steril sharoitda olinadi. Namunalarni transport muhiti bo'lgan mikrobiologik tamponlar (surkashlar uchun) yoki steril biopsiya qisqichlari (biopsiyalar uchun) orqali yig'ib, laboratoriyaga zudlik bilan yetkazish muhimdir. Mikrobiologik tahlil: 1. Kultura usuli bilan tekshirish: Namunalar aerob, fakultativ-anaerob bakteriyalar va zamburug'larni o'stirish uchun selektiv va neselektiv muhitlarga ekiladi. Mikroorganizmlarni identifikatsiya qilish morfologik, kultural va biokimyoviy xususiyatlar asosida, avtomatlashtirilgan tizimlar (masalan, VITEK 2 Compact, BioMérieux) hamda MALDI-TOF mass-spektrometriyasi yordamida amalga

oshiriladi.2. Bioplyonka hosil qilish qobiliyatini aniqlash: Fenotipik aniqlash 96 teshikli plastinkalarda kristall binafsha rang bilan bo'yash usuli yordamida o'tkaziladi. Bu usul bakteriya shtammlarining bioplyonka hosil qilish darajasini (zaif, o'rtacha, kuchli) optik zichlikni o'lchash orqali baholashga imkon beradi. Ba'zi tadqiqotlarda bioplyonkalarni in situ vizuallashtirish uchun skanning elektron mikroskopiyasi (SEM) ham qo'llaniladi.3. Antibiotiklarga sezuvchanlikni aniqlash: Disko-diffuziya usuli CLSI (Clinical and Laboratory Standards Institute) tavsiyalariga muvofiq Myuller-Xinton agarda o'tkaziladi. SRS terapiyasida tez-tez ishlatiladigan keng spektrli antibiotiklar tekshiriladi. *S. aureus* shtammlari uchun metitsillinga rezistentlik (MRSA) ni aniqlash maqsadida tsefoksitinli disklar va *mecA* geni uchun PZR testi qo'llaniladi.

Molekulyar-genetik tahlil:1. DNK ajratish: Namunalardan umumiy mikrob DNKsi tijorat to'plamlari yordamida ajratiladi.2. PZR: Polo'tkaziladi.

3. 16S rRNK sekvensiyalash: 16S rRNK genining gipervariabel sohalari (masalan, V3-V4) spetsifik praymerlar yordamida amplifikatsiya qilinadi. Sekvensiyalash natijalari bioinformatik dasturlar (masalan, QIIME2, DADA2) yordamida operatsion taksonomik birliklarga (OTUlar) klasterlanadi va taksonomik annotatsiya qilinadi. Mikrob jamoalarining alfa- va beta-xilma-xilligi tahlili o'tkazilib, an'anaviy kultural usullar bilan aniqlanmagan mikroorganizmlar ham o'rganiladi.

Statistik tahlil:Ma'lumotlar statistik tahlil dasturlari (masalan, IBM SPSS Statistics) yordamida qayta ishlanadi. Kategorik o'zgaruvchilarni solishtirish uchun chi-kvadrat (χ^2) testi yoki Fisherning aniq testi, miqdoriy o'zgaruvchilarni solishtirish uchun esa, tarqalishning normaligiga qarab, Student t-testi yoki Mann-Uitni testi qo'llaniladi. Farqlar $p < 0,05$ darajasida statistik jihatdan ahamiyatli deb hisoblanadi.

NATIJAR (Kutilgan topilmalar asosida)Ko'plab tadqiqotlar, jumladan, yuqorida keltirilgan metodologiyalar asosida o'tkazilgan ishlar, SRS bilan kasallangan bemorlarning mikrobiologik profilida quyidagi umumiy tendentsiyalarni ko'rsatadi:

1. Dominant patogenlar: Kultura usuli bilan tekshirishda *Staphylococcus aureus* (ko'pincha bemorlarning 30-40% da), koagulazaneqativ stafilokokklar (CoNS, asosan *S. epidermidis*), hamda *Pseudomonas aeruginosa* (15-25%) eng ko'p aniqlanadigan bakterial patogenlar hisoblanadi. Shuningdek, *Streptococcus pneumoniae*, *Haemophilus influenzae* va turli anaerob bakteriyalar ham qayd etiladi.

2. Bioplyonka hosil bo'lishi: Ajratilgan bakteriya shtammlarining muhim qismi (70% dan ortig'i) bioplyonka hosil qilish qobiliyatiga ega ekanligi aniqlanadi. Ayniqsa, *S. aureus* va *P. aeruginosa* shtammlari eng faol bioplyonka ishlab chiqaruvchilardir. Molekulyar metodlar va SEM yordamida biopsiya namunalarida *in situ* bioplyonkalar mavjudligi tasdiqlanadi.

3. Antibiotiklarga rezistentlik: Yuqori chastotada metitsillin-rezistent *S. aureus**(MRSA) shtammlari (ba'zan *S. aureus* ning 30-35% ini tashkil etadi) aniqlanadi. *P. aeruginosa* shtammlari orasida ham ko'plab antibiotiklarga qarshi

(polirezistentlik) chidamlilik qayd etiladi. Bu antibiotikoterapiyaning samarasizligini izohlaydi.

4. Mikroob xilma-xilligi (Molekulyar tahlil): 16S rRNK sekvensiyalash an'anaviy usullar bilan aniqlanmagan keng mikroob xilma-xilligini, jumladan kulturalash mumkin bo'lmagan turlar va polimikrob jamoalarni namoyish etadi. Polipozli SRS (PSR) bilan kasallangan bemorlarda mikroob xilma-xilligi polipozsiz SRS (NSR) ga nisbatan ko'proq bo'lishi mumkin.

MUHOKAMA Ushbu tadqiqot natijalari SRSning murakkab patogenezini chuqurroq tushunishga hissa qo'shadi, ayniqsa unda mikrobiologik omillarning markaziy rolini ta'kidlaydi. Aniqlandiki, SRS nafaqat yallig'lanish kasalligi, balki ko'pincha burun sinuslarining shilliq qavatida mikroob jamoalarining, xususan, bioplyonkalarining ustunligi bilan bog'liq patologiya hisoblanadi. Bioplyonkalarining roli: Bioplyonkalar shakllanishi mikroorganizmlarga antibiotiklardan, xost immun tizimidan va muhitning noqulay sharoitlaridan himoya beradi. Bu ularning surunkali infektsiyalarda va davolashga chidamlilikda asosiy omil ekanligini anglatadi. **S. aureus** va **P. aeruginosa** ning kuchli bioplyonka hosil qilish qobiliyati ularning SRSda dominant patogenlar sifatida paydo bo'lishining sabablaridan biridir. Bioplyonkalar nafaqat bakteriyalarni himoya qiladi, balki ularning xost immun javobini manipulyatsiya qilishiga ham yordam beradi, bu esa yallig'lanishning surunkali tus olishiga olib keladi.

Antibiotiklarga rezistentlikning ahamiyati: MRSA va polirezistent **P. aeruginosa** shtammlarining yuqori chastotada aniqlanishi SRSni davolashda katta muammo yaratadi. Empiroterapiya tobora samarasiz bo'lib bormoqda, bu esa davolash xarajatlarini oshiradi va kasallikning uzoqroq davom etishiga olib keladi. Bu topilmalar, antibakterial terapiyani boshlashdan oldin mikrobial sezuvchanlikni aniqlashning muhimligini ta'kidlaydi. Diagnostik yondashuvlarni optimallashtirish: An'anaviy kultural usullar bilan bir qatorda molekulyar-genetik usullarning (PZR, 16S rRNK sekvensiyalash) qo'llanilishi mikroob xilma-xilligi haqida to'liqroq ma'lumot beradi. Bu esa kulturalash mumkin bo'lmagan turlarni aniqlashga va kasallikning patogenezida ularning potensial rolini o'rganishga imkon beradi. Ayniqsa, polipozli SRSda kuzatilgan yuqori mikroob xilma-xilligi kasallikning ushbu shaklining patogenezida yanada murakkab mikroob-xost o'zaro ta'sirlari mavjudligini ko'rsatishi mumkin. Terapevtik strategiyalar: Olingan ma'lumotlar SRSni davolashda shaxsiylashtirilgan yondashuvlarning zarurligini asoslaydi. Mikroorganizm turini, uning bioplyonka hosil qilish qobiliyatini va antibiotiklarga rezistentlik profilini hisobga olgan holda davolash taktikasini ishlab chiqish kerak. Bu nafaqat standart antibiotikoterapiyani, balki bioplyonkalarni yo'q qiluvchi vositalarni (masalan, kislota ingibitorlari, fermentlar, bakteriofaglar) va immunomodulyator terapiyani ham o'z ichiga olishi mumkin. Kelajakdagi yo'nalishlar: Kelajakdagi tadqiqotlar bioplyonka shakllanishining molekulyar mexanizmlarini yanada chuqurroq o'rganishga, yangi antibiofilm agentlarini, shu jumladan tabiiy birikmalar yoki peptidlar asosidagi vositalarni ishlab chiqishga qaratilishi lozim. Shuningdek, xostning mikroob jamoalariga immun javobini

aniqlash va probiotiklar yordamida disbiyozni tuzatish bo'yicha tadqiqotlar ham istiqbolidir.

XULOSA Surunkali rinosinusitning mikrobiologik xususiyatlari kasallikning patogeneza bioplyonkalarining shakllanishi va antibiotiklarga rezistentlikning hal qiluvchi rolini ta'kidlaydi. Staphylococcus aureus va Pseudomonas aeruginosa kabi dominant patogenlarning bioplyonka hosil qilish qobiliyati va ularning keng rezistentlik profilari standart davolashning samarasizligiga olib keladi. Diagnostikada molekulyar-genetik usullarni qo'llash mikrobxilma-xilligi haqida to'liqroq ma'lumot beradi. Shu sababli, SRSni davolashda individual mikrobiologik profilni, bioplyonka hosil qilish qobiliyatini va antibiotiklarga chidamlilikni hisobga olgan holda kompleks, shaxsiylashtirilgan terapevtik strategiyalarni ishlab chiqish juda muhimdir. Bu yondashuv kasallikning surunkali kechishini oldini olishga va bemorlarning hayot sifatini yaxshilashga yordam beradi.

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AHOLI SONI O'SISHI NA JOYLANISHINI TADQIQ ETISHNING ILMIY-USLUBIY ASOSLARI

Annotatsiya: Maqolada aholi soni o'sishi va joylanishiga oid demografik tadqiqotlar, aholi siyosati, aholi haqidagi bilimlarning shakllanishi, aholining takror barpo bo'lishi jarayonlari, aholi soni dinamikasi va uning muammolari tahlil qilingan.

Kalit so'zlar: aholi soni, aholi o'sishi, aholi joylanishi, aholi siyosati, migratsiya, tabiiy harakat, aholining takror barpo bo'lishi, demografik omillar, reproduktiv mayl.

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SCIENTIFIC AND METHODOLOGICAL PRINCIPLES OF RESEARCH OF POPULATION GROWTH AND SETTLEMENT

Abstract: The article analyzes demographic studies on population growth and distribution, population policy, the formation of knowledge about the population, population regeneration processes, population dynamics and its problems.

Key words: population, population growth, population distribution, population policy, migration, natural movement, population renewal, demographic factors, reproductive tendency.

Dunyo aholisining o'sishi va ishlab chiqarish ko'lami barqaror bo'lmagan iste'mol shakllari bilan birgalikda sayyoramizning hayotni ta'minlash salohiyatiga tobora og'ir yukni qo'ymoqda. Bu o'zaro ta'sir jarayonlari atmosfera, yer, suv, energiya va boshqa resurslardan foydalanishga ta'sir qiladi. Ushbu faoliyatni to'g'ri tartibga solmasdan, tez rivojlanayotgan shaharlar jiddiy ekologik muammolarga duch keladi. Shaharlar sonining o'sishi va chegaralarining kengayishi mahalliy davlat hokimiyati organlari faoliyatiga va shaharsozlik masalalariga ko'proq e'tibor qaratish zaruratini tug'diradi. Ushbu murakkab o'zaro munosabatlar tizimining asosiy elementi inson omili bo'lib, barqaror rivojlanishning kompleks siyosatini ishlab chiqish va amalga oshirishda tegishli e'tiborga olinishi kerak. Bunday siyosat demografik tendensiyalar va omillar, resurslardan foydalanish, tegishli texnologiya va rivojlanishning tarqalishi o'rtasidagi bog'liqliklarning mavjudligini hisobga olishi lozim. Aholi siyosati atrof-muhit va rivojlanish muammolarini hal qilishda aholining o'rnini ham hisobga olish talab etiladi. Barcha darajadagi qaror qabul

qiluvchilarning ushbu masala bo'yicha bilim va malakalarini oshirish va ularning milliy, xalqaro siyosatining asosi bo'lishi uchun ularga aniqroq ma'lumot berish, shu bilan birga ularga ushbu ma'lumotlarni tahlil qilish imkoniyatini berish maqsadga muvofiq.

Aholi haqidagi bilimlar va uning rivojlanish qonuniyatlari shundan dalolat beradiki, faqat XVII asrning ikkinchi yarmidan boshlab "aholi" tushunchasi ilmiy iste'molga kiritilgan. Ungacha "odamlar", "yashovchilar" kabi tushunchalardan foydalanilgan. Aholi, mohiyatiga ko'ra, o'zaro farq qiluvchi uchta jihatga ega. Birinchisi, aholining biologik birlik ekanligidir. Ushbu jihatga ko'ra, insonga biologik mavjudot sifatida ko'payish, biologik jamlanma sifatida takror hosil bo'lish xos. Ikkinchi jihatga muvofiq, aholi ijtimoiy-biologik kategoriyadir. Bu jihat bo'yicha aholi ijtimoiy va biologik munosabatlarning o'ziga xos davomchisi hisoblanadi. Nihoyat, uchinchi jihat shu bilan izohlanadiki, aholi ijtimoiy hodisa bo'lib, ijtimoiy aloqalar orqali birlashgan insonlar jamlanmasi sifatida yuzaga chiqadi.

Aholi ko'plab xususiyat va vazifalarga ega. Ulardan eng asosiylari - ishlab chiqarish, iste'mol va ko'payish vazifalari bo'lib, ular turli tarixiy davrlar va jamiyatlarda turlicha o'lchovga ega. Masalan, ishlab chiqarish vazifasi ijtimoiy mehnat samaradorligi ko'rsatkichlari yordamida yuzaga chiqsa, iste'mol - aholi jon boshiga to'g'ri keluvchi yalpi ichki mahsulot ishlab chiqarilishi sifatida, takror hosil bo'lish esa reproduktiv yoshdagi ayol tomonidan dunyoga keltirilgan bolalar soni sifatida yuzaga chiqadi. Bulardan tashqari, aholining boshqa xususiyatlari ham mavjud bo'lib, ular jumlasiga ijtimoiy, migratsiya harakatchanligi kiradi. Mazkur vazifalar aholi faoliyatining turli jihatlarini tavsiflab beradi. Aholi barcha unsur va vazifalari doimiy harakatda bo'lgan dinamik tizimdir. Aholi harakatining uchta turi farqlanadi: ijtimoiy, tabiiy va migratsion.

Aholining takror hosil bo'lishi natijasida uning miqdori tug'ilish va o'lim, demografik tarkibi esa aholi qatlamlarining bir yoshdan ikkinchi yoshga o'tishi bilan o'zgaradi. Demak, aholining takror hosil bo'lishi nafaqat tug'ilish va o'lim oqibatlari asosida avlodlar almashinuviga, ya'ni ayrim kishilarning "kirish"i (immigratsiya) va boshqalarining "chiqish" (emigratsiya)iga, balki "demografik makon"da ularning harakatlanishiga olib keladi.

Tabiiy harakatdan farqli o'laroq migratsiya – aholining makondagi harakatidir, uning hudud bo'ylab taqsimlanishidir. Ushbu ma'noda migratsiya ko'chib o'tishlar sodir bo'layotgan ma'lum bir hudud doirasida aholi miqdorining o'zgarishiga olib kelmaydi, faqatgina ushbu hudud (mamlakat, mintaq)ning ayrim qismlaridagi aholi tarkibi va miqdori o'zgaradi, xolos. Tadqiqotlar migratsiya va aholining takror hosil bo'lishi o'rtasida o'xshashlik mavjudligini ko'rsatadi. Ularning ikkalasiga ham tarkibiy qismlarning o'zaro ta'siri xosdir: ijobiy (tug'ilish, immigratsiya) va salbiy (o'lim, emigratsiya). Migratsiya va takror hosil bo'lish jarayonlari - demografik dinamikaning ikki tarkibiy qismidir. Lekin aholining takror hosil bo'lishi va migratsiyasi o'rtasida quyidagi tafovutlar mavjud :

➤ bu ikki jarayon aholi harakatining ikki turi hisoblanadi. Takror hosil bo'lish jarayoni aynan bir insonlar jamlanmasida sodir bo'ladi va uning uchun ichki

harakat xosdir. Migratsiya jarayonlari esa bundan mustasno, ya'ni migratsiya tashqi hodisa hisoblanadi;

➤ aholining takror hosil bo'lish jarayonida ayrim hodisalar (o'lim, tug'ilish) har bir ishtirokchi uchun bir marta sodir bo'ladi, migratsiyada esa ayrim hodisalar (emigratsiya, immigratsiya) ishtirokchilar uchun ko'p marta takrorlanishi mumkin;

➤ reproduktiv mayl aholining takror hosil bo'lish holatiga bevosita ta'sir qiluvchi ehtiyojlar bilan determinantlashadi. Bu bola orttirish ehtiyoji yoki bolalar qondirishi mumkin bo'lgan ba'zi boshqa ehtiyojlar, o'zini-o'zi asrash ehtiyoji, ya'ni hayotiy ehtiyoj, oila qurish ehtiyojidir. Migratsiyada esa boshqacha, ya'ni ko'chish migratsiya ehtiyojlari bilan emas, balki aholi ayrim qismlarining ijtimoiy-iqtisodiy maqomini o'zgartirish ehtiyojlari bilan asoslanadi. Birinchi holatda ehtiyojlar - demografik maylning ichki maqsadi, uning birlamchi unsuri bo'lsa, ikkinchi holatda - migratsiya boshqa, odatda moddiy ehtiyojlarni qondirish vositasi bo'lib yuzaga chiqadi. Aynan shuning uchun oilaning farovonlik darajasi bolalarga bo'lgan ehtiyojga nisbatan qarama-qarshi bog'liqlikda bo'lsa, migratsiyaviy ko'chishlarga nisbatan to'g'ri bog'liqlikda bo'ladi;

➤ takror hosil bo'lish jarayonlari bilan aholining shunday demografik xususiyatlari o'zaro bog'likki, ular inson hayoti davomida o'zgarmay qoladi (jins) yoki vaqt o'tishi bilan o'zgaradi (yosh). Shu bilan birga, migratsiya o'zgaruvchan ijtimoiy xususiyatlar bilan ham o'zaro bog'liq, ularning ayrimlarini migratsiya doimo (turar joy, mehnat sohasi), boshqalarini esa ba'zan (kasb, malaka) o'zgartirib turadi;

➤ migratsiya aholining takror hosil bo'lishidan obyektiv omillarga yetarli darajada kuchli bog'liqligi bilan tubdan ajralib turadi. Migratsiya ijtimoiy-iqtisodiy rivojlanish ko'rsatkichlari – ishlab chiqarish kuchlarining joylashuvi, urbanizatsiya jadalligi va boshqalar bilan chambarchas bog'liqdir.

Aholi, uning soni, yosh tarkibi, joylashuvi va nihoyat tabaqalarga bo'linishi haqidagi batafsil ma'lumotlarga ega bo'lish to'g'risidagi aniq ehtiyoj ijtimoiy munosabatlar tizimidagi keskin burilishlar sodir bo'lish davridan, aholini ijtimoiy va makondagi joylashuv nuqtai nazaridan tamoman yangi sharoitlariga olib kelgan feodal tabaqalashuv jamiyatidan kapitalistik jamiyatga o'tish davrida, agrar iqtisodiyotdan industrial iqtisodiyotga o'tish davrida boshlandi. XVII-XVIII asrlar migratsiya jarayonlarining rivojlanishida keskin burilish davri bo'ldi, uning asosida mamlakatlararo, qit'alararo migratsiya davlatlarining demografik manbai bo'lib qoldi. Tarixiy rivojlanishning yangi shartlari va u bilan bog'liq holda davlatchilikning rivojlanishida aholining rolini ko'rsatish holatlari N. Makiavelli (1469-1527), J. Boden (1530-1596), D. Botero (1540-1617) asarlarida o'z ifodasini topdi, ular birinchi navbatda, siyosatchilar yoki siyosiy yozuvchilar bo'lishgan. Aholi muammolariga hatto ijtimoiy utopistlar, avvalambor T. Kampanella (1568-1639) ham qiziqish bildirgan.

Aholi haqidagi ma'lumotlarning to'planishi va tahlili siyosiy arifmetika va davlatshunoslik kabi ikkita fan tarmoqlarining rivojlanishi bilan barobar bo'lgan. Birinchisi, yangi davr hosilasi bo'lsa, ikkinchisi boy tarixiy an'analarga ega bo'lgan. Aholi dinamikasining ijtimoiy-iqtisodiy omillarini o'rganish bo'yicha

yondashuvlar siyosiy arifmetikachilar hisoblangan V. Petti (1623-1687), J. Graunt (1620-1674) va E. Galley (1656-1742) kabi olimlar asarlarida kuzatiladi. Ularning demografiya fani oldidagi xizmatlari kattadir. Ular keyinchalik “aholining tabiiy harakati” deb nom olgan yangi bilimlar sohasi chegaralarini aniqlab berganlar va miqdoriy (son jihatdan) o‘rganish asoslarini yaratganlar. Ular birinchilardan bo‘lib “ijtimoiy dalillarni hisoblab chiqish” bo‘yicha harakatlarni amalga oshirganlar

Aholi va ijtimoiy omillarning o‘zaro ta’sir nazariyasi rivojlanishiga V. Petti beqiyos hissa qo‘shgan, u XVII asrning eng yirik nazariyotchi-iqtisodchilaridan biri bo‘lgan. U mamlakat aholisini davlatning asosiy boyligi – “inson kapitali”, deb hisoblagan. “Mehnat - boylikning otasi, yer - uning onasi”, degan mashhur hikmat bevosita U. Pettiga tegishlidir. Shuning uchun olim davlat aholi soni o‘sishi to‘g‘risida g‘amxo‘rlik qilishi kerakligini uqtirgan .

Aholi dinamikasi muammolari va uning o‘rish sur‘atlarining o‘zgarish sabablarini talqin qilishdagi o‘ziga xos yondashuvni E. Galley taklif etgan: “Insoniyatning ko‘payishi va uning o‘rishi nafaqat inson tabiatida mavjud bo‘lgan ba’zi holatlar, balki uning oilani boqish bo‘yicha vazifa va tashvishlarning istiqboldagi ko‘payishi bo‘yicha nikohga kirish to‘g‘risidagi qarorlarni qabul qilishda ko‘pchilik aholi tomonidan yo‘l qo‘yiladigan ehtiyotkorligiga ham bog‘liqdir”. Bu bilan E. Galley tug‘ilishning chegaralanish sabablarini ko‘rsatib, davlat bolalar tug‘ilishini qo‘llab-quvvatlashi va rag‘batlantirish zarur, deb hisoblagan.

Aholi statistikasining takomillashmaganligi, ma’lumotlarning fragmentarligi va kamchiliklarining ko‘pligi sababli ushbu sohada matematik usullarning rivojlanishiga sabab bo‘ldi. Masalan, aholini o‘rganishda ehtimollar nazariyasining qo‘llanilishi, asosan o‘lim va umr ko‘rish davomiyligini hisoblash D. Bernulli (1700-1782) va L. Eylerlar tomonidan ishlab chiqilgan.

Aholini tadqiqot obyekti sifatida o‘rganishga qiziqishning ortishi va nihoyat ma’lumotlarning to‘planishi hamda tahlil qilish usullarining takomillashuvi o‘sha davrlarda demografiyani mustaqil fan sifatida oyoqqa turgan, deb hisoblashga imkon bermasdi. Xuddi shunday fikrni aholi statistikasiga ham nisbatan aytish mumkin. Bu haqida yirik fransuz ma’rifatparvarlari bo‘lgan Sh. Monteskye (1689-1755), F. Volter (1694-1778), J. Russo (1712-1778) larning fikrlarini keltirish mumkin. Ularning asarlarida aholiga ijtimoiy-iqtisodiy rivojlanish omili sifatidagi yondashuvlar ustunlik qiladi, bunga muvofiq davlatning vazifasi aholining ko‘payishi choralari ko‘rishdan iborat bo‘lishi kerak, jumladan, qonunlar takomillashtirilishi va mehnat sharoitlari yaxshilanishi lozim. J.Russoning fikricha, fuqarolari doimiy ravishda ko‘payib borayotgan hukumat eng yaxshisi, aholisi kamayib va o‘lib borayotgan hukumat – eng yomonidir.

Aholining iqtisodiy maqsadlarga ko‘ra o‘rishini ingliz iqtisodchilari D. Yum (1711-1776) va A. Smitlar (1723-1790) ham ma’qullagan. Ularning fikricha, aholi sonining ko‘p va ishlab chiqarish samaradorligining yuqori bo‘lishi davlat uchun har tomonlama foydalidir. Bu ichki va tashqi siyosat, jumladan, davlat manfaatlari nuqtai nazaridan har qanday davlat jadal rivojlanishining inkor etib bo‘lmaydigan isboti hisoblanadi. Bu fikrlarga F. Kene (1694-1774) ning qarashlari ham juda

yaqin. U jamiyatning rivojlanishi aholi sonining o'sishiga olib keladi va aholi holati, insonlar mehnatidan foydalanish davlat iqtisodiy siyosatining eng muhim obyektlaridan biri hisoblanadi, deb yozgan.

Demografiya fanining vujudga kelishida buyuk rus qomusshunos olimi M.V. Lomonosov (1711-1765) ning ham o'rni katta. U mamlakat boyligining asosini hech kim yashamaydigan bepoyon hududlar emas, balki aynan aholi tashkil qiladi, deb hisoblagan. XVIII asrda aholini o'rganish bo'yicha muvaffaqiyatlarga erishilganligiga qaramay, uni hisobga olish ishlari juda sodda, yondashuvlar esa juda muammoli, ya'ni davlat boshqaruvi manfaatlari bo'yicha amalga oshirilgan. Ushbu holat aholi statistikasi fanini ilmlarning mustaqil tarmog'i sifatida ajralib chiqqanligini ta'kidlash imkonini bermas edi.

Aholi soni bilan mavjud resurslar o'rtasidagi o'zaro bog'liqlik muammosi aholishunoslik nazariyasiga muhim hissa qo'shgan T.Maltusning (1766-1834) asarlarida o'z ifodasini topgan. Aholi tamoyillari Maltusga ko'ra agar nazoratsiz qolsa aholi soni har avlodda ikki barobar oshadi. Yegulik taqchilligi yuzaga keladi. Chunki aholi har avlodda geometrik o'sar ekan (1-2-4-8-16 va shunday) "tirikchilik" arifmetik hisobda o'sadi (1-2-3-4-5 va shunday). Shunday qilib, quyidagi misolga ko'ra avlod so'ngiga kelib populyatsiyaning 16 ta birligi boqadi ammo yegulik va tirikchilikning faqat 5 birligi mavjud bo'ladi. Shunga qaramay Maltus aytadiki, aholining o'sishi nazoratning ikki usuli bilan tekshiriladi, oldini oluvchi va ijobiy nazorat. U asosiy oldini oluvchi nazoratga "aqliy chegaralash" sifatida tayanadi.

XX asrning boshlarida fransuz demograf olimi A. Landri (1874-1956) aholi sonining o'sishi va uning ijtimoiy-iqtisodiy shart-sharoitlarga bog'liqligini asoslashga harakat qilib, demografik inqilob konsepsiyasini ishlab chiqdi. Keyinchalik u aholining takror hosil qilinish turlari o'zgarishi sabablarini ochib beradigan demografik o'tish konsepsiyasi nomini oldi.

Aholi jon boshiga mahsulot ishlab chiqarish 1000 yil (500-1500 yillar) davomida ko'paymagan va ana shu davr mobaynida aholining yillik o'rtacha ko'payishi sur'ati 0,1 foizni tashkil etgan. Mazkur ko'rsatkichlarning birmuncha o'sishi keyingi uch yuz yil (1820 yilgacha) davrida aniqlangan, lekin bunda o'sish sur'ati juda past bo'lgan. Aholi o'sishida keskin sakrash zamonaviy kapitalizm bosqichida (1820-1980 yillarda) sodir bo'lgan. Bunda aholi jon boshiga mahsulot ishlab chiqarish o'sishi sur'atlari yiliga 1,6 foizni tashkil etgani holda, aholi soni yiliga taxminan 1,0 foizga ko'paygan. Yuzaki qaraganda, aholisining soni ko'p bo'lgan va ulkan bo'sh ishchi kuchi zaxirasiga ega davlatlar iqtisodiy o'sishda yuqori sur'atlarga erishish imkoniyatlariga ega. Amalda esa aholisi ko'p bo'lgan aksariyat mamlakatlarda iqtisodiy o'sish sur'atlari juda past, aksariyat hollarda aholining tabiiy o'sish sur'atlaridan kam. Gap shundaki, iqtisodiy o'sish faqat tabiiy - yer, ishlab chiqarish vositalari, kapitalgagina emas, balki bu resurslardan ham muhimrog'i - insonga, aniqrog'i inson kapitali - bilimi, malakasi, tajribasi, salomatligi va boshqalarga bog'liq.

Jumladan, T.Shulsning fikricha, insonga investitsiya kiritishning asosiy natijalari kishilarda mehnat qobiliyatining ortishi, ularning jamiyatda samarali

bunyodkorlik faoliyatini amalga oshirishi, salomat bo'lishi va boshqalarda o'z ifodasini topadi. U inson kapitali jamlanish va takror hosil qilinishga qodir, deb hisoblagan. Olimning fikricha, jamiyatda ishlab chiqarilayotgan jamlanma mahsulot umumiy hajmining to'rtidan uch qismi inson kapitalini to'plashga sarflanmoqda. Holbuki, XX asrdagi takror hosil qilishga doir ko'pchilik nazariyalarda bu ko'rsatkich to'rtidan bir qismni tashkil etadi, deb ko'rsatilar edi.

Aholi ko'payishi, tarkibi va rivojlanishi bir tomondan jamiyat taraqqiyotiga, undagi iqtisodiy, siyosiy o'zgarishlarga bog'liq bo'lsa, ikkinchi tomondan mamlakat taraqqiyotiga o'z ta'sirini ko'rsatadi. Demografik jarayonlar u yoki, bu davlatlarda ro'y beradigan turli o'zgarishlarni ma'lum jihatdan osonlashtiradi yoki qiyinlashtiradi.

Aholi soni o'sishi oziq-ovqat yetishmasligi, narxi ko'tarilib ketishi, qishloq xo'jaligida foydalanadigan yer maydonining qisqarishi kabi qator muammolarni ham keltirib chiqaradi.

Amerikalik professor Revell – oziq-ovqat muammosi faqat qishloq xo'jaligi tarmog'iga bog'liq bo'lib, agarda, qishloq xo'jaligi tarmog'ini yer yuzining hamma qismida talab darajasida yo'lga qo'yilib, e'tibor berilganda 100 milliard odamni boqishga yetadigan oziq-ovqat mahsuloti yaratish mumkinligini ta'kidlaydi. Agrobiolog Veggoner esa, mavjud qishloq xo'jaligi ekin maydoni, iqlim, suv, quyosh energiyasidan samarali to'g'ri foydalanilsa, atrof-muhitga zarar yetkazmasdan 80 milliard kishining qornini to'yg'azish imkoniyati borligini ta'kidlaydi.

1781 yilda fransuz yozuvchisi Abbat Giyom Reynal o'zining Amerika revolyutsiyasiga bag'ishlangan asarida "Amerika Qo'shma Shtatlaridagi bugungi ahvoldan kelib chiqib qachondir, bu joy 10 million aholini boqa olsa juda katta ish bo'lar edi. Chunki, mamlakat o'zini-o'zi zo'rg'a ta'minlayotgan hozirgi paytda, shuncha aholini faqat tabiiy resurslarga tayangan ravishda, iqtisodiyotni qattiq nazoratga olish orqali boqish mumkin, aks holda zarur mahsulotlar bilan ta'minlay olmasligini", ta'kidlaydi. Muallif ushbu so'zlarni yozganda Amerika aholisi 3 million kishini ham tashkil etmagan edi. AQSH aholisi bugungi kunda 323,9 mln kishi va bu, davlatning ijtimoiy-iqtisodiy jihatdan taraqqiy etishiga xalaqit berayotgani yo'q.

Umuman olganda aholi va uning o'sishi bo'yicha olimlar tomonidan ishlab chiqilgan bir qancha nazariyalarni quyidagi guruhlariga bo'lish mumkin.

- Maltus nazariyasi va uning tarafdorlari bo'lib, asosiy xususiyat aholi o'sishi oziq-ovqat va boshqa resurslarning mavjudligi bilan cheklanib, qashshoqlik va ochlikka olib kelishi bilan belgilanadi;

- boshqa bir guruh olimlari demografik o'tish nazariyasi tarafdorlari bo'lib, u jamiyat taraqqiyotining turli bosqichlarida tug'ilish va o'lim darajasining o'zgarishini tavsiflaydi. Bunda birinchi bosqichda tug'ilish va o'lim darajasi yuqori bo'lsa, ikkinchi bosqichda tug'ilish darajasi yuqori bo'lib qoladi, o'lim darajasi pasayadi, uchinchi bosqichda tug'ilish darajasi o'lim darajasiga tenglashadi;

- aholi sonining optimal soni nazariyasi tarafdorlari esa optimal aholi soni resurslar va ishlab chiqarish texnologiyalarining mavjudligiga bog'liqligini ta'kidlashadi.

Umuman olganda, aholi sonining ko'payishi nazariyalari aholining haddan tashqari ko'payishining sabablari va oqibatlarini tushunishga yordam beradi va aholi o'sishini nazorat qilish strategiyasini ishlab chiqadi.

Aholining o'sishi bilan bog'liq bo'lgan tadqiqotlar tug'ilish, o'lim va migratsiya dinamikasini tahlil qilishni, resurslar va ishlab chiqarish texnologiyalarining mavjudligini baholashni, shuningdek, aholining haddan tashqari ko'payishining ijtimoiy-iqtisodiy va ekologik oqibatlarini o'rganishni o'z ichiga oladi. Masalan, demografik o'tish davri bo'yicha tadqiqotlar tug'ilish va o'lim darajasidagi o'zgarishlar aholi soni va tuzilishiga, shuningdek, mamlakatning ijtimoiy-iqtisodiy rivojlanishiga qanday ta'sir qilishini tushunish imkonini beradi. Resurslar va ishlab chiqarish texnologiyalarining mavjudligi bo'yicha tadqiqotlar muayyan mamlakat yoki mintaqa uchun optimal aholi sonini aniqlashga yordam beradi.

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ANALOGUE ALGAFLORA OF THE BIOLOGICAL PONDS

Resume: *The article presents data on the comparative analysis of biological ponds, sewage treatment plants, which according to its climatic, hydrological and physical- chemical conditions of the environment is different from the other ponds. This article discusses the ecological- floral analysis of natural population of algal ponds used as biological ponds - reservoirs, clarifiers.*

Keywords: *factor, pond, algae, flora, al'goflora, saprobity, systematic, filtering, season.*

Algae of biological ponds largely determines the appearance of phytoplankton in various water bodies. The difference in the species composition of algae in biological ponds of purification plants from other bioproducts in Uzbekistan and Central Asia is not surprising, since the hydrological and hydrochemical characteristics of water bodies affect the composition of the flora. The level of development of phytoplankton in biological ponds of sewage treatment plants is much more common from other ponds in Uzbekistan and Central Asia.

Comparative monotony of conditions the existence of algae in water bodies and their transfer from place to place affect their geographical distribution. Seasonal changes in conditions causing a change in algae in the same water body during the period under study are also very significant. The similarity of the flora is determined by geographical proximity.

In biological ponds of treatment plants, which differs from other ponds in its climatic, hydrological and physicochemical conditions, this complex complex of factors determined the specific features of the species composition and development of algae.

The species composition of the algae flora of ponds in different regions of Uzbekistan and Central Asia is different. These reservoirs differ in area, depth, mineralization, nutrition, location, composition of prevailing species.

So in the biological ponds of purification plants in the city of Bukhara in early spring, late autumn and in winter, the algae found are peculiar to the mountain and northern water bodies proper. In the spring, summer and early autumn, the more thermophilic forms of algae developed.

The study of the qualitative and quantitative composition of algae in the ponds of the Kalgan Chirchik fish farm in the Tashkent region, as well as the periodicity of its development for the seasons of the year, was studied by P.N. Saksen also identified 522 taxa, of which blue-green -87, golden -6, diatoms -209, dinophyte -6, euglene -37, yellow-green -4, green -172. In the list of algae found in the Kalgan Chirchik fishery, 56 species of algae are similar to our studies.

Since, for example, *Merismopedia punctata*, *Gomphosphaeria lacustris*, *Pediastrum duplex*, *P. simplex*, *Tetradion minimum*, *Ankistrodesmus densus*, *Scenedesmus acuminatus*, *Pandoriuna morum* and others were also found in the spring, summer and autumn of the biological ponds of the purification facilities in Bukhara.

Also, AE Ergashev (1974) studied the algoflora of the ponds of the Kolkhoz Farm. Kalinin Yakkabagsky district of the Kashkadarya region. As a result of processing of the collected algological material, 118 taxa were found out of them, blue-green, -38 diatoms, -68 euglenes, -12 green, -2 green. Similar species were found in 32 species: *Oscillatoria lacteirens*, *O. grinceps*, *O. woronichinii*, *Phormidium tenue*, *Gloecapsa tarrigida*, *Mastogloia smithii*, *M. baltica*, *Nitzschia sigina*, *N. signoidea*, *N. trublionella*, *Euglena oxyuris*, *Chlorella vulgaris* and others.

Ponds of the fish farm of the Akkurgan district of the Tashkent region collected 104 algological samples and as a result of treatment 168 taxons were found, among them blue-green -28, diatoms -64, dinophyte -6, euglenic -8, green -58. (Ergashev, 1974) Of the algae found common to our ponds -17, such common are *Microcystis aeruginosa*, *M. pulvereana*, *Gomphosphaeria lacustris*, *Anabaena flos-aquae* from blue-green; *Cyclotella kuetzingiana*, *C. meneghiana*, *Melosira granulata*, *Fragilaria crotonensis*, *F. capucina* of diatoms; *Euglena oxyuris* of euglenae; *Chlamydomonas ehrenbergii*, *Dalmella microscopica*, *Tetradion minimum*, *Pediastrum duplex*, *P. simplex*, *Scenedesmus quadricauda*, *S. obliquus* and others from green algae.

Ponds of Tashkent fish hatchery registered 118 species and algae species, consisting of 118 taxa of which blue-green-14, diatoms-18, euglenic -22, green -78. (Ergashev, 1974). Similar to ours are *Oscillatoria amphibia*, *Lunbua aestuarii* of blue-green, *Synedra ulna*, *Nitzschia sigmaidea* of diatoms; *Euglena texta*, *E. proxima*, *E. gracilis* from Euglenae; *Golenkinia radiata*, *Dictyosphaerium ehrenbergianum*, *Sphaerocystis schroeterii*, *Cladophora glomerata* and others from green algae. Thus, the species composition of algae biological ponds of purification facilities in Bukhara has some commonness with flora ponds of Uzbekistan and Central Asia.

We begin our comparisons in the ponds of Uzbekistan and Central Asia. When comparing the flora of algae in the biological ponds of sewage treatment plants with some other places in Uzbekistan and Central Asia, one can see here that it has much in common with the flora of other regions.

Algae biological ponds purification plants in Bukhara, we studied the first time. According to our observations, representatives of all systematic groups of algae developing in one or another body of water participate to a varying degree in the processes of self-purification of sewage.

This indicates the need for comprehensive and deep floristic studies of the natural algal population of water bodies used as biological ponds - storage tanks, sedimentation tanks and filtration fields. In addition to scientific interest, such studies are of purely practical significance, since the features and seasonal changes

in the species composition of the algoflora can be used to enrich it with the species most desirable in this case.

Before the algalization, we investigated the species composition of the natural algae flora and their distribution by bioplasts, 120 species, varieties and forms of algae characteristic of polluted water bodies were identified.

With the development of introduced organisms in biological ponds, favorable conditions are gradually created for many accompanying species of hydrobionts. Some introduced algae gave active development in ponds.

This contributed to a decrease in the organic content of water and gave rise to an increase in the amount of oxygen dissolved in water. In the coastal parts in all ponds, there were often accumulations of filamentous algae consisting of the waters of the genera *Stigeolonium*, *Cladophora*, *Spirogyra* and others. Along with them occasionally came across blue-green, diatoms and other algae. Among them, *Oscillatoria tenuis*, *O. sancta*, *Phormidium foveolarum*, *Lungbya aestuarii* and others were distinguished.

Fouling was observed on the surface of various underwater objects (branches, boards, stones) consisting of *Stigeolonium tenue*, along with them the threads *Oscillatoria brevis*, *O. irrigua*, *O. limosa*, *O. tenuis* and on the surface of filaments epiphytic species of diatoms *Cocconeis placentula*, *Navicula tryptocophala* and much more.

Thus, after algalization, the phytoplankton and phytobenthic groups were enriched in qualitative and quantitative terms of the biological ponds of the purification plant in the city of Bukhara. The increase in the species composition of algae up to 357 taxa and their adaptation in bioproducts allowed to continue work on revealing the role of algae in wastewater treatment.

Algae are mostly composed of alpha-beta-mesosaprobies. The content of dissolved oxygen in water is one of the important factors of water self-purification. As the amount of dissolved oxygen increases, the self-cleaning process accelerates. In the spring period, when the temperature of water and solar energy rises in biological ponds, intensive development of phytoplankton is observed. As microalgae develop in water, the amount of dissolved oxygen increases to 3.0-4.0 mg / l. Reduces the amount of organic substances in BOD₅ to 44.0-50.8 mg O₂ / l.

On the basis of 520 algological samples collected biological ponds of the city of Bukhara and as a result of treatment 357 algal taxa, belonging to 5 systematic groups, were found; blue-green - 105, diatoms - 100, dinophytes - 10, euglenic - 30, green - 112. The highest occurrence is observed by the predominance of green algae, then blue-green and diatom algae. A small number is euglenic and dinophyte. As can be seen species diversity of bioproducts is great.

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DEVELOPMENT AND STUDY OF FLORISTIC COMPOSITION OF ALGAE

Annotation: *The hydrochemical composition of pond water, which plays a major role in the development and formation of algae flora, has been clarified; as a result, it has been established that the pollution of ponds with organic, mineral and toxigenic substances increases from municipal and industrial wastewater. This changes the species composition of the water. An ecological and sanitary assessment of biological ponds is given based on the species composition of algae. Comparative analyzes of the algal flora of biological ponds of treatment facilities in the city of Bukhara with a similar flora of ponds in Uzbekistan and a detailed study of the algae flora of biological ponds of treatment facilities of the city of Bukhara are given.*

Keywords: *algal flora, indicator role, saprobity, hydrochemistry, wastewater, biological pond, algae biomass, pond, wastewater.*

The algal flora of individual artificial reservoirs of Central Asia, the composition of the phytoplankton of the Khauzs, canals in the vicinity of Old Bukhara were originally described in the works of A.I. Kiselev (1926, 1930, 1931) and indicated 600 species of algae belonging to the surveyed reservoirs. E.I. Kiseleva (1931, 1939) studied the vegetation of reservoirs in the vicinity of Old Bukhara. According to Kiselev, the following types of algae are mainly characteristic of the reservoirs of Bukhara: *Pediastrum duplex*, *P. simplex*, *P. clathratum*, *Tetraedron costatum* var. *palatinum*, *T. limneticum*, *T. lobatum*, *T. trigonum*, *Kirchneriella botryoides*, *Ankistrodesmus falcatus*, *A. longissimus*, *Scenedesmus opoliensis*, *S. quadricauda*, *Crucigenia emarginata*, *C. rectangularis*, *Coelastrum microsporum*, *C. reticulatum*, *Selenastrum gracile*, *Actinastrum hantzschii*, *Dictyosphaerium pulchellum*.

The basic patterns of distribution and development of algae in various water bodies of Central Asia were studied by A.M. Muzafarov. The results of many years of research by the author were published in the monograph "Flora of algae in water bodies of Central Asia" (1965).

According to Muzafarov (1958), a systematic list of the algae flora of mountain reservoirs of Central Asia includes 812 species and varieties: pyrophytes 2, golden 4, red 5, charophytes 6, euglenoids 11, blue-green 158, green 171, diatoms 469. Of these, 269 taxa are new for Central Asia.

For natural and individual artificial reservoirs of Central Asia, the author lists 2807 taxa, of which 8 are red, 22 are golden, 31 are charophytes, 35 are

heteroflagellates, 42 are pyrophytes, 107 are euglenophytes, 590 are blue-green, 806 are green, 1160 are diatoms (Muzafarov, 1965).

As you can see, a lot of work has been done to study the flora and vegetation of reservoirs in Central Asia, but many of them do not provide comprehensive information about the algal flora of artificial reservoirs in Central Asia.

Complete information about the floristic composition of algae from the treatment facilities of Bukhara and the patterns of their development is missing to this day.

The hydrochemical composition of pond water, which plays a major role in the development and formation of algae flora, the ecological and sanitary assessment of biological ponds based on the species composition of algae, and research results make a significant contribution to the knowledge of the algal flora of reservoirs in the Bukhara region. The data obtained can be used in compiling a guide to algae in water bodies of Central Asia.

For improvement of water quality, specific biological methods for treating wastewater from municipal and industrial enterprises are recommended.

The treatment facilities of Bukhara are located on the 2nd left bank terrace of the Zerafshan river valley, in 2.8 km south of the border of the city of Bukhara and is located 180-200 meters south of the Kagan-Ashgabat railway. Between 480-750 meters to the west of the wastewater treatment plant sites there is a collector named after Sakovich. The site has the shape of a rectangle, stretched from north to south. The terrain of the site is calm with slight dips from northeast to southwest.

Ground elevations range from 215.1 to 213.6 m. The overall slope of the site from northeast to southwest is 0.00014. The site is a desert, highly saline area composed of alluvial deposits of Quaternary age from: gray loams, fine-grained water-saturated sand, sandy clay and small rounded pebbles of crystalline rocks. Groundwater is highly mineralized. Salinity is sulfate-chloride. Depth of groundwater 1.20-2.20 m. There are artificial ditches on the site, with a total length of 1530 m, with middle section 0.7 m², as well as the location of buildings and structures. The area of the site has key wire fencing. The basis for the development of a master plan for the site of the Bukhara sewerage treatment plant is: a technological diagram for the placement of buildings and structures on the site and an altitude diagram for water for structures related to the technology of sewerage treatment work.

The city's sewerage is carried out by a system of gravity collectors, the main of which are Western, Central, and Southern. Wastewater treatment is fully biological in artificially created conditions (in aeration tanks) with additional treatment in bioponds.

Discharge of purified and disinfected wastewater is carried out into the Parallel collector through the Sakovich collector. The system is designed for a prospective flow rate of 200 thousand m³/day.

The oasis is characterized by a sharply continental climate with high dryness in summer and relatively cold winter.

The average annual temperature throughout the territory ranges from 13.8-15.10C, the coldest month of the year is January, the hottest is July. The average January temperature throughout the oasis varies between 0.6-1.80C. The average temperature in July reaches 29.1-30.10C, increasing as it approaches the desert strip. Absolute minimums, falling mainly in December and January, range from 14 to 180C. The summer months are characterized by high temperatures with an absolute maximum of up to 450C; the annual temperature range seems to be very significant.

Atmospheric precipitation occurs during the winter-spring period, during which about 85% of the annual amount falls. They do not exceed 114-132 mmon average over a long-term period.

The phytoplankton of bioponds is one of the most important producers of organic matter, on the basis of which subsequent links of organic life develop. The role of phytoplankton in the general cycle of consumer substances, abundance, distribution throughout the reservoir, seasonal periodicity of development and their production capabilities.

In the works of a number of authors, an analysis was carried out about the predominant algae in the studied water bodies.

The dynamics of the development of dominant species and their numbers and biomass, as well as saprobic species and their indicator role in water self-purification and the scientific results taken can be used when writing textbooks and books for students on the course of algology, hydrobiology, ecology and environmental protection.

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CHO'L-VOHA LANDSHAFTLARI ALOQADORLIGI: ULARNING YO'NALISHLARI VA SHAKLLARI (BUXORO VILOYATI MISOLIDA)

Annotatsiya: *Voha landshafti – bu arid zonalarda insonning maqsadli yo'nalishdagi xo'jalik faoliyati natijasida vujudga kelgan, doimiy ravishda sug'oriladigan va inson tomonidan boshqarilib turiladigan antropogen geosistemalarning bir turidir.*

Kalit so'zlar: *Voha landshafti, Buxoro viloyatida cho'l vohalari, Qizilqum chegarasidagi dunalar.*

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RELATIONSHIP OF DESERT-OASIS LANDSCAPES: THEIR DIRECTIONS AND SHAPES (IN THE EXAMPLE OF BUKHARA REGION)

Annotation: *Oasis landscape is a type of anthropogenic geosystems that arose as a result of targeted human economic activity in arid zones, are constantly irrigated and managed by humans.*

Keywords: *Oasis landscape, desert oases in Bukhara region, dunes on the border of Kyzylkum.*

Voha bu cho'l va chala cho'llarda obod qilingan yer. Vohada namgarchilik qo'shni hududlarga nisbatan ko'p bo'ladi. Yer osti suvlari yuza bo'lib, buloqlar chiqib yotadi, daryolar vaqt-vaqti bilan toshib turadi. Vohalar ko'pincha daryo, ko'l, kanal va quduqlardan suv bilan ta'minlanadi.

Cho'l vohalari – keng maydonlarda yirik kengliklar bilan o'zgaruvchan landshaftlar bo'lib, o'ziga xos geomorfologik jarayonlar, iqlimiy ziddiyatlar va inson faoliyatining o'zaro ta'sirida shakllanadi. Buxoro viloyati O'zbekistonning janubiy-g'arbiy qismida joylashgan bo'lib, yirik cho'l vohalarining chegaralariga yaqin joylashgani tufayli o'ziga xos landshaft turlarini namoyon etadi. Bu hududda Qizilqum (Kyzylkum) cho'lga yaqin bo'lgan qismlar, Amudaryo va Zarafshon

vodiysining aynan chegaralanish kristallashgan qismlari, shuningdek qishloq xo'jaligi qatlamlarining yo'l yo'riqlari o'zaro uyg'unlashadi.

Cho'l vohalari hududiy jihatdan keng hududlarni o'z ichiga oladi, ular bo'yicha suv yo'llari, shamolli yo'nalishlar, yer makonlarining o'ziga xoslashuvi va iqlim o'zgarishiga moslashuv tadbirlari muhim rol o'ynaydi. Buxoro viloyatida cho'l vohalari faqat tekis maydonlar emas, baland tog'lar yonidagi qirg'irlar, yoriqlar, eroziya yo'llari va o'tkinchi daryolar tomonidan shakllangan. Hududiy aloqalar quyidagi nuqtalarda namoyon bo'ladi:

- Sug'orish va irrigatsiya: cho'l zonalarida yaqinida joylashgan irrigatsiya tarmoqlari cho'l vohasining suvga bo'lgan ehtiyojini qondiradi, bu yerlarning qismi natural gidrolik jarayonlar bilan muvozanatlanadi.

- Poytaxtlar va qishloq g'arbiy yo'nalishlar: shaharlararo yo'l tarmoqlari voha ichidagi landshaft o'zgarishlariga ta'sir qiladi; yo'l-transport logistikasining yo'naltirishi landshaft shakllanishini o'zlashtiradi.

- Eroziya va yovvoyi ildizlar: yovvoyi shamollanish va daryolarning keng yoyilishi cho'l vohalarining shakllantirishi kerak bo'lgan jarayonlarni shakllantiradi.

- Biologik xilma-xillik: cho'l voha bo'ylaridagi madaniy o'rmonlar, ko'proq sug'orishga moslashgan o'simliklar va yovvoyi o'tlar hududi, landshaft dinamikasini belgilaydi.

- Iqlim o'zgarishi va xavfsiz landshaft: cho'l vohalarining qisqa yomg'irlar davrida yondashuvlar, suv resurslarini boshqarish siyosatlari hududiy xavfsizlikka ta'sir qiladi.

Buxoro viloyatidagi cho'l vohalari, hududning kimyoviy-geomorfologik xususiyatlariga mos keladigan shakllarning namunasini beradi:

- Qizilqum chegarasidagi dunalarning tarqalishi: viloyatning janubiy-qismidan o'tib boruvchi Qizilqum cho'liga yaqin hududlarda yassi maydonlar o'rta qismidagi yirik-kichik dunalarning katta miqdori paydo bo'ladi. Bunday dunalarning yo'nalishlari shamol yo'nalishiga mos keladi va viloyatning qishloq xo'jaligi zonalaridagi suv resurslari bilan bevosita bog'liq.

Buxoro vohasi — Markaziy Osiyodagi eng qadimgi va yirik dehqonchilik maskanlaridan biri. Zarafshon daryosining quyi qismida joylashgan. Shimoli-sharqda Hazar yo'lagi orqali Karmana va Konimex vohalariga, janubi-g'arbda esa Jondor yo'lagi orqali Qorako'l vohasiga tutash. Uzunligi 80 kilometr, eng keng joyi 60 kilometrga teng. Buxoro vohasining dastlabki relyefi inson faoliyati natijasida jiddiy o'zgargan. Daryo terrasalari ekinzorga aylantirilgan. Zarafshonning qadimgi tarmoqlari o'rnidagi pastqamliklar hamda balandligi 5—15 metrli tepalar voha relyefini birmuncha murakkablashtirgan. Iqlimi subtropik belgilarga ega bo'lgan keskin kontinental cho'l iqlimi.

Cho'l vohalari iqlimi juda quruq bo'lib, yillik yog'ingarchilik kam (100–300 mm atrofida, hududga qarab farq qiladi), shovqinli yozlar va sovuq qishlar bo'ladi. Buxoro viloyatidagi cho'l vohalari asosan Amudaryo yoki Zarafshon vodiysi yo'llaridagi suv resurslarining kamayishi yoki taqsimlanishi landshaftga o'zgarishlar keltirib chiqaradi. Suv taqsimoti mazkur hududda qishloq xo'jaligi

uchun muhim omil bo'lib qoladi. Cho'l vohalari — keng hududlarda joylashgan, o'zgaruvchan geomorfologik jarayonlar, iqlimiy sharoitlar va inson faoliyatining o'zaro ta'sirida shakllanadigan landshaftlar hisoblanadi. Buxoro viloyati cho'l vohalari esa o'ziga xos mikroiklim, suv taqsimoti va irrigatsiya arxitekturasini bilan ajralib turadi.

Xulosa: Cho'l vohalari — keng hududlarda joylashgan, o'zgaruvchan geomorfologik jarayonlar, iqlimiy sharoitlar va inson faoliyatining o'zaro ta'sirida shakllanadigan landshaftlar hisoblanadi. Buxoro viloyati cho'l vohalari esa o'ziga xos mikroiklim, suv taqsimoti va irrigatsiya arxitekturasini bilan ajralib turadi.

Cho'l voha landshaftlari Buxoro viloyatida turli yo'nalishlarda shakllanadi: cho'llarning yo'nalishi shamolga qanchalik mos keladi, vohalar yaqinidagi landshaft moslashuvi, eroziya zonalari, shaharlarning o'zgaruvchan chegaralari. Bu hududlarda iqlim, suv va ekologiya o'zaro bog'liq bo'lgan ko'p omillarga bog'liq. Rivojlanish uchun muhim masala — raqamli atlaslar, GIS yordamida hududiy landshaftlarni monitoring, xavfsiz landshaftlar uchun barqaror boshqaruv tizimini yaratish. Bu yo'l bilan Buxoro viloyati mustahkam, xavfsiz va yashashga qulay ekologik-ko'p qirralik hudud bo'lib qoladi.

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GEOGRAFIK LANDSHAFTLAR VA ULARNING ILMIY-AMALIY AHAMIYATI

Annatatsiya: Ushbu maqola yosh avlodni geografik landshaftlar haqidagi bilimlarini oshirishga va tabiiy geografiyaning ilmiy-amaliy ahamiyati haqidagi tushunchalarni shakllantirish va talaba yoshlar g‘oyalarini tadbiq qilishini o‘rganishini ta‘minlaydi.

Kalit so‘zlar: Landshaftlar, geografik landshaftlar, tarkibiy-genetik yo‘nalish, funksional-dinamik yo‘nalish, landshaftlar geokimyosi, landshaftlar geofizikasi.

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GEOGRAPHICAL LANDSCAPES AND THEIR SCIENTIFIC AND PRACTICAL SIGNIFICANCE

***Abstract:** This article provides the younger generation with the opportunity to expand their knowledge of geographical landscapes and form ideas about the scientific and practical significance of natural geography, as well as to study the implementation of the ideas of young students.*

***Key words:** Landscapes, geographical landscapes, structural-genetic direction, functional-dynamic direction, landscape geochemistry, landscape geophysics.*

Landshaft so'zi aslida nemischa bo'lib, (Land yer va schaft o'zaro aloqadorlik va bog'liqlikni aks ettiruvchi suffiks), umumadabiy tilda manzara, joyning ko'rinishi degan ma'noni anglatadi.

Landshaft atamasi geografiyaga dastavval deyarli bir vaqtda A.A.Borzov, L.S.Berg, L.M.Krashennikov, L.F.Morozovlarning ilmiy ishlari orqali tabiiy geografik kompleks so'zining sinonimi sifatida kirib keldi.

Landshaftshunoslik fanining taraqqiyoti bilan qiziqqan kishi bu fanda bir qator ilmiy yo'nalishlar hosil bo'lganligini payqamay qolmaydi. Bu yo'nalishlardan dastlabkisini **tarkibiy-genetik yo'nalish** deb atasa bo'ladi. Uning namoyondalari asosan landshaftlarni aniqlash, xaritaga kiritish, ularning komponentlari va komponentlararo aloqadorliklarini hamda landshaftlarning morfologik tuzilishi va morfologik qismlararo o'zaro ta'sir va aloqadorliklarni o'rganish bilan, ya'ni ularning vertikal va gorizantal tuzilishini ochib berish bilan shug'ullanganlar. Landshaftshunoslikdagi ushbu yo'nalish landshaftlar o'ziga xos tabiiy geografik kompleks sifatida o'zidan kichikroq bo'lgan komplekslar bog'lamidan iboratdir, degan g'oyaga asoslanadi.

Landshaftshunoslikdagi ikkinchi bir ilmiy yo'nalish bu **funksional dinamik yo'nalishdir**. Bu yo'nalish asosan XX asrning 60-yillaridan boshlab shakllana boshladi. Ushbu yo'nalishda olib borilgan ilmiy izlanishlarning asosiy mazmuni landshaftlarning vaqt mobaynida o'zgarishiga, landshaftlarning o'z funksiyasini, ya'ni maxsus faoliyatini bajarish jabhalariga e'tibor berishdan iboratdir. A.A.Krauklis (1979) ta'biri bilan aytganda, landshaftshunoslikdagi tarkibiy-genetik yo'nalish tabiiy geografik rayonlashtirish bilan birgalikda landshaftlarni o'rganishga "makroskopik" yondashish bo'lsa, funksional-dinamik yo'nalish esa "mikroskopik" yondashishdir. Ularning birinchisida, landshaftlar aniqlanadi, xaritaga tushiriladi, morfologik tuzilishi o'rganiladi va tavsiflanadi. Ikkinchisida esa, landshaftlarning ichida ro'y beradigan jarayonlarni, ham makonda, ham zamonda o'zgarishini, landshaftlararo, ularning morfologik qismlariaro hamda komponentlariaro modda

va energiya almashinishini o'rganishga ko'proq e'tibor beriladi. Bu yo'nalishning yuzaga kelishi bilan landshaftshunoslikka landshaftning holati, landshaftning dinamikasi, landshaft invarianti, landshaftning o'z maxsus faoliyatini bajarishi kabi yangi tushunchalar kirib keldi. Landshaftlardagi modda va energiya almashinish jarayoniga bo'lgan qiziqish boshqa bir qator yangi yo'nalishlarni hosil bo'lishiga olib keldi. Shular qatorida landshaftshunoslik va geokimyo fanlari orasida landshaftlar **geokimyosi yo'nalishi** shakllandi. Bu yo'nalishning eng asosiy xususiyati landshaftshunoslikning obyektini geokimyo fani tadqiqot usullar bilan o'rganishdir.

Landshaftlar geokimyosidagi yetakchi ilmiy g'oyalarning shakllanishi "geokimyoviy landshaft" tushunchasining muallifi va landshaftlar geokimyosi ilmiy maktabining asoschisi B. B.Polinovning bir qator maqolalari bilan bog'liq bo'ldi. Uning tushunchasida, geokimyoviy landshaft kimyoviy moddalarning migratsiya xususiyatlari bo'yicha ajratilgan yerning bir qismidir. Ushbu olim V.V.Dokuchayevning tabiat zonalari haqidagi ta'limoti hamda Vernadskiyning tirik organizmlarning geologik ahamiyati haqidagi ta'limoti asosida landshaftlar geokimyosining metodologiyasini yaratdi.

Landshaftlar geokimyosi yo'nalishining keyingi taraqqiyoti asosan A.I.Perelman va M.A.Glazovskayalarning ilmiy izlanishlari bilan bog'liq bo'ldi. Ularning muallifligida tayyorlangan bir qator monografiyalar va o'quv qo'llanmalar ko'pchilikka yaxshi tanish. Ana shu qo'llanmalar asosida ko'pgina universitetlarda landshaftlar geokimyosi bo'yicha maxsus kurslar o'rgatila boshlandi. Chunki, xalq xo'jaligining ko'pgina tarmoqlarida, jumladan foydali qazilmalarni izlab topishda, yangi yerlarni o'zlashtirish va qishloq xo'jaligining turli tarmoqlarini rivojlantirishda, tabiat muhofazasi bilan bog'liq bo'lgan masalalarni hal etishda landshaftlarning geokimyoviy xususiyatlarini o'rganishning ahamiyati katta ekanligi ayon bo'lib qolgan edi. Bu yo'nalish landshaftshunoslikning amaliyot bilan yaqinlashishida juda qo'l keldi. Masalan, geologiya-qidiruv ishlarida landshaftlarga insonning xo'jalikdagi faoliyati ta'sirini chuqurroq tahlil qilish imkoniyatini yaratdi.

Landshaftlar geokimyosining eng asosiy vazifalardan biri landshaftlar orasida, ularning komponentari orasida va morfologik qismlari orasida ro'y beradigan kimyoviy jarayonlarni, kimyoviy unsurlarning ko'chib yurishi, tarqalishi yoki jamlanishini o'rganishdan iborat. Kimyoviy unsurlarning almashinish jarayoni landshaftlarning hosil bo'lishi, tuzilishi, maxsus faoliyati va taraqqiyoti kabi mahim xususiyatlarini ko'p jihatdan belgilab beradi.

Landshaftlar geofizikasi ham landshaftlar geokimyosi kabi landshaftshunoslikdagi katta bir ilmiy yo'nalishdir. Landshaftlar geofizikasi landshaftlarga xos bo'lgan eng umumiy fizikaviy jarayonlar va hodisalarni o'rganadi. Bu jarayon va hodisalarning o'zaro aloqadorlik va bog'liqlik qonuniyatlarini aniqlash ham ushbu yo'nalishning asosiy vazifalaridan biridir. Landshaftlarni o'rganishda geofizika tadqiqot usullaridan foydalanish landshaftlarning hozirgi holatda dinamikasiga va rivojlanishiga xos bo'lgan xususiyatlarini aniqlashda yaxshi natijalar beradi. Bu esa, o'z navbatida, tabiatni kuzatib turish (geografik monitoring), muhofaza qilish va tabiat boyliklaridan oqilona foydalanish masalalarini hal qilishda katta ahamiyat kasb etadi. Landshaftlar uchun umumiy bo'lgan va fizika fani o'rganadigan fizikaviy

xossalarga massa, ichki energiya, optikaviy va radiofizikaviy xossalarni, ularning makon va zamonga taalluqli xususiyatlarini misol keltirish mumkin. Shu xossalarni o'rganish orqali landshaftlarni o'zinigina emas, balki ularning komponentlarini ham ta'riflab bersa bo'ladi. Masalan, havo, suv yoki o'simlikning optikaviy va radiofizikaviy xususiyatlarini o'rganish kabi. Ammo, landshaftlarga xos bo'lgan fizikaviy xususiyatlar va jarayonlar shu landshaftlarni va ularning komponentlarini yanada kichikroq yoki tuzilishi jihatidan yanada oddiyroq bo'lgan qismlarga bo'lib o'rganishni taqozo qiladi.

Xulosa: Tabiat bilan jamiyat orasidagi o'zaro ta'sir va aloqadorlik nihoyatda murakkab jarayon bo'lib, u dastavval kichik hududlarda landshaft, urochishe va fatsiya kabi tabiiy geografik komplekslarda, ularning tabiiy resurslaridan foydalanish bilan bog'liq bo'lgan holda kechadi. Shuning uchun ham kichik hududlar tabiiy geografiyasi yoki landshaftshunoslikning asosiy vazifalari hisoblanmish landshaft va uning morfologik qismlarini aniqlash, xaritaga tushirish, ularning strukturasini, ichki aloqadorliklarini, dinamikasini, rivojlanishi va barqarorligini tadqiq qilish, kichik hududlarni xalq xo'jaligi nuqtayi nazaridan baholash, ichki imkoniyatlarini aniqlash va samaradorligini oshirish va hokazolar muhim ilmiy va amaliy ahamiyat kasb etadi.

Hozirgi vaqtda tabiiy landshaftlar inson faoliyati natijasida shunday tashqi ta'sirga duch kelmoqdaki, bu o'z navbatida tabiiy geografiya va uning bir qismi bo'lgan landshaftshunoslik oldiga yangi-yangi ilmiy va amaliy muammolarni qo'ymoqda. Ularning ichida eng muhim va dolzarb hisoblanganlari landshaftlarning turli tashqi ta'sirlarga barqarorligini aniqlash, ularni xalq xo'jaligining turli tarmoqlarida foydalanish nuqtayi nazaridan baholash, ularning inson ta'sirida o'zgarishini va bu o'zgarish qaysi yo'nalishda ro'y berishini oldindan aytib berish, ya'ni prognozlash, o'zgartirilishi lozim bo'lgan landshaftlarni haqiqiy madaniy landshaftlarga aylantirish va ularning samaradorligini oshirishning ilmiy asoslarini yaratish kabilardir.

Landshaftlar ham, ularning morfologik qismlari ham, xuddi ekologik tizimlar kabi tabiiy tizimlardir. Ular ham komponentlari o'zaro aloqador va bog'liq bo'lgan bir butun tabiiy hosilalar sifatida o'rganilishi lozim. Bu o'z navbatida landshaft tadqiqot ishlarida eng asosiy vazifalardan biri sifatida ularning strukturasini, dinamikasini va rivojlanishini, maxsus faoliyatini, inson faoliyati ta'sirida o'zgariganlik darajasi va ilmiy tahlil qilib berish kerakligini ko'rsatadi.

Inson bilan tabiat aloqadorligi muammolarini ijobiy hal etishda ekologiya fani biologik fanlar ichida qanday ahamiyatga ega bo'lsa, landshaftshunoslik fani ham geografik fanlar tizimida shunday ahamiyatga ega bo'lishi kerak. Geografik tadqiqot ishlarida landshaftshunoslikda ishlab chiqilgan tadqiqot metodlaridan foydalanish esa eng asosiy metodlardan biri universitetlarda geografiya, hisoblanadi. Shuning gidrometeorologiya, kartografiya kabi yo'nalishlar bo'yicha ta'lim olayotgan talabalar landshaftshunoslikdan puxta bilimga ega bo'lishlari talab qilinadi.

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**EVALUATION AND ANALYSIS OF THE EFFECTS OF MEDICINAL
PLANTS ON IMMUNE RESPONSE AND INFLAMMATORY
BIOMARKERS IN CASES OF TUBERCULOSIS ASSOCIATED WITH
DIABETES MELLITUS**

Annotation. Tuberculosis (TB) and diabetes mellitus (DM) are two prevalent diseases that often coexist, leading to complex clinical manifestations and impaired immune responses. The combined presence of TB and DM significantly increases the risk of complications, prolonged treatment duration, and altered inflammatory processes. Medicinal plants have long been used as complementary therapeutic agents due to their immunomodulatory and anti-inflammatory properties. This study aims to evaluate the effects of selected medicinal plants on immune system parameters and inflammatory biomarkers in patients with concomitant TB and DM. Clinical and laboratory assessments were performed to measure cytokine levels, lymphocyte subpopulations, and key inflammatory markers before and after phytotherapy intervention.

Keywords: Tuberculosis, Diabetes Mellitus, Immune Response, Inflammatory Biomarkers, Medicinal Plants, Phytotherapy, Cytokines, Immunomodulation

Relevance. The coexistence of tuberculosis and diabetes mellitus is a growing global health concern. DM patients are more susceptible to TB due to compromised immunity, leading to more severe disease courses and higher mortality rates. Conventional TB treatments, while effective, may not fully restore immune balance or control systemic inflammation, particularly in diabetic patients. Medicinal plants with immunomodulatory and anti-inflammatory effects offer a promising adjunctive approach. Evaluating their impact on immune response and inflammatory biomarkers can provide a scientific basis for integrative therapeutic strategies, reduce disease complications, and enhance patient outcomes.

Aim. To investigate the effects of selected medicinal plants on immune system parameters and inflammatory biomarkers in patients with concomitant tuberculosis and diabetes mellitus.

Materials and Methods.

Study Design: A controlled clinical study involving 60 patients diagnosed with TB and DM. Patients were divided into two groups:

• **Control group (n=30):** Standard anti-TB therapy combined with conventional diabetes management.

• **Intervention group (n=30):** Standard therapy plus phytotherapy using selected medicinal plants known for immunomodulatory properties (e.g., *Andrographis paniculata*, *Curcuma longa*, *Glycyrrhiza glabra*).

Inclusion Criteria: Adults aged 18–65, confirmed pulmonary TB, diagnosed type 2 diabetes mellitus, and willingness to participate.

Exclusion Criteria: Severe hepatic or renal impairment, autoimmune diseases, pregnancy, and concurrent use of other herbal preparations.

Laboratory Assessments:

• **Immune Parameters:** Total lymphocyte count, CD4+, CD8+ T-cell populations, NK cell activity.

• **Inflammatory Biomarkers:** C-reactive protein (CRP), interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF- α).

Methodology:

- Blood samples were collected at baseline and after 8 weeks of treatment.
- Immune parameters were analyzed via flow cytometry.
- Cytokine and CRP levels were quantified using ELISA assays.
- Statistical analysis performed using SPSS v.25; $p < 0.05$ considered significant.

Results. Intervention with medicinal plants led to a significant increase in CD4+ T-cell count and NK cell activity compared to the control group. Patients who received phytotherapy demonstrated markedly improved immune profiles, with CD4+ lymphocytes showing enhanced proliferation and functional activity. This increase in CD4+ T-cell count indicates a strengthened adaptive immune response, which is critical for combating *Mycobacterium tuberculosis* in the context of compromised immunity due to diabetes mellitus. Additionally, natural killer (NK) cells, which play a vital role in innate immunity and early defense against infections, exhibited higher cytotoxic activity and increased numbers in the intervention group, suggesting that medicinal plants can positively modulate both adaptive and innate immune mechanisms. The enhancement of these immune parameters implies that phytotherapy may contribute to better infection control and potentially reduce the risk of TB progression and complications in diabetic patients.

A substantial reduction in pro-inflammatory cytokines, including interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF- α), as well as decreased levels of C-reactive protein (CRP), was observed in the intervention group. These findings indicate that medicinal plants exert potent anti-inflammatory effects, helping to mitigate the systemic inflammatory state often present in patients with concomitant TB and DM. Lower cytokine levels reflect a decrease in immune system overactivation and may lead to reduced tissue damage, improved clinical outcomes, and a better overall inflammatory balance. The anti-inflammatory properties of the selected plants are likely responsible for these observed changes, highlighting their potential as adjunctive therapy to conventional treatment regimens.

Patients receiving phytotherapy also reported fewer adverse effects associated with standard TB and diabetes treatments. The tolerability and safety of the herbal intervention were noteworthy, as patients experienced less

gastrointestinal discomfort, reduced fatigue, and improved appetite compared to those in the control group. Subjective assessments indicated enhanced overall clinical well-being, increased energy levels, and a more positive perception of health status. The improvement in quality of life metrics underscores the practical benefits of integrating medicinal plants into patient care plans, particularly for those undergoing long-term therapy for chronic coexisting conditions.

Conclusion. The integration of medicinal plants as adjunctive therapy in patients with concomitant TB and DM positively influences immune function and reduces inflammatory activity. Phytotherapy may enhance the efficacy of conventional treatments, support faster recovery, and mitigate disease complications. These findings provide a scientific basis for incorporating medicinal plants into comprehensive management strategies for TB patients with diabetes, warranting further large-scale studies to optimize dosing and selection of herbal agents.

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INVESTIGATION OF THE EFFECTS OF MEDICINAL PLANTS ON IMMUNE SYSTEM PARAMETERS AND INFLAMMATORY BIOMARKERS IN PATIENTS WITH CONCOMITANT TUBERCULOSIS AND DIABETES MELLITUS

Abstract. *This study investigates the effects of medicinal plants on immune system parameters and inflammatory biomarkers in patients with concomitant tuberculosis (TB) and diabetes mellitus (DM). A comparative analysis was conducted between patients receiving standard therapy and those receiving additional phytotherapy. Immunological indicators ($CD4^+$, $CD8^+$ T lymphocytes, NK cells) and inflammatory biomarkers (IL-6, TNF- α , CRP) were assessed before and after treatment. The results demonstrated that medicinal plant-based therapy significantly enhanced immune responses, reduced systemic inflammation, and improved clinical outcomes without serious adverse effects. These findings support the integration of phytotherapy as an adjunctive approach in the comprehensive management of TB–DM comorbidity.*

Keywords: *tuberculosis, diabetes mellitus, medicinal plants, immune response, inflammatory biomarkers, phytotherapy.*

Relevance of the Study. The coexistence of tuberculosis and diabetes mellitus represents one of the most pressing challenges in modern clinical medicine and global public health. Diabetes mellitus is recognized as a major risk factor for the development, progression, and poor prognosis of tuberculosis. Patients with diabetes have a threefold higher risk of developing active TB compared to non-diabetic individuals, primarily due to chronic hyperglycemia-induced immune dysfunction.

From an immunological perspective, diabetes mellitus is associated with impaired cellular immunity, including reduced macrophage activity, decreased $CD4^+$ T-cell proliferation, altered cytokine production, and diminished natural killer (NK) cell function. These alterations compromise the host's ability to control *Mycobacterium tuberculosis*, leading to more severe disease forms, delayed sputum conversion, higher relapse rates, and increased mortality.

In addition, TB–DM comorbidity is characterized by persistent low-grade systemic inflammation. Elevated levels of pro-inflammatory cytokines such as interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF- α), and C-reactive protein (CRP) contribute to tissue damage, insulin resistance, and poor treatment outcomes.

Conventional antituberculosis therapy, while effective against the pathogen, does not adequately address immune dysregulation and chronic inflammation, and prolonged drug use may lead to hepatotoxicity, nephrotoxicity, and metabolic complications.

Medicinal plants have been widely used in traditional medicine for centuries due to their immunomodulatory, anti-inflammatory, antioxidant, and metabolic regulatory properties. Recent experimental and clinical studies suggest that bioactive compounds derived from medicinal plants can enhance cellular immunity, suppress excessive inflammatory responses, and improve metabolic balance with minimal adverse effects.

Aim of the Study. To evaluate the effects of medicinal plants on immune system parameters and inflammatory biomarkers in patients with concomitant tuberculosis and diabetes mellitus.

Materials and methods. A total of 60 patients diagnosed with active pulmonary tuberculosis and type 2 diabetes mellitus were enrolled in the study. Participants were divided into two groups:

- Control group (n = 30): received standard antituberculosis therapy combined with antidiabetic treatment.
- Intervention group (n = 30): received standard therapy plus medicinal plant-based phytotherapy.

Immunological parameters (CD4⁺, CD8⁺ T lymphocytes, NK cells) were measured using flow cytometry. Inflammatory biomarkers (IL-6, TNF- α , CRP) were assessed by enzyme-linked immunosorbent assay (ELISA). Clinical and laboratory evaluations were performed at baseline and after 3 months of treatment.

Results. After 3 months of treatment, significant improvements in immune system parameters were observed in the intervention group compared to the control group. The mean CD4⁺ T-cell count increased from **412.3 $\pm$ 48.6 cells/ μ L** to **545.7 $\pm$ 52.1 cells/ μ L** in the phytotherapy group, representing a **32.3% increase** ($p < 0.001$; 95% CI: 118.6–148.2). In contrast, the control group showed a modest increase from **418.9 $\pm$ 50.2 cells/ μ L** to **465.4 $\pm$ 49.7 cells/ μ L** (**11.1% increase**, $p = 0.041$; 95% CI: 12.4–80.6).

Inflammatory Biomarkers. A significant reduction in inflammatory biomarkers was observed in both groups; however, the magnitude of reduction was substantially greater in the intervention group.

Serum IL-6 levels decreased from **14.8 $\pm$ 3.2 pg/mL** to **8.1 $\pm$ 2.4 pg/mL** in the phytotherapy group (**45.3% reduction**, $p < 0.001$; 95% CI: –8.4 to –5.2), while the control group showed a reduction of only **18.6%** ($p = 0.034$).

TNF- α levels declined by **37.9%** in the intervention group (from **22.6 $\pm$ 4.1 pg/mL** to **14.0 $\pm$ 3.5 pg/mL**, $p < 0.001$; 95% CI: –11.1 to –6.3), compared to a **16.4%** reduction in the control group ($p = 0.048$).

CRP concentrations showed the most prominent change, decreasing from **12.4 $\pm$ 3.6 mg/L** to **6.5 $\pm$ 2.1 mg/L** (**47.6% reduction**, $p < 0.001$; 95% CI: –7.4 to –4.2). In contrast, the control group experienced a **19.8% reduction** ($p = 0.039$).

Clinical and Metabolic Outcomes

Patients in the intervention group showed improved glycemic stability, with a mean reduction in fasting blood glucose of 1.8 ± 0.6 mmol/L ($p < 0.01$) and a downward trend in HbA1c levels (mean decrease: $0.9 \pm 0.3\%$, $p < 0.01$). The control group exhibited smaller, statistically borderline changes ($p = 0.062$).

Clinically, symptom resolution—including fatigue, cough severity, and appetite loss—occurred earlier in the phytotherapy group. Additionally, the frequency of mild adverse drug reactions was lower among these patients, and no serious adverse events related to medicinal plant use were reported.

Inflammatory Biomarkers

A pronounced reduction in systemic inflammation was observed among patients receiving medicinal plants. IL-6 levels decreased by 40–45%, TNF- α by 35–38%, and CRP by 45–50% compared to baseline values. These reductions were significantly greater than those observed in the control group, where biomarker levels declined by only 15–20%.

The marked decrease in pro-inflammatory cytokines suggests that phytotherapy effectively suppresses excessive inflammatory responses without compromising protective immunity. This balance is particularly important in TB–DM patients, where chronic inflammation exacerbates insulin resistance and tissue damage.

Conclusion. Medicinal plant-based phytotherapy significantly improves immune system parameters, reduces inflammatory biomarkers, and enhances clinical outcomes in patients with concomitant tuberculosis and diabetes mellitus. The findings support the inclusion of medicinal plants as a safe and effective adjunct to standard therapy, contributing to immune restoration, inflammation control, and improved treatment tolerance.

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DETERMINANTS OF FEMALE LITERACY RATES: EVIDENCE FROM CROSS-COUNTRY PANEL DATA

Abstract: *The present study seeks to examine the key determinants influencing the female literacy rate across countries. To achieve this objective, a comprehensive review of previous research addressing similar economic issues was conducted. Based on the findings of the literature review, the main independent variables were identified and subsequently incorporated into the estimated model. The dataset was obtained from the World Bank and covers a 30-year period from 1990 to 2020. Panel data comprising indicators from 217 countries were employed for the analysis. The regression results indicate that female literacy rates are significantly influenced by poverty levels, the number of secondary education teachers, the proportion of the rural population, and fertility rates. However, the wage rate was found to be statistically insignificant.*

Furthermore, the analysis was extended by categorizing countries according to their development index, and the corresponding regression results were presented and discussed in the results section. The study also verified and interpreted the assumptions underlying the Ordinary Least Squares (OLS) method. Nevertheless, due to data limitations, some OLS assumptions could not be fully satisfied, which constitutes one of the study's main constraints. Despite these limitations, several policy recommendations were proposed to enhance female literacy levels globally.

Key words: *Literacy rate, gender inequality, economic development, poverty rate.*

Introduction:

Education is widely recognized as one of the most essential factors contributing to a country's economic development. Numerous studies have demonstrated that education not only fosters economic growth but also enhances individual and social development. However, gender disparities persist across many sectors, and education is no exception. According to global statistics, the number of people who are unable to read and write reaches nearly one billion. Additionally, there are approximately 300 million school-aged children who do not attend school. It is estimated that two-thirds of these children are girls lacking basic literacy skills, and around 60 percent of girls worldwide are not enrolled in formal education. For instance, in Africa, 75 percent of boys are enrolled in primary education compared to only 57 percent of girls. Education holds particular importance for women, as they play a vital role in the upbringing and development of future generations, which in turn directly influences the prosperity and progress of the state (Adetude and

Akensina, 2008). For example, women constitute about 53 percent of the population in Pakistan. Therefore, if half of the population remains uneducated, national development becomes unattainable. An uneducated woman who lacks access to knowledge and skills cannot effectively contribute to social and economic advancement. Children primarily learn through observation, particularly from their mothers, as they spend the majority of their early years in maternal care. Hence, a mother's knowledge plays a crucial role in shaping a child's personality and values. Educated mothers are aware of the importance of education and are more likely to ensure that their children receive it as well. Nevertheless, in Pakistan, girls continue to face discrimination and limited access to educational opportunities compared to boys. Many parents underestimate the value of female education, perceiving it as unnecessary or unproductive. Consequently, the literacy rate among women remains significantly low, posing a serious barrier to the country's overall development (Suleman et al.). The present study aims to analyze and identify the key determinants influencing female literacy rates, drawing on insights from previous research discussed in the literature review. Furthermore, the study outlines the research questions, objectives, and provides a detailed description of the variables included in the estimated model in the methodology section. The investigation presents the expected relationships supported by empirical evidence and offers a structured overview of the study, including its conclusions, limitations, policy recommendations, and references.

Literature review:

Based on the study by Klasen (2002), which focused on the issue of low-quality education in schools, it was demonstrated that such deficiencies lead to a decline in economic growth. Using data from various countries, the author confirmed that economic growth is affected by gender inequality in education. Moreover, panel data were utilized in the research to identify the long-term effect of gender inequality in education on economic growth. The results showed that gender inequality directly reduces human capital.

According to another study, the main determinant that affects the literacy level of females is poverty, as the majority of the population lives in rural areas. Therefore, parents are often unable to afford the costs of uniforms, books, and transportation. Nevertheless, there has been a significant improvement in female education and literacy rates over the years. Sharmilla and Dhas (2010), using multiple regression analysis, estimated that poverty in rural areas is a major factor that negatively affects women's education. Similarly, Chernichovsky (1985), who used data from a 1971 survey on rural income distribution in Botswana, found that the number of school-aged children in a household influences school enrollment. In large families, some children are engaged in agricultural work while others attend school. However, the author found that girls' school enrollment decreases when there are babies in the family, as they are often required to look after them.

Urbanization, on the other hand, has been shown to have a positive effect on female literacy rates. When parents face financial constraints and must choose between educating their sons or daughters, the likelihood of choosing boys is much

higher, which greatly affects girls' literacy levels. Imran and Rizwana (2004) found a positive correlation between school attendance and household income, indicating that financially disadvantaged large families tend to prioritize boys' education over girls'. In general, household income is positively correlated with literacy levels. To support the family, children often engage in various income-generating activities, leaving them little or no time to study. These activities differ by gender but contribute to the family's financial situation (Pirzado et al., 2006).

Another important factor influencing female education is culture and tradition. In many societies, women are assigned the primary roles of wives and mothers. Consequently, parents often withdraw their daughters from school before graduation, believing that domestic skills can be learned at home. Social norms view investing in girls' education as a waste of time and money, as their future contributions will benefit their husbands' families. Parents also tend to believe that sons are the main breadwinners and therefore prioritize their education. While most parents acknowledge the importance of girls' education, they still consider boys' education a priority, as future family income depends on them (Humala and Eshaya, 2000).

According to Suleman et al. (2015), educated parents are more likely to educate their daughters. Comparing rural and urban households, families living in urban areas devote more time and resources to raising and educating their daughters. Teachman (1987) found a positive relationship between parents' education and the literacy levels of their children. Similarly, Kung and Bellew (1991) observed that when parents are educated, their daughters are more likely to complete their education. Burney and Irfan (1991) further confirmed that daughters of highly literate parents are more likely to continue their studies in higher education institutions.

A lack of female teachers is another factor that negatively affects girls' education. When female teachers are present, girls are more likely to attend school. However, in schools with only male teachers, parents often perceive a higher risk of physical or sexual harassment from teachers or male students (Hallman et al., 2006). Suleman (2015) also found that the distance between home and school negatively affects girls' literacy levels. In rural areas, where schools are scarce, children must travel long distances, raising safety concerns and discouraging parents from sending their daughters to school. Moreover, the poor condition of rural schools — including a lack of classrooms, educational materials, and qualified teachers — further reduces attendance rates, particularly among girls.

Sundaram and Vanneman (2008) found that an increase in female labor force participation contributes to widening the education gap between men and women. Their findings demonstrate that higher participation of women in the labor market negatively affects female literacy rates.

Buchmann et al. (1996) studied the factors influencing girls' secondary school attendance based on international data from 1975–1987. They analyzed 17 countries and considered national indicators such as urbanization, women's employment in industry, economic development, domestic investment, and

structural adjustment policies. The results revealed that economic development positively influences school enrollment, whereas structural adjustment programs have a negative effect.

Fertility rate is another factor influencing female literacy. Improvements in nutrition and hygiene are closely linked to reductions in fertility rates. Education, especially among women, has a multiplier effect on development. Higher education levels among women are associated with lower fertility and mortality rates, regardless of residence or socioeconomic status. Using data from the 2011 Sample Registration System, Suman et al. (2013) found a significant negative relationship between fertility rate and female literacy rate ($\beta = -0.363$, $p < 0.001$).

Education is a key indicator of national development and is equally important for men and women. According to Islamic teachings, seeking knowledge is a duty for every man and woman. Despite this, the level of women's education remains low. Several factors affect women's access to education, including poverty, culture, tradition, parental education and attitudes, lack of qualified teachers, distance to schools, poor school conditions, weak communication between parents and teachers, early marriage, fertility rate, and inadequate policy implementation.

Alhassan (2017) emphasized that living in a rural area is a critical factor influencing girls' education. In rural regions where no schools are available, girls must commute long distances or live away from home to attend school. The success and completion rates of girls' education largely depend on the type and quality of schools. Akande (1987) found that female students in rural schools perform worse than those in urban schools. Weiss (1986) also supported this finding, noting that 86% of girls in Ghana from low-status families were enrolled only in secondary school. The lack of educational institutions in rural areas limits opportunities for higher education. Similarly, schools located in rural areas often exhibit poorer academic performance compared to urban schools, reflecting negatively on female literacy levels.

Parental income is another determinant that positively affects girls' education. Studies show that parents with higher incomes can afford to support their daughters' education from early childhood, thereby laying a strong foundation for future academic achievement. Sanabary (1989) found a significant relationship between parental income and girls' education, showing that daughters from middle- and high-income families are more likely to enroll in and complete higher education compared to those from low-income households.

Odaga and Heneveld (1995) analyzed the factors influencing girls' education before school age and identified economic, cultural, institutional, and school-related determinants. Hyde (1989) emphasized the importance of social and family-level factors in shaping academic performance in Africa. Stromquist (1998) further identified barriers to women's education, including high education costs, early pregnancy, domestic labor, opportunity costs, inappropriate curricula, family poverty, and insecurity.

Several studies have confirmed that early marriage significantly reduces women's participation in education. In many societies, parents view marriage as a

means of easing economic burdens. For instance, in 1996, 38% of girls in India aged 15–19 were married, while in rural Tajikistan and Albania, early marriages were also common. In countries such as Somalia, Ethiopia, and across West Africa, marriage at the age of 7–8 is not uncommon. Early marriage often leads to school dropout, thereby lowering female literacy rates. Studies consistently show that school attendance declines when girls marry early, and women's overall participation in education decreases due to early marriage.

RESEARCH QUESTION:

What are the determinants that affect literacy level of female in developing and developed countries?

Research Hypothesis:

H₀: The literacy level of females affects to economic development of state.

H₁: The literacy level of females does not affect to economic development of state.

Objectives:

- Analyzing the impact of literacy level to economic growth.
- Identify the main factors that affect education level of girls.
- Estimate the proper quantitative and qualitative measurement for dependent and independent variables.
- Identify the relationship of each independent variables to literacy rate of females.
- Obtain and analyze the results that increase or drop the rate of literacy level of girls.
- Determine which of the variable has statistically significant impact on dependent variable.

Methodology and Expectations:

In order to find out whether the discussed factors in the literature review affect the literacy level of women, six independent variables were considered: poverty, wage rate, secondary education teachers, population living in rural areas, fertility rate, and gross domestic income. These variables are considered quantitative. Based on the literature review, poverty is the main variable that influences women's education; therefore, a good measurement that can represent this variable is the poverty gap. Another factor that influences the level of education is income, and as a proxy variable, the study included the wage rate. The third factor that might increase the literacy rate is the presence of female teachers in secondary education.

Gross domestic income was also considered as an independent variable, as it can represent economic development. Due to the large values in this variable, a new variable was generated by taking the logarithm of gross domestic income. In order to identify whether location matters, the population living in rural areas was included. Early marriages of girls, which lead to pregnancy at a young age and subsequently to childcare responsibilities, affect school attendance; therefore, fertility rate was considered as another independent variable included in the estimated model.

The literacy rate in the estimated model is considered the dependent variable, representing the education level of females. Consequently, to test the hypotheses and identify which of the variables are statistically significant, panel data was chosen in order to compare whether the included variables impact developed and developing countries. Initially, it was planned to use time series data from Pakistan for the period 1995 to 2015. However, due to the possible lack of data for each selected variable, the study was changed to panel data by including developing countries, and the total number of observations was 217.

The data were collected from the World Development Indicators, covering the period from 1990 to 2020. The data were sorted and structured in panel form so that regression analysis could be run in Stata. The classical Ordinary Least Squares, random effects, and fixed effects methods were utilized in the investigation. In order to identify which test was appropriate for the collected data, the Hausman test was performed. Additionally, for the purpose of examining the credibility of the results, essential assumptions were tested.

Thus, the estimated model is as follows:

Literacy rate = $\beta_0 + \beta_1$ Poverty gap + β_2 Wage rate + β_3 Secondary education teachers + β_4 Gross Domestic Income + β_5 Population in rural areas + β_6 Fertility rate + u_i

Where β_0 is intercept, all β are coefficients and u_i is the error term.

Interpretation of variables:

The poverty gap is a coefficient calculated by the average income of the poor who fall below the poverty line. Half of the median household income of the total population is determined as the poverty line. The poverty gap helps to determine the level of poverty in all countries. Wage is the amount of regular payment that an employee receives per unit of time. Gross domestic income measures how economically wealthy a country is, based on all the money earned from goods and services produced in the country over a given period. Secondary education teachers refer to the number of female teachers working in high schools. It is measured as the percentage of teachers instructing students aged 9 to 12. The rural population refers to people living in areas with a smaller population compared to cities and dispersed over a large area. Fertility rate indicates the number of children born to women of a given age during the year, calculated as a percentage of the average annual number of women of the same age. The fertility rate is the ratio of the number of live births across a woman's childbearing age, on average between 15 and 50 years, during a year. Literacy rate indicates the education level of the population aged 15 and above, expressed as a percentage of the corresponding population. In this case, the percentage of educated females from the total population was utilized.

The prior estimation of results:

The poverty gap will most likely negatively affect the literacy rate, as people with low income may not pursue education because they prefer to spend money on food, clothing, or medicine. The study conducted by Afzal et al. (2012) examined education and its determinants. After conducting a Granger causality test, a negative relationship between education and poverty was identified.

Conversely, when the wage rate increases, literacy levels are also expected to rise, as individuals earning more income may allocate resources to self-development. Therefore, this particular variable is expected to positively impact literacy levels. Green and Ridden (2001) investigated the contribution of literacy skills and education to earnings. The aim of their study was to examine the factors contributing to income levels. As a result, they found a positive relationship between literacy rate and wage, indicating that individual earnings increase with stronger literacy skills.

The presence of female secondary education teachers is also likely to positively affect education. When teachers are women, parents can be confident that their daughters are safe, which may increase literacy rates. The role of female teachers has been considered instrumental in reducing the gender gap in developing countries. The authors examined gender disparities in primary schools and suggested that female teachers have a positive impact on girls' education.

Gross domestic income, which indicates the economic welfare of a country, is expected to positively affect literacy rates. When GDP is high, governments tend to invest more in education, which in turn leads to higher literacy rates. Therefore, this independent variable is anticipated to have a positive influence on female literacy levels. The impact of GDP on literacy rates has also been analyzed in previous studies. According to Hanushek and Wößmann (2007), a positive relationship exists between GDP and literacy levels. Economically prosperous countries generally have higher literacy rates, and a correspondingly high per capita income plays a major role in improving standards of living, as the state can allocate substantial resources to education and infrastructure.

The population living in rural areas negatively affects literacy rates. This is largely due to the lack of schools, insufficient numbers of qualified teachers, and greater distances to educational institutions. Consequently, a negative relationship is expected between rural residency and literacy levels. Wenna et al. (2020) analyzed urban–rural disparities as a factor influencing literacy levels. Their results indicate that living in rural areas significantly impacts literacy rates, with a negative relationship observed.

Finally, literacy rates are negatively impacted by fertility rates. Early marriage and childbirth require females to devote time to childcare, leaving little opportunity for education and school attendance, which reduces literacy levels among girls. Suman et al. (2013) examined fertility and mortality rates as factors affecting literacy levels. Their investigation confirmed that education levels are indeed influenced by fertility rates, and a negative correlation between these variables was observed.

Results interpretations and discussions:

Descriptive Statistics:

Table. 1

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Literacy rate	833	88.255	19.179	8.946	100
Poverty gap	1711	3.694	7.729	0	64.1
Wage	5423	56.618	28.189	1.04	99.59
Secondary education~s	2862	51.592	18.584	3.761	88.041
ln GDI	4571	27.199	3.225	18.8	36.906
Rural population	6665	42.968	24.514	0	94.584
Fertility rate	5820	59.641	47.216	.283	223.69

Descriptive statistics of the data were analyzed and interpreted in Table 1, which includes the number of observations, mean, standard deviation, minimum, and maximum values for each variable. The literacy rate has 833 observations in the dataset, with a mean of 88.255, a standard deviation of 19.179, a minimum value of 8.946, and a maximum value of 100. The poverty gap has 1,711 observations, with a mean of 3.694 and a standard deviation of 7.729. The smallest value is 0, and the largest is 64.1. The wage variable consists of 5,423 observations, with a mean of 56.618 and a standard deviation of 28.189. The minimum value in the dataset is 1.04, and the maximum is 99.59. Secondary education teachers have 2,862 observations, a mean of 51.591, a standard deviation of 18.584, a minimum value of 3.76, and a maximum value of 88.04.

In order to compress the data of gross domestic income, the logarithm was taken, and this variable has 4,571 observations, a mean of 27.199, and a standard deviation of 47.215, with minimum and maximum values of 18.8 and 36.906, respectively. Rural population contains 6,665 observations, with a mean and standard deviation of 42.96 and 24.513. The minimum value is 0, whereas the maximum is 94.584. The last independent variable is the fertility rate, which has 5,820 observations, a mean of 59.64, and a standard deviation of 47.216. The minimum and maximum values in the dataset are 0.283 and 223.69, respectively.

Correlation:

Table. 2

Variables	1	2	3	4	5	6
(1) Poverty gap	1.000					
(2) Wage	-0.660	1.000				
(3) Secondary educ	-0.570	0.641	1.000			
(4) ln GDI	0.153	-0.292	-0.264	1.000		
(5) Rural population	0.549	-0.649	-0.318	0.034	1.000	
(6) Fertility rate	0.619	-0.765	-0.568	0.182	0.437	1.000

The correlation matrix was illustrated in table.2, which indicates the relationship of the selected variables. It was revealed that wage and poverty gap has the highest negative correlation, which is (-0.66). On the other hand, wage has the positive relationship with secondary education teachers (0.64) and negative with the

population in rural areas (-0.64). Furthermore, poverty gap also correlated with secondary education teachers, which is equal to (0.56), but in terms of rural population, it was observed positive relationship, which is (0.54). The gross domestic income is not strongly correlated with other independent variables.

The results:

Literacy rate = β_0 - 0.220 Poverty rate + 0.153 Secondary education teachers - 0.149 Fertility rate + u_i

Table. 3

VARIABLES	(1) OLS	(1) FE	(1) RE
Poverty gap	-0.220*** (0.0640)	-0.336*** (0.0763)	-0.220*** (0.0640)
Secondary education teachers	0.153*** (0.0459)	0.00389 (0.0563)	0.153*** (0.0459)
Fertility rate	-0.149*** (0.0242)	-0.126*** (0.0322)	-0.149*** (0.0242)
Constant	92.54*** (3.300)	102.7*** (3.494)	92.54*** (3.300)
Observations	199	199	199
Number of c code	70	70	70
R-sq	0.5357	0.520 0.4768	0.5357

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Literacy rate = β_0 - 0.311 Poverty rate + 0.0383 Wage rate + 0.143 Secondary education teachers - 0.172 Gross Domestic Income - 0.133 Rural population - 0.0993 Fertility rate + u_i

Table. 4

VARIABLES	(1) OLS	(2) FE	(3) RE
Poverty gap	-0.311*** (0.0758)	-0.491*** (0.101)	-0.311*** (0.0758)
Wage	0.0383 (0.0522)	-0.00757 (0.0797)	0.0383 (0.0522)
Secondary education teachers	0.143*** (0.0530)	0.00672 (0.0721)	0.143*** (0.0530)
Ln Gross domestic income	-0.172 (0.333)	-1.156 (1.576)	-0.172 (0.333)
Rural population	-0.133** (0.0621)	-0.145 (0.107)	-0.133** (0.0621)
Fertility rate	-0.0993*** (0.0284)	-0.0809 (0.0534)	-0.0993*** (0.0284)
Constant	98.95*** (11.80)	138.8*** (43.85)	98.95*** (11.80)

Observations	192	192	192
Number of c code	67	67	67
		0.511	
R-sq	0.6464	0.4547	0.6464

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

The interpretation of results:

The data was collected from the World Bank and sorted out. When all materials were posted in one table, even though the number of observations was 266, including developed and developing states taken for ten years (2005–2015), there were many missing observations in the dependent and independent variables. When the regression was run, some variables became insignificant, and the number of observations decreased to 28. Therefore, the data was rearranged again, excluding the developed countries, and the time period was extended to 30 years (1990–2020). In order to decrease the number of missing observations in the data, all possible proxies were included. Data was plugged into Stata and run. First of all, the data was summarized in order to identify which variables had the highest number of observations. Thus, the dependent and all independent variables were selected and the regression was run. Based on the results, it is possible to state that the initial predictions were correct, but some of them turned out to be statistically insignificant. Indeed, all included variables are statistically significant except wage and gross domestic income. The first model had 199 observations, and the R-squared was 0.5357. On the other hand, when three more variables were included and the regression was run, the number of observations dropped to 192, and the R-squared decreased by 0.11, showing the significance of the determinants.

The statistical results are provided in Tables 1 and 2. The R-squared interprets the percentage of the dependent variable explained by the included independent variables. In the case of Table 1, R-squared is equal to 0.5357, but in Table 2 it is 0.6464, making it possible to estimate that included variables such as Poverty Gap, Secondary Education Teachers, Rural Population, and Fertility Rate are statistically significant since the p-values are less than the 95% confidence interval. On the other hand, Wage and Gross Domestic Income became statistically insignificant. In the case when the poverty gap increases by one percentage point, it will decrease the literacy rate by -0.311 percentage points on average, *ceteris paribus*. However, when the number of female teachers in secondary education increases by one percentage point, holding all other variables constant, the literacy rate will rise by 0.143 percentage points on average. Increasing the fertility rate by one percentage point will lead to a decrease of -0.0993 percentage points in literacy rate on average, *ceteris paribus*. In terms of the population living in rural areas, if it rises by one percentage point, a decrease of -0.133 percentage points in the literacy rate of females will be observed. For further progress, more determinants will be included in the estimated model, such as labor force and population in rural areas.

In order to test whether the results are reliable, the OLS assumptions were tested. Moreover, to support further forecasting of literacy rate using the included variables, fixed and random effect analyses were implemented and illustrated. In terms of random effect coefficients, the significance of variables did not change. However, in fixed effect analysis, only the poverty gap became statistically significant, whereas the others turned out to be insignificant. In order to identify which test is suitable for further prediction of literacy level, the Hausman test was checked, and according to the results, fixed effect is more reliable for the data (Appendix 1).

Additionally, the data was divided into two groups, which are developed and developing states, as illustrated in Table 5. The reason for that is to identify whether the literacy rate is impacted by the estimated variables equally in both groups. After running OLS regression analysis, it was revealed that in developing states, all variables except rural population and fertility rate became statistically insignificant, whereas in comparison with developed states, poverty gap, secondary education teachers, gross domestic income, rural population, and fertility rate were statistically significant.

Table. 5

VARIABLES	(1) developing countries	(2) developed countries
Poverty gap	-0.161 (0.137)	-0.108*** (0.0358)
Wage	-0.0458 (0.118)	0.00148 (0.0129)
Secondary education teachers	0.164 (0.128)	0.0351*** (0.0130)
Ln GDI	0.0189 (0.692)	0.104* (0.0574)
Rural population	-0.306** (0.153)	-0.0333*** (0.0119)
Fertility rate	-0.230*** (0.0646)	-0.0328*** (0.00604)
Constant	112.7*** (23.42)	96.18*** (2.376)
Observations	64	128
Number of c code	31	36
R-sq	0.7058	0.6464

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Conclusion:

The study analyzed the economic issue that occurs with females and their discrimination in terms of education. It discussed the importance of female education, even more compared to males. Due to the fact that women will take care of babies and children will be educated with fundamental knowledge from their mothers, this will be reflected in the economic development of the state. Moreover,

in order to find out what kind of determinants impact literacy rate, the essential factors affecting literacy were reviewed and interpreted in this paper. It was revealed that poverty has a significant negative effect on the education level of females, but in terms of wage, the opposite occurred. Based on the literature review, it is positively correlated with the level of literacy. Another determinant found was female teachers, who influence literacy rate among girls positively. The reason for that is safety and credibility. The gross domestic income also plays a role in changing literacy levels, since if the state is financially stable, it will contribute more to the education sector, which will lead to an increase in the literacy rate of girls. Furthermore, living in rural areas also impacts education. Due to the fact that schools located in rural areas are not conditionally sufficient, many school-age children do not attend classes. Besides, the lack of qualified teachers also stands as a barrier to increasing the level of literacy. The last indicated independent variable was fertility rate, which indeed impacts the education of girls. It was found that in rural areas, the majority of girls marry at school age and give birth early, which later decreases attendance, or the female is even able to leave school.

Based on the literature review, particular independent variables were included in the estimated model. OLS, FE, and RE analyses were implemented in order to determine the significance of those variables and their impact on literacy rate. Regarding the results, Poverty Gap, Secondary Education Female Teachers, Rural Population, and Fertility Rate have a significant impact, whereas Wage and Gross Domestic Income impact literacy rate negatively. Utilizing panel data, which was collected from the World Bank, data was analyzed and descriptive statistics were provided. In order to check the multicollinearity problem, the correlation matrix was analyzed. Moreover, to avoid the normality issue in the data, the regression was run with robust standard errors, which is available in Appendix 1.

Based on the first regression analysis, where Poverty Gap, Secondary Education, and Fertility Rate were included in the model, all variables were below the confidence interval of 95% and became statistically significant. However, when an additional three variables were included, the significance levels changed. All independent variables became significant except Wage and Gross Domestic Income. Additionally, the data was divided into two groups depending on the development index. It was revealed that Rural Population and Fertility Rate in developing countries significantly influence the literacy rate, but in more developed states, only Wage became insignificant.

Limitations and Policy suggestions:

It was not found a paper that consists of all included independent variables that were utilized in this investigation. Furthermore, based on the previous analysis, all independent variables were predicted to be statistically significant, but after analysis, some variables turned out to be statistically insignificant. The lack of data is also another issue that affects predictor coefficients, and therefore not all OLS assumptions were satisfied.

For women's literacy, a stable political space is critical to address the cultural, sociological, and economic biases that girls face in everyday life. The right programs and policies in the area of education are needed. Policy action is central to eradicating gender disparities in literacy. Literacy and life skills programs help girls gain knowledge and skills. Furthermore, group programs promote the development of social skills that will help develop skills for networking, negotiation, and communication in a social environment.

States should increase the budget of the education sector, since education is one of the main elements of the country's development. In order to motivate women to get an education, laptops and free training seminars for loyalty and development towards increasing literacy levels, as well as medical promotion, should be offered. Moreover, the government should choose targets for the implementation of education by creating additional quotas for female teachers. Therefore, to increase the education level of females, more schools should be opened in rural areas. In addition, women teachers should be encouraged with certificates of high qualification. The environment and structure of schools must be improved to ensure the employment of women. Through the media, there should also be awareness of violence, emphasizing that the education of girls and women is important not only for th

Appendix:

1.

Hausman (1978) specification test

	Coef.
Chi-square test value	31.764
P-value	0

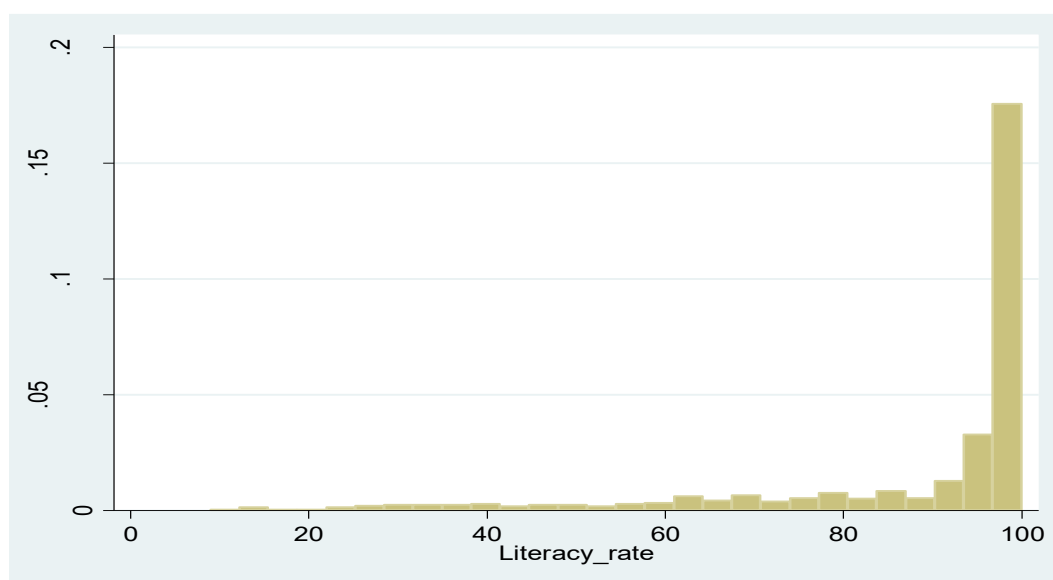
2.

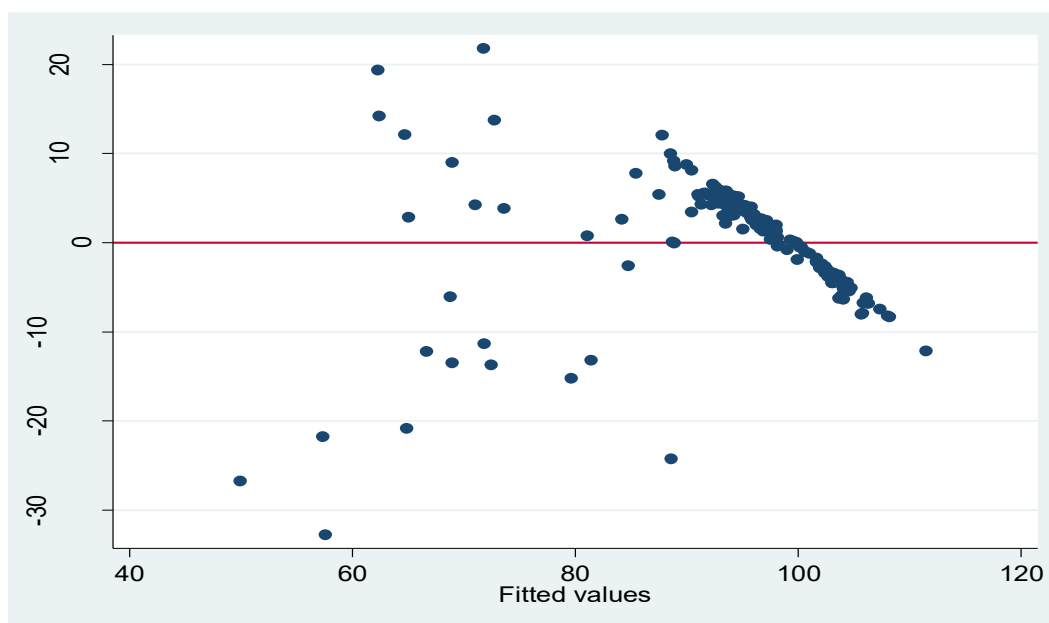
VARIABLES	(1) OLS with robust
Poverty gap	-0.311** (0.147)
Wage	0.0383 (0.0606)
Secondary education teachers	0.143*** (0.0523)
Ln GDI	-0.172 (0.290)
Rural population	-0.133* (0.0786)
Fertility rate	-0.0993** (0.0488)
Constant	98.95*** (13.41)
Observations	192
Number of c code	67

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3.





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ADVANTAGES AND DISADVANTAGES OF ULTRASONOGRAPHY IN THE THYROID DISEASES

Resume. *Thyroid diseases are among the most common endocrine pathologies in the world. According to the World Health Organization, up to 30–50% of adults will have at least one thyroid nodule during their lifetime, and 5–15% of them may be malignant. This article is devoted to studying the role and effectiveness of ultrasound examination in modern diagnostics of various pathological conditions of the thyroid gland. The article studies the main advantages of ultrasound examination (ultrasonography; US) - safety, high accuracy, real-time visualization, dynamic monitoring capabilities, and the ability to combine with functional examinations (blood flow). At the same time, certain disadvantages of the method - operator dependence, limitations in viewing deep structures - are analyzed.*

Keywords: *Thyroid gland, Ultrasonography, US, echogenicity, diagnosis, TI-RADS.*

The role and importance of ultrasonography in thyroid diseases. Ultrasonography (US) is the primary imaging diagnostic method in thyroid diseases, which allows for the assessment of anatomical structures with high accuracy [1]. The advantages of US are that it is radiation-free, completely safe for the patient, repeatable, and inexpensive [2]. Due to the close location of the thyroid gland to the surface, it is possible to visualize tissues with high resolution through US, which is why it is chosen as the first-line examination method in all countries [3]. US has a sensitivity of up to 95% in detecting thyroid nodules, which is significantly higher than CT/MRI of the chest or neck [4]. Nodular thyroid diseases are widespread, and in women over 50 years of age, the detection of nodules by US reaches 50–70%, therefore it has become an important element of screening [5]. This method evaluates a number of criteria, such as the type of structure of the nodule, its borders, echogenicity, types of calcification, blood supply, and relationship to the capsule; they serve as the basis for making a diagnostic conclusion about whether the nodule is benign or malignant [6]. Papillary carcinoma in particular has very clear morphological signals on US, which can be detected early [7]. The clinical importance of US is that it plays a key role in determining the indications for FNAB (fine-needle aspiration biopsy), i.e. not every nodule is biopsied - the results of US clearly determine whether a biopsy is necessary or not [8]. Therefore, US is at the

heart of clinical decision-making - it reduces unnecessary biopsies and helps to effectively identify malignant nodules [9].

Thyroid anatomy and basic principles of US imaging. US allows for a high-resolution depiction of thyroid anatomy, allowing for improved morphological assessment [10]. The thyroid gland is divided into two lobes (lobus dexter and sinister), an isthmus, and sometimes a third pyramidal lobe; the anterior surface of the lobes is covered by skin, neck muscles, and adipose tissue [11]. Normal thyroid tissue appears homogeneous on US imaging, with moderate echogenicity and higher echogenicity than muscle [12]. When a nodule is present, this homogeneity is disrupted and focal changes appear [13]. Therefore, US is also capable of detecting microstructural changes with high spatial resolution [14].

The following technical factors significantly affect the quality of the ultrasound image: 1) sensor frequency (10–15 MHz provides high resolution) [15], 2) focal length [16], 3) gain parameters [18], 4) presence or absence of artifacts [19]. Therefore, ultrasound examination requires not only high-tech equipment, but also a qualified specialist; operator experience significantly reduces diagnostic errors [20].

US classification and main criteria of thyroid nodules. US evaluates nodules based on 5 main parameters: 1. Echogenicity; 2. Structure; 3. Borders; 4. Calcifications; 5. Vascularization. These criteria are very important in differentiating between benign and malignant nodules [21]. For example, hypoechoic nodules are more likely to be malignant than benign nodules [22]. Hyperechoic nodules are often associated with benign colloid nodules [23]. Thyroid nodules can be of three types: 1. solid (solid) nodules, 2. cystic nodules, and 3. mixed structural nodules [24]. Among solid nodules, the risk of malignancy is higher than that of mixed and cystic nodules [25]. Microcalcifications (<1 mm) are also a classic diagnostic feature of papillary carcinoma [26].

Microcalcifications and their association with malignancy. Microcalcifications are one of the most important US features of papillary carcinoma and are consistent with psammoma bodies [27]. They are punctate, shiny, non-acoustically opacifying calcium deposits and may increase the risk of malignancy by up to 80% [28]. Several large studies have shown that microcalcifications are associated with: a) papillary carcinoma [29]; b) medullary carcinoma [30]; c) lymphoma [31]. Benign nodules rarely have microcalcifications, whereas macrocalcifications may be present [32]. Therefore, the type of calcification is of great importance in assessing malignancy.

Borders: smooth, irregular, and infiltrative contours. The appearance of the nodule border on US is one of the most accurate criteria for determining whether a nodule is malignant or benign [33]. 1. Smooth and clear contours are characteristic of benign nodules [34]. 2. Indistinct, spiculated contours indicate malignant infiltration [35]. Papillary carcinoma often presents with indistinct borders because the tumor extends into the surrounding tissue [36]. The “taller-than-wide” sign (vertical dimension greater than horizontal dimension) is an important diagnostic

indicator of malignancy and is assigned a high score in the international TI-RADS system [37].

Elastosonography and tissue stiffness measurement. Elastography is a newly developed form of US methodology that assesses the stiffness of a nodule by either tissue deformation (strain elastography) or mechanical velocity (shear-wave) measurement (shear-wave elastography) [29]. Malignant nodules typically have a fibrous stroma and dense tumor tissue, so they have low deformation and high shear-wave velocity on elastography [30]. In strain elastography, the stiffness of the nodule is represented by a color map; blue indicates high stiffness and green indicates soft tissue [31]. This visual assessment method may be dependent on operator experience, as the pressure is manually controlled and the operator may have varying levels of sensitivity and accuracy [31]. Shear-wave elastography, on the other hand, provides a more precise measurement (m/s or kPa), and many studies have shown that nodes with shear-wave velocities > 50 kPa are more likely to be malignant [32]. The combination of strain + shear-wave helps to increase diagnostic accuracy, as they are complementary [33]. Meta-analyses have shown that the accuracy of US combined with elastography (especially shear-wave) is increased: the SROC AUC is ~0.92, which is a significant improvement over conventional US [10]. However, calcified nodes can give false results on elastography, as calcium opacity and stiffness confound strain measurements [34]. Elastography is also useful as an additional assessment tool in nodes with “unknown” (non-diagnostic or indeterminate) FNAB results. Studies have shown that strain and shear-wave elastography can help predict the risk of such nodules, which may provide improved biopsy selection [11].

Superb Microvascular Imaging (SMI) and assessment of microvascularization. In addition to conventional Doppler US, advanced techniques such as Superb Microvascular Imaging (SMI) allow for the detailed visualization of microvascular structures (small vessels and new capillaries) [5]. SMI has a high sensitivity in imaging the very small capillary flow that characterizes angiogenesis processes, which helps to detect the formation of new blood vessels in dangerous nodules [5]. Several clinical studies have shown that combining SMI features with TI-RADS criteria improves the sensitivity and specificity of contrast assessment. For example, the combination of TI-RADS + SMI may reconsider the need for biopsy in suspicious nodules in patients [5]. The use of SMI allows for the following approaches: identification of signs of invasive angiogenesis, guidance in biopsy planning, and monitoring of dynamic changes in blood vessels during monitoring.

Sonographic monitoring and surveillance strategies. Dynamic monitoring of nodules by ultrasound is a widely used and proven strategy in clinical practice [17]. According to widely used recommendations, nodules with benign ultrasound features and judged benign by FNAB are usually followed up with annual ultrasound [17]. During surveillance, the following are considered: change in nodule size (diameter or volume), change in echogenicity and structure (appearance of new septa or cystic components), development of calcifications, and change in vascularization [8]. If the nodule shows a significant change in size (e.g., diameter

increase of more than 20%) or if new malignant features appear, an additional FNAB is recommended [8]. However, the monitoring strategy should be individualized according to the patient's age, location of the nodule, and clinical risk factors.

Operator and technical limitations. The results of ultrasound are highly operator-dependent: the skill, experience, and adherence to standardized procedures of the operator have a significant impact on the reliability of ultrasound results [20]. Many studies have shown that nodule interpretation varies between centers and between physicians of different experience levels. The quality of the ultrasound equipment (high-frequency probes, good resolution, and focusing) is also important for diagnostic accuracy [15]. Low-quality transducers, older equipment, or low-frequency probes can limit the detection of micronodules or ill-defined contours. Technical limitations also include artifacts: Acoustic shadowing may occur around calcifications, which may distort the appearance of underlying structures. Reverberation artifacts may cause an unnatural appearance in nearby tissues. When the focus and contrast settings are incorrect, small nodules or unclear areas may be missed. These limitations increase the risk of diagnostic error in US evaluation, and therefore, US findings should always be evaluated in the context of the clinical picture (biochemical tests, patient history, clinical risk factors).

Clinical protocol and recommendations. Ultrasonography should be an integral part of diagnostic and management protocols in clinical practice. The following recommendations are used in many clinical guidelines: 1. Each nodule should be assessed on US for its initial appearance, size, characteristics, and patient risk factors (e.g., hereditary cancer, surgical history) [8]. 2. Nodule classification should be performed using the TI-RADS system or nationally adapted protocols, and indications for FNAB should be determined [35][36][40]. 3. Advanced US techniques such as elastography and SMI (if available) should be used as a supplementary assessment tool in suspicious nodules [5][33]. 4. Safe and low-risk nodules should be followed up with annual US monitoring and re-evaluated if there is any change in size, structure, or vascularity [17]. 5. Ultrasound results should be combined with other diagnostic information (biochemical markers, patient history) to make a final clinical decision (biopsy, surgery, or observation).

General clinical algorithms for ultrasonography. Ultrasonography (US) is the first-line diagnostic tool in the evaluation of thyroid nodules and guides clinical decision-making [7]. Current international clinical guidelines (ATA, AACE, eTA) have developed clear algorithms for the classification of nodules and the determination of biopsy indications based on US findings [8][36]. In the initial stage, US examination documents the size, echogenicity, contours, margins, microcalcifications, composition (solid, cystic, mixed), Doppler vascularization, and elastographic parameters of the nodule [15]. Based on these criteria, the nodule is divided into 5 risk groups according to the TI-RADS or ATA system [35]. In the next step, intermediate and high-risk nodules are selected for FNAB, while low-risk nodules are referred for observation [14][36]. If the nodule has benign US features or is soft on elastography, biopsy is not required, thus avoiding unnecessary invasive

procedures [29][33]. If the nodule has any of the high-risk features (microcalcifications, irregular contour, vertical orientation, hardness, intra-nodal chaotic vascularization), FNAB is recommended, even if the nodule is small (<10 mm) [9][10]. This approach allows for early detection of papillary carcinoma. Several clinical studies have shown that the combination of US + elastography + Doppler in the diagnostic process provides significantly higher accuracy in predicting risk than US alone, especially when used with the TI-RADS system [10][33]. Therefore, multimodal sonographic assessment has become an integral part of modern clinical algorithms.

Advantages of ultrasound in selection. The main advantages of ultrasound are its high accuracy, speed, and safety for the patient, especially during repeated monitoring [6]. Due to the lack of radiation, ultrasound is used as the first-choice diagnostic tool in children, pregnant women, and elderly patients [15]. Modern sensor technology (high-resolution linear probes) allows the detection of micronodes (2–3 mm), which helps to plan clinical decisions at an early stage [5]. In combination with Doppler technology, ultrasound allows the assessment of blood flow in the nodule, angiogenesis, and signs of invasive growth [19]. Elastography significantly improves the differential diagnosis by measuring the stiffness of malignant nodules, and shear-wave elastography in particular provides objective numerical indicators of clinical significance [29][30][33]. This technique avoids unnecessary biopsy of benign nodules and also helps to more accurately assess the malignancy risk in nodules with indeterminate FNAB results [11]. Another advantage of US is the ability to provide precise topographic mapping before surgery or radiofrequency ablation: determining the nodule's relationship to the trachea, esophagus, recurrent nerves, and blood vessels [12].

Limitations of ultrasonography (factors affecting diagnostic quality). Although US is the leading method for diagnosing thyroid nodules, it has a number of limitations. The most important limitation is the high dependence on operator skill, which leads to significant differences in US interpretation between different centers [20][21]. The subjective assessment factor is particularly high in determining the contours of the nodule, echogenicity, and microcalcifications [34]. In patients with high obesity, thick neck muscles, or very deep-seated nodules, ultrasound penetration is reduced, which reduces the result [15]. Calcified nodules do not show the underlying structure due to acoustic shadowing, which makes it difficult to determine the true boundary of the nodule [19][34]. In multinodular goiter, nodules may be confluent, and cysts and fibrous changes may complicate the assessment of simple echogenicity [8]. US may not be able to determine the internal architecture of some nodules, such as subcapsular microinvasion, minimal extrathyroidal growth, or lymphatic spread, for which CT or MRI is more informative [43].

Algorithms for risk assessment using US. The main principle in assessing the risk of a nodule is the general combination of echogenicity, calcifications, contour and vascularity [8][35]. The most characteristic US features of papillary carcinoma are microcalcifications, indistinct margins, a “taller-than-wide” configuration and

high hardness [10]. The TI-RADS system converts the risk of malignancy into a numerical score (0–3 points low, 4 points moderate, 5 points high risk), which helps the physician to accurately indicate the indication for biopsy [35][36]. In clinical practice, TI-RADS has been shown to reduce the number of biopsies by 25–30%, while maintaining the sensitivity for detecting malignant nodules [36]. Integration of elastography further optimizes risk assessment: shear wave > 50 kPa is an independent predictor of risk, and “stiff” dominant zones in the strain map indicate a tumor tissue rich in fibrous stroma [29][32]. On Doppler perfusion, “chaotic intranodular flow” and a high-resistance index are signs of angiogenesis, increasing the likelihood of risk [19].

Monitoring and reassessment criteria. The monitoring interval for benign nodules is annual US, which is considered sufficient, especially in young, asymptomatic patients without significant risk factors [17]. If the nodule diameter increases by more than 20% or new malignant features appear, a repeat FNAB is recommended [8][14]. In multinodular glands, each nodule should be evaluated individually, as malignancy may not always be present in the largest nodule but may also be present in small micronodules [12]. In autoimmune thyroiditis, it may be difficult to distinguish benign from malignant nodules due to the heterogeneity of the parenchyma, and additional methods such as elastography and SMI are clinically useful [5][22].

Conclusions: Ultrasonography is the cornerstone of thyroid nodule assessment and is a primary source of information for clinical decision-making [7]. Its advantages include safety, speed, high resolution, multimodality (Doppler, elastography, SMI), and accuracy in biopsy guidance [5][10][29]. Despite the operator-dependence of US and some technical limitations, the diagnostic accuracy has increased significantly with the introduction of modern TI-RADS systems, elastography protocols, and contrast-enhanced US technologies [36][40]. Today, US is the first and most important link in the multimodal diagnostic chain, and its results are integrated with CT, MRI, PET, and FNAB to create a complete clinical picture [43]. Thus, ultrasonography is an integral, necessary, and most widely used method of a correctly selected diagnostic strategy in thyroid diseases.

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INDICATORS OF THE RESILIENCE OF FINE-FIBER COTTON VARIETIES OF *GOSSYPIMUM BARBADENSE* L. UNDER STRESS CONDITIONS

***Annotation.** This article presents some data obtained on the level of physiological changes in small-fiber cotton varieties under various stress conditions. Rising temperatures pose a serious threat to future harvests. This article shows that stress affects the yield of fine-fiber cotton varieties in different ways at the morphological, biochemical, and molecular levels. Slowing of growth and development of cotton varieties, reduced seed germination, and decreased photosynthesis rates as a result of heat stress lead to reduced yields. losses, and that such changes vary to different degrees depending on the stages of growth and development of varieties and their biological characteristics.*

***Key words:** water supply, fine fiber cotton, varieties, moisture levels, transpiration, water regime, productivity.*

Introduction. Sustainable cotton cultivation requires a clear understanding of the impact of water scarcity on cotton and the development of appropriate mitigation methods [1]. Drought affects physiological and biochemical processes in cotton, especially photosynthesis. Water stress reduces water availability and carbon uptake for photosynthesis and affects plant development [2].

One-third of the world's agricultural land suffers from water shortages. Droughts regularly reduce the yield of mesophytic crops and can exacerbate the problem of global climate change. Water stress or drought can affect reproductive growth phases, reducing agricultural productivity [3]. Salinity and drought are two of the most important environmental problems that reduce crop productivity worldwide [4,5].

Excessive salt concentration in the soil disrupts water absorption and ion balance in cotton plants, leading to ion poisoning, stunted growth, leaf burns, and reduced yields. Salt stress is one of the main factors limiting agricultural productivity in the biosphere. Salinity significantly threatens the growth, productivity, and quality of cotton fiber [6].

Research results and discussion. According to the information obtained from our scientific research, water deficiency in the soil has a negative effect on water absorption and utilization by plants and causes changes in water balance. This leads to water deficiency in cotton leaves. In addition, at high air temperatures and low relative humidity, especially in the afternoon, the water deficit in plant leaves is high, which negatively affects water metabolism in plants. Plant physiology

shows that drought affects water absorption and use by plants, causing changes in water balance and water deficiency in plant organs, especially in leaves. Based on data obtained from assessing the effect of humidity on residual water deficiency in leaves, it was noted that residual water deficiency was significantly higher during flowering than during tillering and budding, under both humidity conditions for all varieties.

The residual water deficit in leaves during the flowering phase was also studied. During the flowering phase, the residual water deficit in leaves in the morning at sufficient humidity was 2.62% for the Surkhan-18 variety, 1.68% for the Termez-208 variety, 2.00% for the Termez-202 variety, 1.39% for the SP-1607 variety, and 2.87% for the Surkhan-16 variety. In the morning, under conditions of limited humidity, this indicator was 3.11% for the Surkhan-18 variety, 2.05% for the Termez-208 variety, 2.46% for the Termez-202 variety, 1.81% for the SP-1607 variety, and 3.25% for the Surkhan-16 variety. When studying the process at noon, i.e., between 12:00 and 14:00, the residual water deficit in the leaves was 2.94% for the Surkhan-18 variety, 1.86% for the Termez-208 variety, 2.46% for the Termez-202 variety, 1.69% for the SP-1607 variety, and 3.42% for the Surkhan-16 variety under optimal humidity conditions. Under conditions of limited humidity, this indicator reached 3.25% for the Surkhan-18 variety, 2.24% for the Termez-208 variety, 2.89% for the Termez-202 variety, 2.10% for the SP-1607 variety, and 3.89% for the Surkhan-16 variety.

During the flowering phase, when residual water deficiency in the leaves was observed in the evening between 4:00 p.m. and 6:00 p.m., it was 3.37% for the control variety Surkhan-18, 2.38% for the variety Termez-208, 2.89% for the variety Termez-202, 1.89% for the variety SP-1607, and 3.82% for the variety Surkhan-16. Under conditions of limited moisture in the evening, this indicator was 3.86% for the Surkhan-18 variety, 2.74% for the Termez-208 variety, 3.41% for the Termez-202 variety, 2.46% for the SP-1607 variety, and 4.37% for the Surkhan-16 variety. In all variants with limited moisture, the water deficit was significantly higher than in variants with optimal moisture. Significant differences in the above indicators were noted between the studied varieties. The highest residual water deficit was found in plants of the Surkhan-16 variety grown under conditions of limited moisture at all stages of development. With a decrease in moisture levels, an increase in these indicators was observed. The lowest value was observed in the SP-1607 variety grown under optimal humidity conditions. The Termez-208, Termez-202, and Surkhan-18 varieties occupied intermediate positions for this indicator.

The concentration of cell sap in all cotton varieties grown in highly saline soil conditions is significantly higher than in plants grown in non-saline conditions. It was observed that the concentration of cell sap in non-saline variants of all varieties was lower than in saline variants. With an increase in soil salinity, the concentration of cell sap in all varieties also increased. The highest values were recorded for cotton varieties grown in saline soil conditions. At the flowering stage in non-saline conditions, the value was 12.8 for the SP-1607 variety, 13.6 in the moderately saline

variant, and 15.8 in the highly saline variant; in the control variant of the Termiz-208 variety, it was 12.4, in the moderately saline variant, it was 13.0, and in the highly saline variant, it was 15.2; 12.0 in the control variant of the Termiz-202 variety, 12.5 in the variant with medium salinity, and 13.6 in the variant with high salinity; 11.6 in the control variant of the Surkhan-18 variety, 12.2 in the variant with medium salinity, and 13.2 in the variant with high salinity; In the control variant of the Surkhan-16 variety, it was 11.2, in the variant with average salinity, it was 12.0, and in the variant with high salinity, it was 12.6.

Conclusions. Assessment of the effect of salinity on cell sap concentration shows that during the flowering and tillering stages, all cotton varieties studied exhibited the same patterns as during the boll formation stage. In other words, salinity led to an increase in cell sap concentration. Based on the above, it can be said that the concentration of cell sap in cotton leaves depended on the concentration of salts in the soil, the stages of cotton development, and the biological characteristics of the varieties. According to the data obtained on the assessment of the effect of salinity on cell sap concentration, sharp differences between varieties were also noted. The highest results were observed in the SP-1607 and Termiz-208 varieties. The lowest indicator was recorded in the Surkhan-16 variety.

It was noted that in unsalted environments, the osmotic pressure of cell sap was lower than in environments with medium and high salinity. Conversely, in soils with high salinity levels, the osmotic pressure of cell sap was higher. Expressed in figures, for the Surkhan-18 variety, it was 6.08 in the control, 6.67 in the medium salinity environment, and 7.68 in the high salinity environment; for the Surkhan-16 variety, it was 5.63 in the control, 6.36 in conditions of medium salinity, and 7.17 in conditions of high salinity; in the Termiz-208 variety, it was 7.07 in a non-saline environment, 7.72 in an environment with average salinity, and 8.56 in an environment with high salinity; In the Termiz-202 variety, osmotic pressure was 6.38 in unsalted soil, 7.14 in conditions of medium salinity, and 7.93 in conditions of high salinity. For cotton variety SP-1607, this indicator was 7.12 in unsalted conditions, 8.06 in conditions of medium salinity, and 9.26 in conditions of high salinity. Similar conditions were observed during the flowering and storage phases of cotton varieties. With increasing salinity, osmotic pressure increased significantly. For the SP-1607 variety, the highest pressure was recorded during storage in high salinity conditions. The lowest osmotic pressure was observed in the Surkhan-16 variety. In general, plant cells adapt to maintain osmotic pressure balance under salinity conditions. Adaptation mechanisms are important for plant stress resistance under salinity conditions. In addition, osmotic pressure control is better developed in salt-tolerant varieties.

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EFFECT OF ECOSTRESSORS ON THE PHYSIOLOGICAL CHARACTERISTICS OF FINE-STAPLE COTTON VARIETIES UNDER THE CONDITIONS OF BUKHARA PROVINCE

Abstract. *The article presents some data obtained on the level of physiological changes in fine-fiber cotton varieties under different degrees of soil salinity and moisture conditions. During the experiments, the aspects of the physiological characteristics of the fine-fiber cotton varieties Surhon-18, Termiz-202, Termiz-208, SP-1607, and Surhon-16 related to soil salinity and moisture levels were examined. A positive and negative correlation was found between physiological indicators and yield weight in the studied varieties, and such changes are also related to the growth and development stages of the varieties and it was determined that such changes vary at different levels depending on the biological characteristics of the varieties.*

Keywords: *fine-fiber cotton, salinity, water deficit, salinity, water supply, moisture levels, water exchange, productivity, yield.*

Introduction. By 2050, the world's population is expected to reach 10 billion people, and sustainably feeding them will be a major challenge. To meet this demand, we need to produce roughly 50% more food products in a short period of time.

On the other hand, achieving a sustainable supply of food products in agriculture is not only about the sustainability of food production, food security, and food security, but also because great emphasis is placed on the planned distribution and justification of food worldwide, the research being conducted in this area is regarded as one of the most important tasks.

The rise in temperature will pose a serious problem for plant yields in the future. Heat stress affects plant yields at the morphological, biochemical, and molecular levels. Slowed plant growth and development, reduced seed germination, and decreased photosynthetic rates due to heat stress lead to yield loss [1,2].

Eine weitere Auswirkung hoher Temperaturen ist die Beschleunigung des Pflanzenwachstums, insbesondere in der Vegetationsphase, wodurch sich Früchte oder Samen schneller entwickeln können. Es ist zu beachten, dass Hitzestress den Trockenstress verschlimmern kann, indem er die Transpiration und letztlich die Wasserverdunstung erhöht [3].

Finding solutions to ensure long-term sustainable agriculture in the context of environmental limiting factors is a key challenge for future research. Climate change, as one of the major ecological factors, is a concern in many countries. It is

expected to become a problem that negatively affects food security and plant breeding, and under such conditions it necessitates the activation of various physiological and biochemical mechanisms in plants. Impact on the yield of fine-fiber cotton varieties. The factors affecting this include a shortened cotton development period, increased boll and flower drop rates, water deficiency during flowering and boll formation, salinity, and high temperatures. All of these factors lead to a decrease in yield and its quality. In this regard, it is possible to identify tolerant genotypes by applying modern physiological, biochemical, and genetic methods [4].

Drought means a decrease in soil water potential, resulting in reduced water uptake by the roots. The molecular-level response of plants involves osmotic remodeling, meaning that the accumulation of various osmolytes and hydrophilic proteins leads to a decrease in the osmotic potential of the cell's cytoplasm. The primary signal arising from drought is hyperosmotic stress, often simply called osmotic stress, since a hypotonic condition is generally not a serious problem for plant cells. In leaves, drought leads to stomatal closure, which is associated with reduced CO₂ uptake, resulting in an imbalance between photosynthetic electron transport and carbon assimilation. As a result, cell dehydration is also associated with an increased production of reactive oxygen species [5].

The growth rate of plants changes dramatically under the influence of adverse external environmental factors. In controlling growth rate, the level of water supply to plants, together with agronomic measures, plays a major role. Plant growth processes are particularly strongly influenced by water deficit. Their growth rate is directly related to the level of water deficit and its intensity. The plant's response to such stressors consists of several stages. Specifically, the plant's reaction to adverse factors includes the individual reaction and restitution (recovery) stages. Water deficiency in the soil slows down growth processes and also negatively affects crop quality. Soil water deficiency affects all developmental stages of plants.

The negative effects of drought persist even after moisture levels have returned to normal. According to many experimental data, plant growth is more sensitive to drought than photosynthesis [6].

Fine-staple cotton varieties are superior to medium-staple cotton varieties in terms of high fiber type, fiber fineness, fiber length, fineness, and strength. Cotton is one of the important industrial crops in our republic that supplies raw materials. For this reason, optimal factors are required to produce sufficiently high and high-quality yields. In the context of global climate change, further improving the agronomic condition of irrigated areas, reducing the effects of water scarcity and soil salinization, and implementing agrotechnical measures improving, identifying crop varieties adapted to stress factors and protective measures, and determining physiological and genetic characteristics that reflect the adaptation coefficient of fine-fiber cotton varieties under unfavorable soil and climate conditions.

Research results and their discussion. Based on laboratory experiments, to assess the effects of water deficit and salinity, the germination rate of fine-fiber cotton seeds, root growth activity, stem length, leaf area, root volume, plant fresh

weight, total leaf water content, and other parameters were comparatively analyzed across varieties, and the obtained results were used to plan agronomic measures and the feasibility of using it as a primary criterion for selecting ecostress-tolerant adaptive varieties was demonstrated. Under optimal moisture conditions, all cotton varieties exhibited higher water evaporation at the flowering stage than at the budding stage. The water evaporation of cotton varieties grown under moderate moisture conditions is considerably faster than that of plants under limited moisture conditions. In all varieties tested, limited moisture, i.e., water deficit, negatively affected the plant's water relations.

In establishing the degree of stress factor impact on the yield of fine-fiber cotton varieties, the growth dynamics of the varieties in terms of height, the expansion of their leaf area, and net photosynthesis yield, the degree of variation in yield and quality traits, and physiological tolerance and productivity characteristics were evaluated, and those with high biological and economic yield were identified. varieties were scientifically classified into three groups—highly tolerant, moderately tolerant, and intolerant based on their responses to water deficit and salinity, resulting in higher yields. In studies on the net photosynthetic productivity of the investigated varieties, it was found that this indicator varies depending on the cotton's developmental stages and moisture levels, and that its value in all varieties ranges from flowering to lint formation phase, and that its value increases in all varieties from budding to the cotton boll opening phase. Some interrelationships of the eco-physiological and productivity characteristics of the fine-staple cotton varieties Termiz-202, Termiz-208, SP-1607, Surhon-16, and Surhon-18 were scientifically substantiated.

In the water-deficient and moderately saline variants, all studied cotton varieties showed varying degrees of yield reduction compared to the control variant. In particular, under soil moisture-deficient conditions, the average yield weight in the Surhon-18 variety was 32.2% lower; in the Termiz-208 variety –35.4; in the Termiz-202 variety –33.4; in the SP-1607 variety –37.9; and in the Surhon-16 variety –30.7 centners. The yield under the average saline condition relative to the control was 31.2 for the Surhon-18 variety, 34.8 for Termiz-208, 32.8 for Termiz-202, 37.1 for SP-1607, and 29.2 for the Surhon-16 variety. High tolerance to ecostresses was observed in the Termiz-208 and SP-1607-18 varieties, with the Surxon-18 and Termiz-202 varieties occupying intermediate positions and the Surxon-16 variety ranking lowest. Fiber length of cotton varieties, the effects of soil moisture and salinity levels on fiber length, fiber yield, and the mass of 1,000 seeds varied, and it was noted that their adaptation to limited moisture and salinity conditions is linked to the activity of the relevant varieties' physiological and metabolic processes.

Conclusions Factors affecting the yield of fine-fiber cotton include a shortened development period, increased rates of boll and flower drop, flowering, and boll formation. during the boll and flower development stages, water deficiency, salinity, and high temperatures. All of these lead to a decrease in yield and its quality. In this regard, it is possible to identify tolerant genotypes by applying

modern physiological, biochemical, and genetic methods. Under the moderately saline and water-deficient soil and climatic conditions of Bukhara province, the adaptively tolerant SP-1607, which exhibits high levels of resistance to these adverse factors as well as high yield volume and quality indicators, The cultivars Termiz-208 and Termiz-202 are recommended for planting. In the province's non-saline soils and under conditions of adequate water supply and climate, it is recommended to plant the Surhon-18 and Surhon-16 varieties, which have low stress tolerance but high yield mass and quality indicators. To obtain a high-quality yield from the above-mentioned fine-staple cotton varieties, it is recommended to implement all agronomic and irrigation measures at a high standard.

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YANGI O'ZBEKISTON TARAQQIYOT STRATEGIYASIDA IJTIMOY HIMOYA MASALALARINING SOTSIOLOGIK TAHLILI

***Annotatsiya:** Mazkur maqolada Yangi O'zbekiston taraqqiyot strategiyasi doirasida ijtimoiy himoya masalalarining sotsiologik tahlili amalga oshiriladi. Tadqiqotda ijtimoiy himoya tizimining jamiyat barqarorligi va ijtimoiy adolatni ta'minlashdagi o'rni, aholining turli ijtimoiy qatlamlari ehtiyojlari hamda davlat siyosatining ustuvor yo'nalishlari sotsiologik yondashuv asosida yoritiladi. Shuningdek, ijtimoiy himoya sohasida amalga oshirilayotgan islohotlarning ijtimoiy ong, turmush darajasi va ijtimoiy faollikka ta'siri ilmiy jihatdan tahlil qilinadi.*

***Kalit so'zlar:** ijtimoiy himoya, taraqqiyot strategiyasi, ijtimoiy siyosat, sotsiologik tahlil, ijtimoiy adolat, aholi farovonligi.*

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SOCIOLOGICAL ANALYSIS OF SOCIAL PROTECTION ISSUES IN THE DEVELOPMENT STRATEGY OF NEW UZBEKISTAN

***Abstract:** This article provides a sociological analysis of social protection issues within the framework of the Development Strategy of New Uzbekistan. The study covers the role of the social protection system in ensuring social stability and social justice, the needs of different social strata of the population, and the priority areas of state policy based on a sociological approach. Also, the impact of reforms being implemented in the field of social protection on social consciousness, living standards, and social activity is scientifically analyzed.*

***Keywords:** social protection, development strategy, social policy, sociological analysis, social justice, population well-being.*

Kirish.

Hozirgi davrda jamiyat taraqqiyoti, ijtimoiy barqarorlik va inson kapitalini rivojlantirish masalalari davlat siyosatining ustuvor yo'nalishlaridan biri sifatida namoyon bo'lmoqda. Ijtimoiy jarayonlarning murakkablashuvi, global va

mintaqaviy o'zgarishlar, iqtisodiy islohotlarning jadallashuvi sharoitida aholining turli ijtimoiy qatlamlarini himoya qilish, ularning munosib turmush darajasini ta'minlash masalasi alohida ahamiyat kasb etadi. Shu jihatdan Yangi O'zbekiston taraqqiyot strategiyasida ijtimoiy himoya tizimini takomillashtirish, aholi farovonligini oshirish va ijtimoiy adolat tamoyillarini mustahkamlash muhim strategik vazifa sifatida belgilangan.

Ijtimoiy himoya jamiyatning eng muhim ijtimoiy institutlaridan biri bo'lib, u aholining zaif qatlamlarini qo'llab-quvvatlash, ijtimoiy tengsizlikni kamaytirish va ijtimoiy xavflarning salbiy oqibatlarini yumshatishga qaratilgan tizimli choralarni majmuasini o'z ichiga oladi. Ushbu tizimning samaradorligi nafaqat iqtisodiy resurslar bilan, balki jamiyatda shakllangan ijtimoiy munosabatlar, qadriyatlar va ijtimoiy ong darajasi bilan ham bevosita bog'liqdir. Shu bois ijtimoiy himoya masalalarini faqat huquqiy yoki iqtisodiy nuqtayi nazardan emas, balki sotsiologik yondashuv asosida chuqur tahlil qilish zarurati yuzaga kelmoqda.

Yangi O'zbekiston taraqqiyot strategiyasi ijtimoiy siyosatni modernizatsiya qilish, inson manfaatlarini oliy qadriyat sifatida e'tirof etish va ijtimoiy sohada manzilli yondashuvni kuchaytirishga qaratilganligi bilan ajralib turadi. Ushbu strategiyada ijtimoiy himoya tizimini takomillashtirish, kambag'allikni qisqartirish, aholining bandligini ta'minlash, nogironligi bo'lgan shaxslar, keksalar, ayollar va yoshlar uchun teng imkoniyatlar yaratish masalalari ustuvor yo'nalish sifatida belgilangan. Bularning barchasi jamiyatda ijtimoiy birdamlik va ijtimoiy ishonch muhitini mustahkamlashga xizmat qiladi.

Sotsiologik tahlil ijtimoiy himoya tizimining jamiyat hayotidagi real ta'sirini aniqlash, davlat siyosati va aholi ehtiyojlari o'rtasidagi muvofiqlik darajasini baholash imkonini beradi. Ijtimoiy guruhlar o'rtasidagi farqlar, ijtimoiy stratifikatsiya, ijtimoiy mobilitet va ijtimoiy adolat masalalari ijtimoiy himoya tizimi bilan chambarchas bog'liq bo'lib, ularni sotsiologik yondashuvsiz to'liq anglab bo'lmaydi. Shu sababli mazkur tadqiqotda ijtimoiy himoya masalalari jamiyatning ijtimoiy tuzilmasi, ijtimoiy ong va ijtimoiy xulq-atvor kontekstida tahlil qilinadi.

Bugungi kunda ijtimoiy himoya sohasida amalga oshirilayotgan islohotlar aholining ijtimoiy faolligiga, davlat va jamiyat o'rtasidagi munosabatlarga ham sezilarli ta'sir ko'rsatmoqda. Ijtimoiy yordam va qo'llab-quvvatlash mexanizmlarining shaffofligi, adolatliligi va manzilliligi fuqarolarning davlat siyosatiga bo'lgan ishonchini oshiruvchi muhim omillardan biri hisoblanadi. Shu nuqtayi nazardan Yangi O'zbekiston taraqqiyot strategiyasida belgilangan ijtimoiy himoya yo'nalishlarini sotsiologik jihatdan tahlil qilish ilmiy va amaliy ahamiyatga ega bo'lib, ijtimoiy siyosat samaradorligini oshirishga xizmat qiladi.

Asosiy qism. Yangi O'zbekiston taraqqiyot strategiyasida ijtimoiy himoya masalalari jamiyat rivojining muhim sotsiologik omili sifatida talqin etiladi. Ushbu strategiya doirasida ijtimoiy himoya tizimi nafaqat moddiy yordam ko'rsatish mexanizmi, balki jamiyatda ijtimoiy barqarorlikni ta'minlovchi, ijtimoiy tenglik va adolatni mustahkamlovchi institutsional tuzilma sifatida qaraladi. Sotsiologik nuqtayi nazardan ijtimoiy himoya tizimi ijtimoiy guruhlar o'rtasidagi

munosabatlarni tartibga soluvchi, ijtimoiy ziddiyatlarning oldini oluvchi va ijtimoiy birdamlikni kuchaytiruvchi muhim vosita hisoblanadi.

Taraqqiyot strategiyasida ijtimoiy himoyaning manzilliligi va adolatliligi asosiy tamoyil sifatida belgilangan. Bu yondashuv ijtimoiy resurslarni taqsimlashda ehtiyojlar, ijtimoiy holat va hayotiy vaziyatlarni inobatga olishni nazarda tutadi. Sotsiologik tadqiqotlar shuni ko'rsatadiki, manzilli ijtimoiy himoya mexanizmlarining joriy etilishi aholining davlat siyosatiga bo'lgan ishonchini oshiradi, ijtimoiy norozilik darajasini pasaytiradi va fuqarolarning ijtimoiy faolligini kuchaytiradi. Bu jarayon jamiyatda ijtimoiy adolat tushunchasining mustahkamlanishiga xizmat qiladi.

Ijtimoiy himoya masalalarining sotsiologik tahlilida ijtimoiy stratifikatsiya va ijtimoiy tengsizlik muammolari alohida o'rin tutadi. Jamiyatda daromadlar darajasi, bandlik holati, ta'lim imkoniyatlari va ijtimoiy xizmatlardan foydalanish darajasidagi farqlar ijtimoiy himoya tizimining samaradorligiga bevosita ta'sir ko'rsatadi. Yangi O'zbekiston taraqqiyot strategiyasida kambag'allikni qisqartirish va aholi turmush darajasini oshirishga qaratilgan chora-tadbirlar aynan ushbu ijtimoiy tafovutlarni kamaytirishga yo'naltirilgan. Sotsiologik yondashuv ushbu choralarning real ijtimoiy natijalarini baholash, aholining turli qatlamlari hayotida yuz berayotgan o'zgarishlarni aniqlash imkonini beradi.

Ijtimoiy himoya tizimining yana bir muhim jihati uning ijtimoiy ong va ijtimoiy xulq-atvorga ta'siridir. Ijtimoiy qo'llab-quvvatlashning mavjudligi fuqarolarda ijtimoiy xavfsizlik hissini shakllantiradi, kelajakka bo'lgan ishonchni mustahkamlaydi. Bu esa jamiyatda ijtimoiy pessimizm va befarqlik kayfiyatlarining kamayishiga olib keladi. Shu bilan birga, ijtimoiy himoya siyosati aholining o'z mehnati va tashabbusiga bo'lgan munosabatini ham o'zgartiradi. Sotsiologik tadqiqotlar shuni ko'rsatadiki, samarali ijtimoiy himoya tizimi aholida boqimandalik kayfiyatini emas, balki o'z imkoniyatlarini ro'yobga chiqarishga intilish hissini kuchaytiradi.

Yangi O'zbekiston taraqqiyot strategiyasida alohida e'tibor qaratilgan ijtimoiy guruhlar, jumladan, keksalar, nogironligi bo'lgan shaxslar, ayollar va yoshlarning ijtimoiy himoyasi masalasi ham sotsiologik jihatdan muhim ahamiyatga ega. Ushbu guruhlarining jamiyat hayotida to'laqonli ishtirok etishi ijtimoiy inklyuziya darajasini belgilovchi asosiy mezonlardan biridir. Ijtimoiy inklyuziya esa jamiyatda ijtimoiy birdamlik va barqarorlikni ta'minlovchi muhim omil hisoblanadi. Strategiya doirasida ushbu guruhlar uchun yaratilayotgan shart-sharoitlar ularning ijtimoiy maqomi va o'z-o'zini anglash darajasiga ijobiy ta'sir ko'rsatmoqda.

Shuningdek, ijtimoiy himoya tizimini raqamlashtirish va boshqaruv mexanizmlarini takomillashtirish ham sotsiologik tahlil nuqtayi nazaridan muhimdir. Raqamli texnologiyalarning joriy etilishi ijtimoiy xizmatlardan foydalanishdagi byurokratik to'siqlarni kamaytiradi, shaffoflikni oshiradi va aholining ijtimoiy himoya tizimiga bo'lgan munosabatini ijobiy tomonga o'zgartiradi. Bu jarayon ijtimoiy ishonch va ijtimoiy legitimlikni mustahkamlashga xizmat qiladi.

Umuman olganda, Yangi O'zbekiston taraqqiyot strategiyasida ijtimoiy himoya masalalarining sotsiologik tahlili ushbu tizimning jamiyat rivojida kompleks rolini ochib beradi. Ijtimoiy himoya nafaqat iqtisodiy yordam vositasi, balki jamiyatdagi ijtimoiy munosabatlarni muvozanatlashtiruvchi, ijtimoiy barqarorlik va adolatni ta'minlovchi muhim institutsional mexanizm sifatida namoyon bo'ladi.

Xulosa. Yangi O'zbekiston taraqqiyot strategiyasi doirasida ijtimoiy himoya masalalarining sotsiologik tahlili shuni ko'rsatadiki, mazkur soha jamiyat taraqqiyoti va ijtimoiy barqarorlikni ta'minlashda muhim tizimli omil sifatida namoyon bo'lmoqda. Ijtimoiy himoya faqatgina aholining ayrim qatlamlariga moddiy yordam ko'rsatish bilan cheklanib qolmay, balki jamiyatdagi ijtimoiy munosabatlarni tartibga soluvchi, ijtimoiy adolat va tenglik tamoyillarini mustahkamlovchi muhim institut vazifasini bajaradi. Sotsiologik nuqtayi nazardan ushbu jarayon jamiyatning ijtimoiy tuzilmasi, ijtimoiy ong va ijtimoiy xulq-atvor bilan uzviy bog'liqdir.

Tadqiqot natijalari ijtimoiy himoya tizimining samaradorligi aholining davlat siyosatiga bo'lgan ishonchi, ijtimoiy faolligi va ijtimoiy barqarorlik darajasiga bevosita ta'sir ko'rsatishini tasdiqlaydi. Taraqqiyot strategiyasida belgilangan manzilli va adolatli yondashuv jamiyatdagi ijtimoiy tengsizlikni kamaytirishga, ijtimoiy ziddiyatlarning oldini olishga hamda ijtimoiy birdamlikni kuchaytirishga xizmat qilmoqda. Bu holat sotsiologik tahlilda ijtimoiy himoya tizimining ijtimoiy integratsiyani ta'minlovchi mexanizm sifatida qaralishiga asos bo'ladi.

Shuningdek, ijtimoiy himoya siyosatining ijtimoiy ongga ta'siri alohida e'tiborga loyiqdir. Aholida ijtimoiy xavfsizlik hissining shakllanishi, kelajakka bo'lgan ishonchning ortishi va ijtimoiy pessimizmning kamayishi jamiyatda ijobiy ijtimoiy muhitni yuzaga keltiradi. Bu jarayon fuqarolarning o'z imkoniyatlarini ro'yobga chiqarishga intilishi, mehnat faoliyatiga bo'lgan munosabatining o'zgarishi va ijtimoiy mas'uliyat hissining kuchayishida namoyon bo'ladi. Sotsiologik jihatdan bu holat ijtimoiy himoya tizimining faqat iste'molchi emas, balki faol ijtimoiy subyektni shakllantirishga xizmat qilayotganini ko'rsatadi.

Ijtimoiy himoya sohasida raqamli texnologiyalarning joriy etilishi va boshqaruv mexanizmlarining takomillashuvi ham jamiyat hayotida sezilarli ijobiy o'zgarishlarga olib kelmoqda. Shaffoflikning oshishi, byurokratik to'siqlarning qisqarishi va ijtimoiy xizmatlardan foydalanish imkoniyatlarining kengayishi aholining davlat institutlariga bo'lgan munosabatini ijobiy tomonga o'zgartirmoqda. Bu esa ijtimoiy legitimlik va ijtimoiy ishonchning mustahkamlanishiga xizmat qiladi.

Xulosa qilib aytganda, Yangi O'zbekiston taraqqiyot strategiyasida ijtimoiy himoya masalalarining sotsiologik tahlili ushbu sohaning jamiyat taraqqiyotidagi kompleks va ko'p qirrali ahamiyatini ochib beradi. Ijtimoiy himoya tizimini takomillashtirish, uni ijtimoiy ehtiyojlar va jamiyatdagi real jarayonlar bilan uyg'unlashtirish davlat siyosatining muhim ustuvor yo'nalishi bo'lib qolmoqda. Ushbu yondashuv jamiyatda ijtimoiy adolat, barqarorlik va farovonlikni

ta'minlashga xizmat qilishi bilan birga, ijtimoiy rivojlanishning uzoq muddatli istiqbollarini belgilovchi muhim omil sifatida namoyon bo'ladi.

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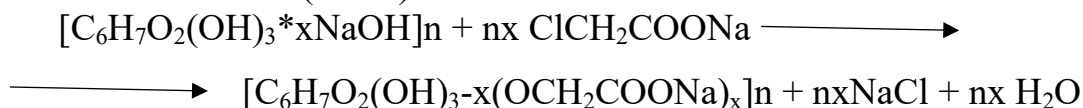
RESEARCH ON SODIUM CARBOXYMETHYL CELLULOSE: ANALYSIS OF SELECTED PHYSICAL PROPERTIES

Abstract: *This article presents information about cellulose, as well as one of its most important derivatives — sodium carboxymethyl cellulose — and some of its properties. In addition, Na-CMC solutions with concentrations of 0.01, 0.02, 0.03, 0.04, and 0.05 M were prepared, then diluted, and the pH levels of these solutions were also determined. Using the spectrophotometry method, the physical properties of Na-CMC at various concentrations were studied.*

Keywords: *Cellulose, sodium carboxymethyl cellulose, spectrophotometry, spectrophotometer, degradation,*

1. Introduction. Carboxymethyl cellulose (CMC) is a carboxymethyl derivative of cellulose, and its sodium salt (Na-CMC) is a water-soluble compound [1, 2]. Due to its excellent properties such as thickening, emulsifying, film-forming, and moisture retention, Na-CMC is widely used in the food industry, construction, medicine, biomedicine, household chemicals, textile, and paper production sectors [3–7]. Cellulose is a naturally abundant polymer known since ancient times. It is used in many branches of the national economy. Under various conditions, cellulose undergoes chemical reactions to form simple and complex esters that exhibit valuable physicochemical and operational properties.

Carboxymethyl cellulose, the carboxymethylated ether of cellulose, is a simple ether of cellulose and glycolic acid. It is produced in the form of its sodium salt (Na-CMC) through the interaction of alkaline cellulose with monochloroacetic acid or its sodium salt (MCA).



The most common derivative of carboxymethyl cellulose is sodium carboxymethyl cellulose (Na-CMC). Sodium carboxymethyl cellulose appears as a white fibrous or granular powder. It is odorless, hygroscopic, soluble in water, and insoluble in ethanol, ether, and trimethylmethane. Na-CMC is used as a thickening agent in the food industry, as a drug carrier in the pharmaceutical industry, and as a binder and anti-redeposition agent in the household chemical industry. In the petrochemical industry, it can be used as a component of fracturing fluids in oil recovery.

Na-CMC also exhibits adhesive, thickening, strengthening, emulsifying, water-retaining, and suspending properties. For experimental purposes, Na-CMC solutions of required concentrations are prepared by dissolving the powdered form in water. However, when preparing accurately concentrated Na-CMC solutions on an industrial scale, certain technical issues may arise. In such cases, the Na-CMC concentration of the pre-prepared solution is first determined, and then the desired concentration is achieved by adding either powder or water accordingly.

Na-CMC is soluble in water; however, it dissolves more readily in water heated to 40–50 °C, forming high-viscosity solutions that do not obey Newtonian fluid laws. Its viscosity depends on factors such as the polymer content in the solution, the degree of polymerization, temperature, the nature of the solvent, and the pH of the medium.

One of the key properties of Na-CMC is its ability to form highly viscous colloidal solutions that retain their viscosity over time. Research to date shows that the rheological properties of aqueous Na-CMC solutions depend not only on concentration, molecular structure, and molecular weight of the polymer but also on the degree of substitution [8].

In our study, we set out to investigate certain physicochemical properties of Na-CMC. Additionally, the pH environment of the prepared solutions was also determined.

2. Materials and methods

In this experimental study, sodium carboxymethyl cellulose (Na-CMC) was initially prepared in concentrations of 0.01, 0.02, 0.03, 0.04, and 0.05 M. These solutions were then diluted to obtain concentrations of 0.02, 0.04, 0.06, 0.08, and 0.1 mg/mL. Methylene blue was used and dissolved in deionized water.

Spectroscopic measurements were carried out using a UV-1800 model spectrophotometer manufactured by Shimadzu Corporation (Japan).

For the tests, 2 ml of each Na-CMC solution (0.02, 0.04, 0.06, 0.08, and 0.1 mg/mL) was mixed with 2 ml of methylene blue solution in separate beakers and stirred thoroughly. Color changes were then observed. Based on this, some of the properties of the solutions were studied using the spectrophotometric method.

To elaborate, spectrophotometry is a widely used method in various industries that allows for the quantitative measurement of the interaction between electromagnetic radiation and the studied material. A spectrophotometer is a high-tech device designed to measure the absorbance, transmittance, optical density, and concentration of substances through their spectral relationships under various electromagnetic wavelengths — primarily in the visible, infrared, and ultraviolet ranges. The most commonly used spectrophotometers operate in the ultraviolet and visible light spectra.

Aqueous and alkaline Na-CMC solutions are characterized by their high viscosity and non-Newtonian flow behavior [9]. Under the influence of diluted and concentrated acid or alkali solutions — both at room temperature and when heated — degradation occurs along the glycosidic bonds in the presence of oxygen. To examine this behavior in Na-CMC, an aqueous solution was prepared and observed

over a 10-day period at room temperature. A comparative study was conducted to determine the extent of degradation under two different conditions.

3. Results

Using the spectrophotometric method to determine the composition of Na-CMC, 10 drops of methylene blue were added to each solution, and changes in the solution were observed. The following pH values were recorded:

The pH values of Na-CMC solutions with different concentrations (as shown in Figure A) were as follows:

- 0.02 mg/mL solution: pH 7.81
- 0.04 mg/mL solution: pH 7.97
- 0.06 mg/mL solution: pH 8.04
- 0.08 mg/mL solution: pH 8.07
- 0.10 mg/mL solution: pH 8.11

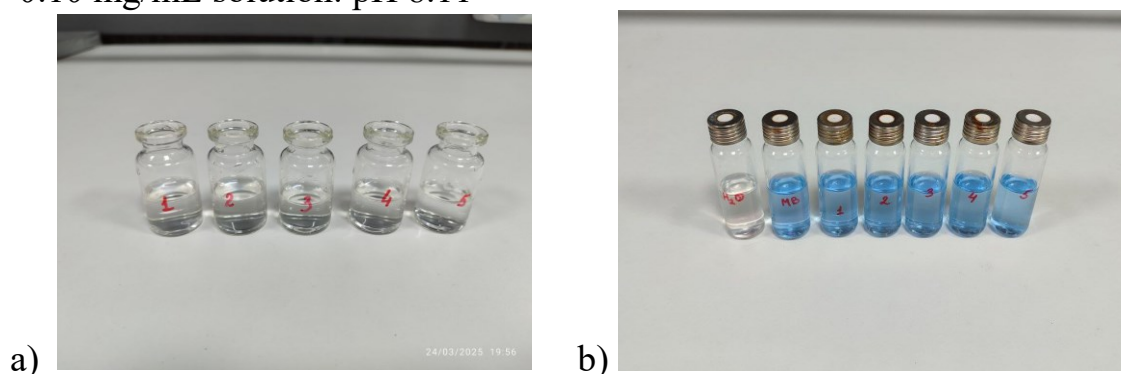
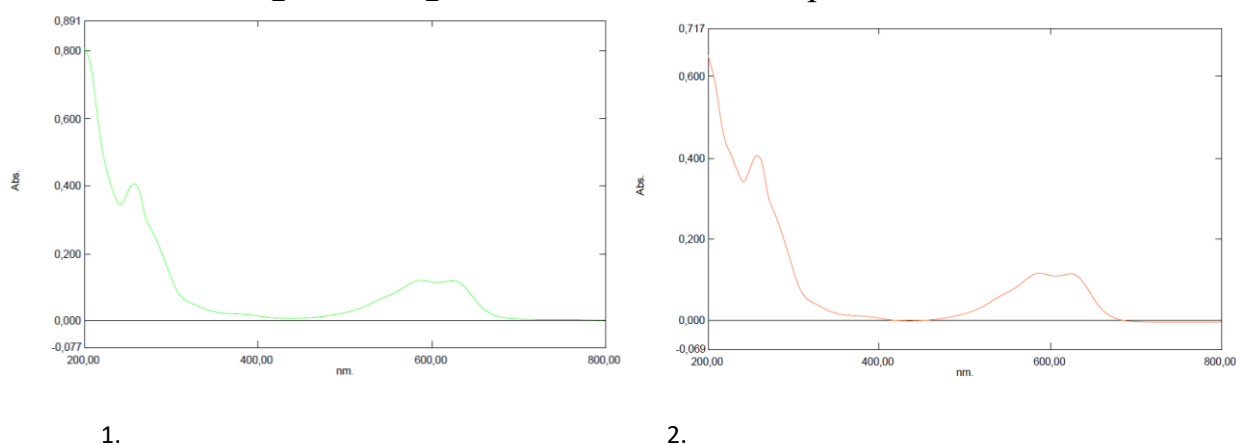


Figure 1. a) Solutions of Na-CMC with concentrations of 0.02, 0.04, 0.06, 0.08, and 0.1 mg/ml (respectively) b) Color change observed in the 0.02, 0.04, 0.06, 0.08, and 0.1 mg/ml Na-CMC solutions upon the addition of methylene blue

In **Figure B**, the results obtained from determining the composition of Na-CMC using the spectrophotometric method — after adding 10 drops of methylene blue and observing the changes in the solution — are presented as follows:



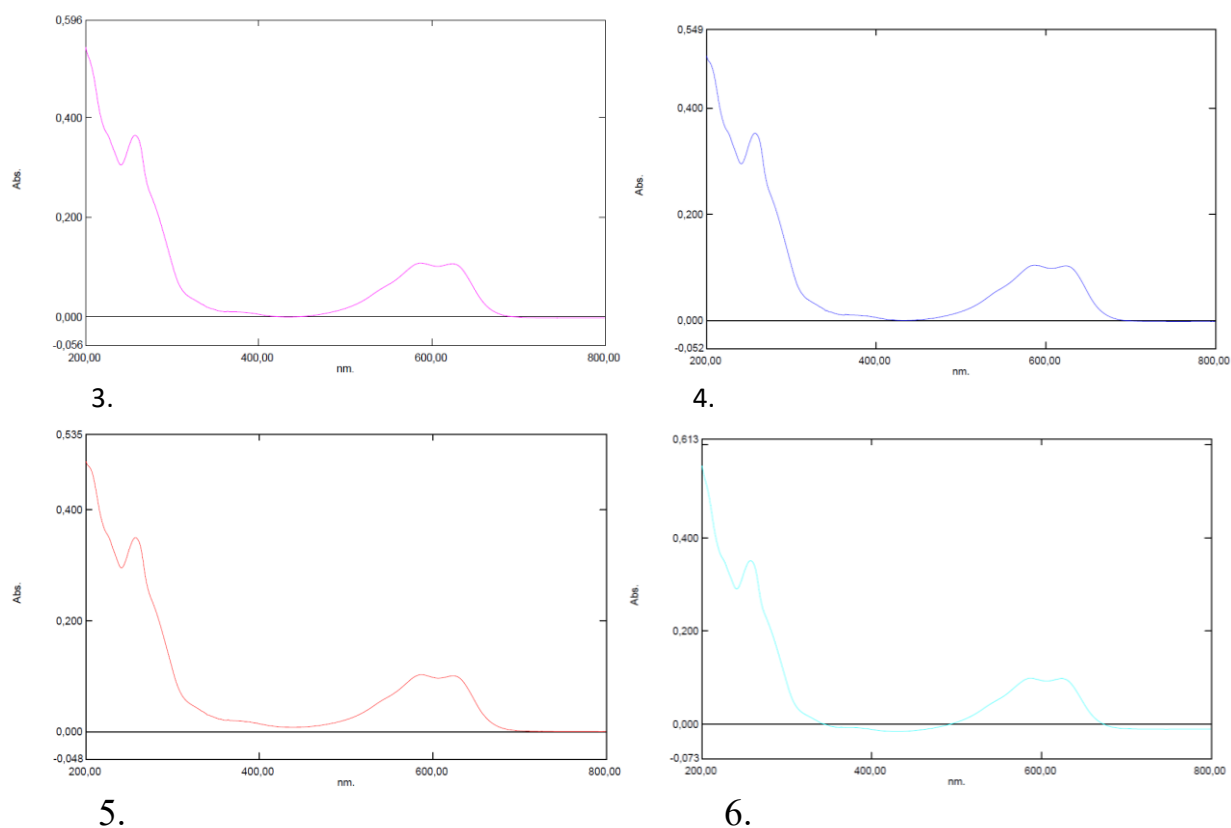


Figure 2. Results

As mentioned above, when Na-CMC samples dissolved in two different solvents were observed, the following conditions were noted. In the first sample, under open surface conditions, and in the second sample, under vacuum conditions, the first sample underwent changes over 10 days and experienced degradation.



Figure 3. Na-CMC sample degraded under open-air conditions
In the second sample, no changes were observed. However, when the second sample was heated in a dry air oven, degradation occurred.

4. Discussion. In the first figure above, when the spectrophotometric analysis of water was performed, an absorption value of 0.118 was recorded at a wavelength of 597 nm. Following this, the spectra of Na-CMC solutions at various concentrations mixed with methylene blue solutions are presented. The absorption values at 597 nm are shown in the spectral analysis results of Figure 2. For the 0.02 mg/mL solution, the value was 0.13; for the 0.04 mg/mL solution, it was 0.109; for the 0.06 mg/mL solution, it was 0.104; for the 0.08 mg/mL solution, it was 0.1; and for the 0.1 mg/mL solution, it was 0.096. As can be seen, the absorption of methylene blue at 597 nm sharply decreased as the Na-CMC concentration increased.

Thus, the absorption level at 597 nm or the maximum absorption wavelength shift of MB is related to the Na-CMC concentration, and based on this, a mathematical relationship can be established between these parameters.

№	Wavelength {nm}	Concentration {mg/ml}	Absorbtion
1	597	0,00	0,118
2		0,02	0,113
3		0,04	0,109
4		0,06	0,104
5		0,08	0,1
6		0,10	0,096

Table 1.

Values

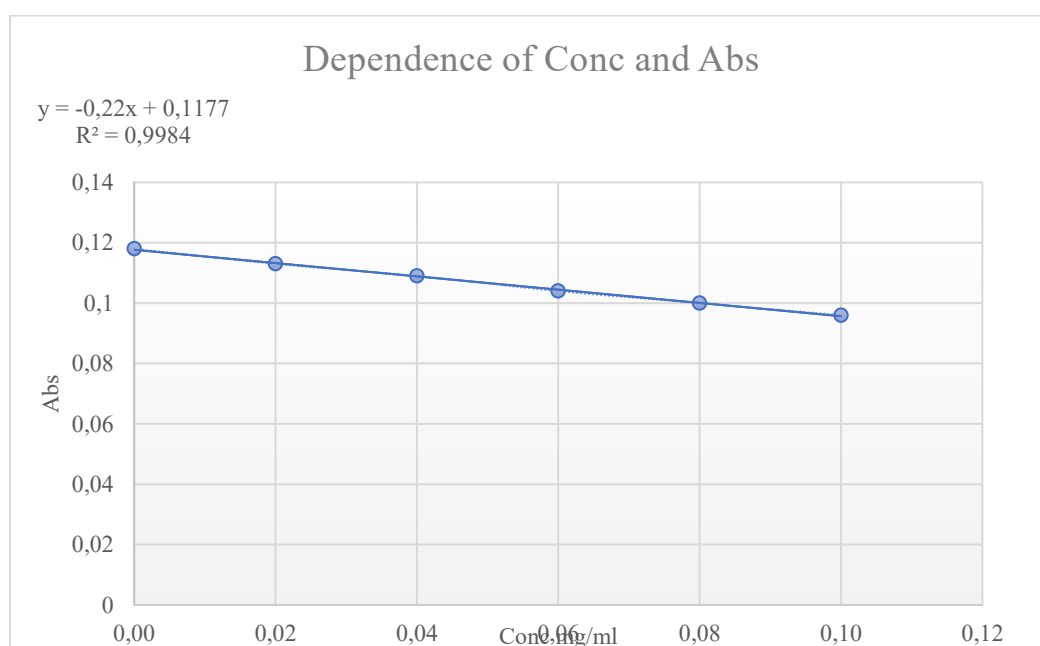


Figure 4. Diagram of the Adsorption Dependency of Na-CMC

5. Conclusions

A spectroscopic method based on methylene blue as an indicator has been developed to determine the concentration of Na-CMC in aqueous solutions. The results show that this method provides good accuracy and sensitivity for analyzing Na-CMC concentrations. The analysis results indicate that, when Na-CMC aqueous solutions are tested using the UV-1800 spectrophotometer, the absorption value decreases as the concentration of Na-CMC in the solution increases. Since spectroscopic measurements can be quickly performed, this method is considered suitable for process control in industrial settings.

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ISHLAB CHIQARISH FAOLIYATIDA XARAJATLARNI BOSHQARISH VA IQTISODIY SAMARADORLIKNI OSHIRISHNING NAZARIY- ASOSIY YO'NALISHLARI

***Annotatsiya:** shbu maqolada xo'jalik yurituvchi subyektlarning iqtisodiy faoliyati doirasida ishlab chiqarish xarajatlarini boshqarish, ularni tahlil qilish va maqbullashtirish orqali ishlab chiqarish samaradorligini oshirish masalalari ko'rib chiqiladi. Tannarxni shakllantirish va uni pasaytirish choralari raqobatbardosh mahsulot ishlab chiqarishda muhim omil sifatida e'tirof etilgan. Maqolada shuningdek, raqamli iqtisodiyot sharoitida xarajatlar tuzilmasi va ularning moliyaviy barqarorlikka ta'siri tahlil etilgan.*

***Kalit so'zlar:** Tan narx, ishlab chiqarish samaradorligi, xarajatlar tuzilmasi, iqtisodiy samaradorlik, resurslardan foydalanish, raqamli iqtisodiyot, moliyaviy barqarorlik.*

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THEORETICAL AND BASIC DIRECTIONS OF COST MANAGEMENT AND INCREASING ECONOMIC EFFICIENCY IN PRODUCTION ACTIVITIES

***Annotation:** This article examines the issues of managing production costs within the economic activities of business entities, as well as analyzing and optimizing these costs to improve production efficiency. The formation of production cost and the measures aimed at its reduction are recognized as key factors in ensuring product competitiveness. The article also analyzes the cost*

structure in the context of the digital economy and its impact on the financial stability of enterprises.

Keywords: *Price, production efficiency, cost structure, economic efficiency, resource use, digital economy, financial stability.*

Kirish. Mahsulot ishlab chiqarish bilan shug'ullanuvchi xo'jalik yurituvchi subyektlar iqtisodiy faoliyatining murakkabligi, ko'p omilliligi va o'zaro bog'liqlikda kechishi ularning barqaror rivojlanishini ta'minlashda resurslar va xarajatlarni oqilona boshqarishni talab qiladi. Ishlab chiqarish jarayonida yuzaga keladigan har xil xarajat turlari korxonaning umumiy daromadiga bevosita ta'sir ko'rsatadi va ularning iqtisodiy samaradorlikka ta'siri chuqur o'rganilishi lozim. Mahsulot ishlab chiqarishga ixtisoslashgan har qanday xo'jalik yurituvchi subyektning iqtisodiy faoliyati o'z mohiyatiga ko'ra ko'p omilli va murakkab xarakterga ega bo'lib, uning barqaror ishlashi bir qator resurslar va xarajat turlarining oqilona boshqaruviga bevosita bog'liqdir. Xususan, ishlab chiqarish jarayoni samaradorligini belgilovchi asosiy omillar qatorida xom ashyo va materiallar, yoqilg'i-energiya resurslari, ishlab chiqarish vositalari, mehnat resurslari, ularning ish haqi, soliq va boshqa majburiy to'lovlar, amortizatsiya ajratmalari hamda boshqa operatsion va doimiy xarajatlar muhim o'rin egallaydi. Mazkur resurslar o'rtasidagi o'zaro bog'liqlik va ularning korxona daromadiga ko'rsatadigan ta'siri ishlab chiqarish faoliyatini rejalashtirishda va iqtisodiy samaradorlikni ta'minlashda asosiy rol o'ynaydi. Shuningdek, xarajatlar tuzilmasini chuqur tahlil qilish, ularni maqbullashtirish yo'llarini aniqlash, resurslardan foydalanish samaradorligini oshirish orqali ishlab chiqarish tannarxini pasaytirish va raqobatbardoshlikni ta'minlash mumkin. Shu boisdan ham, ishlab chiqarish faoliyatining iqtisodiy asoslarini chuqur o'rganish nafaqat nazariy, balki amaliy ahamiyatga ham ega bo'lib, bu yo'nalishda olib boriladigan tadqiqotlar korxona iqtisodiy strategiyasini shakllantirishda muhim vosita sifatida xizmat qiladi.

Ishlab chiqarish jarayoni samaradorligiga ta'sir ko'rsatuvchi omillar orasida xom ashyo va materiallar, yoqilg'i-energiya manbalari, ishlab chiqarish fondlari, mehnat resurslari, soliqlar va boshqa majburiy to'lovlar, amortizatsiya ajratmalari, shuningdek operatsion va doimiy xarajatlar muhim o'rin tutadi. Bu xarajatlarning o'zaro uyg'unlashuvi ishlab chiqarish natijalari va daromad ko'rsatkichlariga sezilarli ta'sir ko'rsatadi. Ushbu xarajatlarning umumiy miqdorini hisobga olish va tahlil qilish uchun ular pul ifodasida yagona ko'rsatkichga – tannarxga keltiriladi. Bugungi raqamli iqtisodiyot sharoitida mahsulot tannarxi korxonaning ishlab chiqarish va xo'jalik faoliyatining asosiy ko'rsatkichlaridan biri hisoblanadi.

Tannarxni aniqlash ishlab chiqaruvchi korxona uchun bir qator muhim iqtisodiy va boshqaruviy afzalliklarni taqdim etadi. Avvalo, bu jarayon ishlab chiqarish rejasining bajarilishi hamda uning o'zgarish dinamikasini tizimli tahlil qilish imkonini yaratadi. Shuningdek, mahsulot nomenklaturasi bo'yicha rentabellik darajasini aniqlash, tannarxni pasaytirish bo'yicha ichki rezervlarni aniqlash hamda ulgurji narx siyosatini shakllantirishda zarur asos bo'lib xizmat qiladi. Bundan tashqari, ishlab chiqarish tannarxining aniq hisoblab chiqilishi

iqtisodiy samaradorlikni baholash, yangi texnologiyalar, zamonaviy uskunalar, tashkiliy va texnik yangiliklarni joriy etish bo'yicha ratsional qarorlar qabul qilishga zamin yaratadi. Ayniqsa, yangi mahsulot turlarini ishlab chiqarish masalalarida asosli iqtisodiy hisob-kitoblarga tayanilgan holda investitsion va ishlab chiqarish qarorlarini qabul qilish imkonini beradi.

Ishlab chiqarilgan mahsulot (ish yoki xizmat) bo'yicha ketgan umumiy xarajatlar yig'indisi pul ifodasida tannarx ko'rinishida ifodalanadi. Raqamli iqtisodiyotda tannarx asosiy iqtisodiy ko'rsatkichlardan biri bo'lib, u orqali mahsulotning bozordagi raqobatbardoshligi, korxona foydadorligi va moliyaviy barqarorligi aniqlanadi.

Rejalashtirilgan va haqiqiy xarajatlar o'rtasidagi farqlarni aniqlash orqali ishlab chiqarish samaradorligini oshirish imkonini beruvchi ichki zaxiralarni aniqlash mumkin. Bunda, statistik tahlil vositalari bilan bir qatorda, boshqaruv hisoboti va operatsion moliyaviy tahlil usullaridan foydalanish maqsadga muvofiq.

Tannarxni boshqarish – bu faqat uni hisoblash emas, balki uni pasaytirishga qaratilgan strategik qarorlar qabul qilishni ham o'z ichiga oladi. Xarajatlarni puxta tahlil qilish, resurslardan foydalanish samaradorligini baholash va ortiqcha sarflarni bartaraf etish orqali mahsulot rentabelligini oshirish mumkin. Ayniqsa, energiya tejankor texnologiyalar, chiqindilarni qayta ishlash tizimlari va raqamli monitoring tizimlaridan foydalanish xarajatlarni sezilarli darajada kamaytiradi. Bugungi raqamli iqtisodiyot muhitida xarajatlarni samarali boshqarish va optimallashtirish nafaqat zarur, balki korxonaning barqarorligi uchun hal qiluvchi ahamiyatga ega bo'lib qoldi. Xarajatlarni puxta nazorat qila oladigan tashkilotlar innovatsiyalarni joriy etish, marketing strategiyalarini kuchaytirish va biznesni kengaytirishga yo'naltirilgan investitsiyalarni amalga oshirish uchun kengroq imkoniyatlarga ega bo'ladi. Natijada, mahsulotlar sifati yaxshilanadi, bozor ulushi oshadi hamda kompaniyaning obro'yi kuchayadi.

Xarajatlarni kamaytirish quyidagi ijobiy natijalarga olib keladi:

- * Korxona daromadlarining oshishi;
- * Bozordagi raqobatbardoshlikning kuchayishi;
- * Innovatsion loyihalarga ko'proq sarmoya ajratish imkoniyati;
- * Mahsulot sifati va mijozlar ehtiyojini yanada to'liq qondirish imkoniyati;
- * Xodimlar uchun qulay mehnat sharoitlarini yaratish va motivatsiyani oshirish.

Resurslarni tejash va xarajatlarni kamaytirish nafaqat moliyaviy jihatdan foyda keltiradi, balki raqobatbardosh bozor sharoitida omon qolish uchun muhim strategiya hisoblanadi.

Masalan, energiya tejaydigan texnologiyalardan foydalanadigan kompaniyalar energiya xarajatlarini 20% dan 30% gacha kamaytiradi. Chiqindilarni qayta ishlash tizimlarining joriy etilishi yirik ishlab chiqaruvchilarga chiqindilarni yo'q qilish xarajatlarini 15-20 foizga kamaytirishga imkon beradi.

Shuningdek xodimlarni ish vaqti va jarayonini to'g'ri tashkil etish ham juda muhim. Chunki agar xodimning ish haqi vaqtbay shaklida bo'lsa unda ishlab

chiqarishni ko'payishi yoki kamayishi uning uchun unchalik kata ahamiyat kasb etmaydi.

Xulosa qilib aytganda, ishlab chiqarish xarajatlarini tahlil qilish va ularni oqilona boshqarish bugungi kunda korxonaning moliyaviy barqarorligi va raqobatbardoshligini ta'minlashda muhim rol o'ynaydi. Resurslardan samarali foydalanish, ichki imkoniyatlarni safarbar etish va raqamli texnologiyalarni joriy qilish orqali xarajatlarni maqbullashtirish nafaqat foyda olishni ta'minlaydi, balki uzoq muddatli iqtisodiy strategiyani ishlab chiqishda ham asos bo'lib xizmat qiladi. Xarajatlar foydaning asosiy cheklovchisi bo'lib, ishlab chiqarish hajmi va samaradorligiga bevosita ta'sir ko'rsatadi. Shu sababli korxona rahbariyati har qanday qaror qabul qilishdan oldin mavjud xarajatlarni va ularning istiqboldagi qiymatini chuqur tahlil qilishi shart.

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NOSQL MA'LUMOTLAR BAZALARINING AFZALLIKLARI VA KAMCHILIKLARI

***Annotatsiya.** Mazkur maqolada zamonaviy axborot tizimlarida keng qo'llanilayotgan NoSQL ma'lumotlar bazalarining mohiyati, turlari, afzalliklari va kamchiliklari tahlil qilinadi. Katta hajmdagi va tez o'zgaruvchan ma'lumotlar bilan ishlashda NoSQL texnologiyalarining ahamiyati ko'rib chiqiladi. Shuningdek, NoSQL va an'anaviy relatsion ma'lumotlar bazalari o'rtasidagi farqlar yoritilib, qaysi holatlarda NoSQL texnologiyalaridan foydalanish maqsadga muvofiqligi asoslab beriladi.*

***Kalit so'zlar:** NoSQL, ma'lumotlar bazasi, Big Data, relatsion baza, ma'lumotlarni saqlash, axborot tizimlari.*

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ADVANTAGES AND DISADVANTAGES OF NOSQL DATABASES

***Abstract.** This article analyzes the essence, types, advantages, and disadvantages of NoSQL databases widely used in modern information systems. The importance of NoSQL technologies in working with large volumes of rapidly changing data is examined. In addition, the differences between NoSQL and traditional relational databases are highlighted, and the appropriateness of using NoSQL technologies in various situations is justified.*

***Keywords:** NoSQL, database, Big Data, relational database, data storage, information systems.*

Kirish. Bugungi kunda axborot texnologiyalari jadal rivojlanib borayotgan bir davrda ma'lumotlar hajmi ham keskin oshib bormoqda. Internet tarmoqlari, ijtimoiy platformalar, mobil ilovalar va turli avtomatlashtirilgan tizimlar katta miqdordagi ma'lumotlarni doimiy ravishda hosil qilmoqda. Ushbu ma'lumotlarni samarali saqlash, qayta ishlash va tahlil qilish masalasi dolzarb muammolardan biri hisoblanadi. An'anaviy relatsion ma'lumotlar bazalari (MySQL, PostgreSQL, Oracle va boshqalar) uzoq yillar davomida asosiy yechim sifatida foydalanib kelindi. Biroq katta hajmdagi va murakkab tuzilmaga ega ma'lumotlar bilan ishlashda ushbu bazalar ayrim cheklovlarga duch kelmoqda. Shu sababli NoSQL ma'lumotlar bazalari muqobil va samarali yechim sifatida paydo bo'ldi. Mazkur maqolaning asosiy maqsadi - NoSQL ma'lumotlar bazalarining afzalliklari va kamchiliklarini ilmiy-amaliy jihatdan tahlil qilishdan iborat.

NoSQL ma'lumotlar bazasi tushunchasi va kelib chiqishi NoSQL atamasi "Not Only SQL" ya'ni "faqatgina SQL emas" degan ma'noni anglatadi. Bu texnologiyalar relatsion ma'lumotlar bazalariga muqobil sifatida yaratilgan bo'lib, qat'iy jadval va sxemaga bog'lanmagan holda ishlaydi. NoSQL texnologiyalarining rivojlanishiga asosan quyidagi omillar sabab bo'lgan: ma'lumotlar hajmining tez o'sishi; ma'lumotlar formatining turli xil bo'lishi; real vaqt rejimida ishlashga bo'lgan talab; yuqori yuklama ostida barqaror ishlash zarurati. NoSQL bazalari asosan Google, Amazon, Facebook kabi yirik kompaniyalar tomonidan katta hajmdagi ma'lumotlar bilan ishlash jarayonida ishlab chiqilgan. NoSQL ma'lumotlar bazalarining asosiy turlari

NoSQL ma'lumotlar bazalari tuzilishiga ko'ra bir nechta asosiy turlarga bo'linadi:

1. Kalit-qiymat (Key-Value) bazalari Bu turdagi bazalarda ma'lumotlar kalit va unga mos qiymat ko'rinishida saqlanadi. Tuzilishi sodda bo'lib, tezkor ishlashi bilan ajralib turadi. Redis va Riak shular jumlasidandir.

2. Hujjatli (Document-based) bazalar Ma'lumotlar JSON yoki BSON formatida hujjat ko'rinishida saqlanadi. MongoDB ushbu turga misol bo'la oladi. Bu tur web-ilovalar uchun juda qulay hisoblanadi.

3. Ustunli (Column-based) bazalar Ma'lumotlar ustunlar asosida saqlanadi va katta hajmdagi ma'lumotlarni tahlil qilishda samarali ishlaydi. Cassandra va HBase shular jumlasidandir.

4. Graf bazalar Graf bazalar murakkab bog'lanishlarga ega ma'lumotlar bilan ishlash uchun mo'ljallangan. Neo4j ushbu turga misol bo'la oladi. NoSQL ma'lumotlar bazalarining afzalliklari NoSQL ma'lumotlar bazalarining eng katta afzalligi - moslashuvchanlikdir. Unda ma'lumotlar oldindan qat'iy sxema asosida belgilanmaydi, bu esa tizimni tez o'zgartirish va rivojlantirish imkonini beradi. Yana bir muhim afzallik - gorizontallik kengaytirish imkoniyati. Serverlar sonini ko'paytirish orqali tizim unumdorligini oshirish mumkin. Bu esa katta hajmdagi ma'lumotlar bilan ishlashda juda muhim hisoblanadi. NoSQL bazalari yuqori tezlikda ishlash imkoniyatiga ega bo'lib, real vaqt rejimidagi so'rovlarni tez qayta ishlaydi. Shu sababli ijtimoiy tarmoqlar va onlayn xizmatlarda keng qo'llaniladi. Shuningdek, NoSQL texnologiyalari bulutli muhitlar bilan yaxshi moslashgan

bo'lib, zamonaviy web va mobil ilovalar uchun qulay yechim hisoblanadi. NoSQL ma'lumotlar bazalarining kamchiliklari NoSQL ma'lumotlar bazalarining kamchiliklari ham mavjud. Ulardan biri - tranzaksiyalarni boshqarish imkoniyatlarining cheklanganligi. Ko'pgina NoSQL tizimlarida ACID xususiyatlari to'liq qo'llanilmaydi, bu esa ma'lumotlar ishonchliligiga ta'sir ko'rsatishi mumkin. Bundan tashqari, NoSQL bazalarida standart so'rov tili mavjud emas. Har bir tizim o'ziga xos so'rov mexanizmiga ega bo'lib, bu ishlab chiquvchilar uchun qo'shimcha murakkabliklar tug'diradi. Yana bir muammo - ma'lumotlar yaxlitligini nazorat qilish masalasidir. Relatsion bazalardagi kabi tashqi kalitlar mavjud emasligi sababli, bu jarayon dastur darajasida amalga oshiriladi. Shuningdek, NoSQL texnologiyalarini joriy etish uchun malakali mutaxassislar talab etiladi. NoSQL va relatsion ma'lumotlar bazalarini taqqoslash Relatsion ma'lumotlar bazalari qat'iy tuzilishga ega bo'lib, aniq va ishonchli ma'lumotlar bilan ishlashda qulaydir. NoSQL bazalari esa katta hajmdagi va turli formatdagi ma'lumotlar bilan ishlash uchun mo'ljallangan. Amaliyotda ko'plab tizimlarda ushbu ikki texnologiya birgalikda qo'llanilib, har biri o'z vazifasini bajaradi.

Adabiyotlar tahlili va metodologiya

So'nggi yillarda axborot texnologiyalari bo'yicha o'tkazilgan tadqiqotlar shuni ko'rsatadiki, NoSQL ma'lumotlar bazalari zamonaviy tizimlarda katta ahamiyat kasb etmoqda. O'zbekiston va jahon olimlari NoSQL texnologiyalarining murakkab va katta hajmdagi ma'lumotlar bilan ishlashda samaradorligini alohida ta'kidlamodalar. Masalan:

- R.A. Eshmuhammedov (2020) NoSQL tizimlari analitik va tranzaksion operatsiyalarni tezlashtirishda samarali ekanini qayd etadi.

- A.Qodirov (2021) o'z ilmiy ishida NoSQLning masshtablanuvchanlik va elastik struktura afzalliklarini tahlil qilgan.

- Sh.Abdullayev (2022) esa NoSQL texnologiyalarining ma'lumotlar yaxlitligi va standartlar yetishmovchiligi kabi kamchiliklarini ko'rsatgan.

O'zbekiston amaliyotida ham NoSQL texnologiyalari ayrim korxonalar va startaplarda qo'llanmoqda. Biroq, ko'pchilik ilmiy tadqiqotlarda NoSQL va SQL ma'lumotlar bazalarining solishtirma tahlili, ularning turli tizimlarda samaradorligini baholashga alohida e'tibor qaratilmoqda.

Metodologiya

Ushbu maqolada NoSQL ma'lumotlar bazalarining afzalliklari va kamchiliklarini aniqlash uchun mazkur metodlar qo'llanildi:

1. Adabiyotlar tahlili - NoSQL texnologiyalari bo'yicha mavjud ilmiy manbalar, maqolalar, monografiyalar o'rganildi.

2. An'anaviy SQL bilan solishtirma tahlil - asosiy NoSQL turlari (dokumentlar ombori, graf bazalari, kalit-qiyimat va ustunli omborlar) SQL tizimlari bilan solishtirildi.

3. Amaliy misollar tahlili - NoSQL bazalari real tizimlarda qo'llanishi, ularning ishlash tezligi, kengaytirilishi hamda mantiqiy moslashuvchanligi analiz qilindi.

4. Statistik ma'lumotlar orqali baholash - NoSQL tizimlarining yirik ma'lumotlar bilan ishlash tezligi va samaradorligi bo'yicha statistik ko'rsatkichlar tahlil qilindi.

Natija va muhokamalar

Tahlil natijalari shuni ko'rsatdiki:

NoSQL ma'lumotlar bazalarining afzalliklari

- Masshtablanuvchanlik: NoSQL tizimlari shkalalanadigan bo'lib, katta hajmdagi ma'lumotlarni qayta ishlash qulay.

- Moslashuvchan struktura: Ma'lumotlar modeli qat'iy bo'lmaganligi sababli oson integratsiya va yangilanishga ega.

- Yuqori tezlik: Taqsimlangan tizimlarda yozish va o'qish operatsiyalari tez amalga oshadi.

- Bulut muhitiga moslik: NoSQL omborlari bulutli platformalarda samarali ishlaydi.

Kamchiliklar va cheklovlar

- Ma'lumotlar yaxlitligi. SQL kabi kuchli yaxlitlik davlat talablariga javob bermaydi; tranzaksiyalarni murakkab boshqarish.

- Standartlashtirish yetishmasligi. NoSQL turli ishlab chiqaruvchilarda har xil formatda bo'lishi mumkin.

- Murakkab so'rovlar. Ba'zi NoSQL turlari murakkab relatsion so'rovlarni bajarishda cheklangan.

- O'rganish qiyinchiliklari. An'anaviy SQL ma'lumotlar bazalaridan farqli ravishda yangi paradigmalarga moslashish vaqt talab qiladi.

Ushbu tahlillar shuni ko'rsatadiki, NoSQL ma'lumotlar bazalari yirik tizimlar, real vaqt rejimida katta ma'lumotlar bilan ishlaydi, tezlik talab qilinadigan ilovalarda ko'proq afzallik beradi. Biroq, an'anaviy SQL tizimlar ma'lumotlar yaxlitligi va standartlashtirishda ustun turadi. Shuning uchun NoSQL va SQL texnologiyalari ko'pincha birgalikda ham qo'llanilishi mumkin.

Xulosa

Xulosa qilib aytganda, NoSQL ma'lumotlar bazalari zamonaviy axborot tizimlarida katta hajmdagi va turli formatdagi ma'lumotlar bilan ishlash uchun samarali muhit yaratadi. Ularning moslashuvchan modeli, taqsimlangan arxitekturasini va tez ishlash xususiyatlari ko'plab sohalarda, xususan, bulutli hisoblash, real vaqt monitoring, ijtimoiy tarmoqlar va katta ma'lumotlar tizimlarida muvaffaqiyatli qo'llanilmoqda.

Shuningdek, tadqiqot shuni ko'rsatdiki, NoSQL tizimlarining kamchiliklari - ma'lumotlar yaxlitligi, standartlashtirish muammolari va murakkab tranzaksiyalarni boshqarish kabi jihatlar - ularni faqat ma'lum vazifalar uchun moslashtirilgan holda tanlash zarurligini ko'rsatadi. Shu sababli, samarali ma'lumotlar tizimini yaratishda NoSQL bazalari SQL tizimlari bilan birgalikda, har birining afzallik va imkoniyatlari hisobga olingan holda qo'llanilishi tavsiya etiladi.

Umuman olganda, NoSQL ma'lumotlar bazalarining afzalliklari va kamchiliklarini to'g'ri baholash orqali ularni amaliy loyihalarda optimal tanlash va joriy etish mumkinligi isbotlandi

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YANGI O‘ZBEKISTON –BUTUN XALQIMIZNING QALBIDAN CHUQUR JOY OLGAN EZGU G‘OYADIR

***Annotatsiya:** Ushbu maqolada Yangi O‘zbekistonni barpo etish umummilliy harakatga aylanib borayotgan ezgu g‘oya ekanligi to‘g‘risida fikr yuritiladi.*

***Kalit so‘zlar:** Yangi O‘zbekiston, Millat Sardori, Uchinchi Renessans, Birinchi va Ikkinchi Uyg‘onish davrlari, bunyodkorlik, yaratuvchanlik.*

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A NEW UZBEKISTAN IS A NOBLE IDEA THAT IS DEEPLY IN THE HEARTS OF OUR ENTIRE PEOPLE

***Abstract:** This article discusses the idea that the creation of a New Uzbekistan is a noble idea that is becoming a nationwide movement.*

***Keywords:** New Uzbekistan, Leader of the Nation, Third Renaissance, First and Second Renaissance periods, creativity, inventiveness.*

O‘zbekiston Respublikasi Prezidenti Shavkat Mirziyoyevning yaqinda “Yangi O‘zbekiston” gazetasi bosh muharririga bergan intervyusida “Yangi O‘zbekiston” va “Uchinchi Renessans” tushunchalari keng va faol qo‘llandi. Eng muhimi, har ikki tushunchaning aksariyat o‘rinlarda yonma-on, uyg‘un va hamohang kelganini kuzatish mumkin.

Bu haqda so‘z borganda, avvalambor, xalqaro tajribada jahon siyosiy atamashunosligini yangi tushunchalar bilan boyitadigan davlat va jamoat arboblari kam topilishini ta’kidlash lozim. Shu nuqtayi nazardan, O‘zbekiston Respublikasi Prezidenti Shavkat Mirziyoyev “Yangi O‘zbekiston” tushunchasini dunyo siyosati lug‘atiga kiritgani beqiyos ilmiy ahamiyatga ega.

Yangi O‘zbekiston – bu ibora Millat Sardori ilgari surgan va bugungi kunda butun xalqimizning qalbidan chuqur joy olgan, umummilliy harakatga aylanib borayotgan ezgu g‘oyadir. Bu g‘oya zamirida:

bir tomondan, bugungi va ertangi avlodlarimizning “Uchinchi Renessans” poydevorini qo‘yishdek ezgu maqsad-muddaolari;

ikkinchi tomondan, milliy tariximizda Birinchi va Ikkinchi Uygʻonish davrlariga asos solgan ulugʻ ajdodlarimiz, alloma bobolarimizning orzu-intilishlari va armonlari;

uchinchi tomondan, bunyodkorlik, yaratuvchanlik, har doim oʻqish va izlanishga daʼvat oʻz mujassamini topgan.

Yangi Oʻzbekiston meʼmori va tashabbuskori hisoblanuvchi Prezidentimiz qayd etganidek, “Yangi Oʻzbekistonni barpo etish – bu shunchaki xohish-istak, subyektiv hodisa emas, balki tub tarixiy asoslarga ega boʻlgan, mamlakatimizdagi mavjud siyosiy-huquqiy, ijtimoiy-iqtisodiy, maʼnaviy-maʼrifiy vaziyatning oʻzi taqozo etayotgan, xalqimizning asriy intilishlariga mos, uning milliy manfaatlariga toʻla javob beradigan obyektiv zaruratdir”.

Avvalo, Yurtboshimiz taʼbiri bilan aytganda, “yangi” degan soʻzning biz uchun alohida ahamiyati bor. Shu maʼnoda, bundan besh yil oldin qabul qilingan Harakatlar strategiyasida oʻz oldimizga Yangi Oʻzbekistonni barpo etish va Uchinchi Renessans poydevorini yaratishdek buyuk vazifalarni strategik maqsad qilib qoʻyganimiz bejiz emas. Prezidentimizning intervyusida biz intilayotgan ana shu ezgu gʻoyani roʻyobga chiqarish yoʻlida hayotimizning turli sohalarida qoʻlga kiritilgan yuksak natijalar va bu borada oldimizda turgan masʼuliyatli vazifalar haqida soʻz borgan. Oʻz navbatida, Prezidentimiz Shavkat Mirziyoyev rahnamoligida Oʻzbekistonda yangi Uygʻonish davri, yaʼni Uchinchi Renessans poydevorini yaratish asosiy maqsad etib belgilandi. Davlatimiz rahbari taʼkidlaganidek, “Biz Uchinchi Renessans masalasini strategik vazifa sifatida oldimizga qoʻyib, uni milliy gʻoya darajasiga koʻtarmoqdamiz”.

“Renessans” soʻzi – fransuzcha “Renaissance”, italyancha – “Rinascimento” – qayta yuzaga kelmoq, yangidan tugʻilmoq, qayta tirilish, uygʻonish – degan maʼnolarni anglatadi. “Uygʻonish” istilohi ilk bor XVI asrda meʼmor, musavvir va sanʼat tarixchisi Jorj Vazari (1511-1574) tomonidan Gʻarbiy Yevropada burjua munosabatlari rivojlanishining dastlabki bosqichi bilan shartlangan tarixiy davrni tavsiflash uchun qoʻllanilgan. Ushbu istilohning hozirgi maʼnosi farang tarixchisi Jul Mishle (1798-1874) tomonidan XIX asrda joriy qilindi.

Tarix faniga “Musulmon Renessansi” tushunchasi taniqli Avstriya sharqshunosi Adam Mes (1876-1946) tomonidan XX asr boshlarida, yanada aniqrogʻi, 1909-yilda kiritilgan. Olim “Sharq” atamasini tarixiy mazmunda ishlatib, bunda Oʻrta yer dengizidan to Yevropa qitʼasigacha boʻlgan yurtlarni va bu hududlarda IX-XII asrlarda madaniyat yuksaklarga koʻtarilganligini koʻzda tutgan. Mazkur oʻlkalar qadimiy sivilizatsiya beshigidir. Sobiq sovet davrida tarix va oʻquv adabiyotlarida faqat Gʻarb Uygʻonish davri haqida gap borardi. Sharqdagi Uygʻonish jarayoni haqida lom-lim deyilmacdi. Chunki tarix fanida yevropotsentrizm gʻoyasi hukmron, “Gʻarb – ilgʻor, Sharq – qoloq” aqidasi ustuvor edi. Vaholanki, ulugʻ ajdodlarimiz tarixda bir emas, ikkita Maʼrifiy Renessansga asos solganlar. Sharq Uygʻonish davri – IX-XII asrlarda mintaqamizda yuz bergan “Maʼrifiy Renessans” hisoblanadi.

Maʼrifiy Uygʻonish davrida buyuk allomalar, qomusiy bilim sohiblari, mashhur mutafakkirlar yetishib chiqqan. Aniq fanlar sohasida Muhammad

Xorazmiy, Abu Bakr Roziy, Abu Rayhon Beruniy, Ahmad Fargʻoniy, Umar Hayyom, falsafa sohasida Abu Nasr Forobiy, Ibn Rushd, Muhammad Gʻazzoliy, Aziziddin Nasafiy, tibbiyot sohasida Abu Ali ibn Sino, tilshunoslikda Mahmud Zamaxshariy, sheʼriyatda Abu Abdullo Rudakiy, Abulqosim Firdavsiy, Hofiz Sheroziy, Nizomiy Ganjaviy barakali ijod qilganlar. Ularning jahonshumul ilmiy-ijodiy kashfiyotlari umumbashariyat taraqqiyoti rivojiga mislsiz hissa qoʻshgan.

Tarixiy manbalarda “islom madaniyatining oltin asri” deb eʼtirof etiladigan bu davrda ona zaminimizdan yetishib chiqqan Imom Buxoriy, Imom Termiziy, Imom Moturidiy, Burhoniddin Margʻinoniy, Abul Muʼin Nasafiy kabi ulugʻ mutafakkirlar butun musulmon olamiga dong taratgan. Ikkinchi Sharq Uygʻonish davri – XIV-XVI asrlardagi "Temuriylar Renessansi"dir. Bunda Amir Temur bunyod etgan ulugʻ saltanatning oʻrni va ahamiyati beqiyosdir. Sohibqiron bobomiz ilm-fan va madaniyat ravnaqiga keng imkoniyatlar yaratgan, din peshvolari, olimlar, sanʼatshunoslar, yozuvchilar, shoirlarga alohida gʻamxoʻrlik koʻrsatgan. Bu maʼnaviy-maʼrifiy siyosat natijasida Sharq Uygʻonish davrining ikkinchi bosqichiga asos solingan.

Bu davrda Qozizoda Rumiy, Mirzo Ulugʻbek, Gʻiyosiddin Koshiy, Ali Qushchi singari benazir olimlar, Lutfiy, Sakkokiy, Hofiz Xorazmiy, Abdurahmon Jomiy, Alisher Navoiy, Bobur Mirzo kabi mumtoz shoir va mutafakkirlar maydonga chiqdi. Sharafiddin Ali Yazdiy, Mirxond, Xondamir kabi tarixchilar, Mahmud Muzahhib, Kamoliddin Behzod singari musavvirlar, koʻplab xattot va sozandalar, musiqashunos va meʼmorlarning shuhrati dunyoga yoyilgan.

Mamlakatimizda Uchinchi Renessansni XX asrda maʼrifatparvar jadidlar amalga oshirishlari mumkin edi. Nega deganda, bu fidoyi va jonkuyar zotlar butun umrini milliy uygʻonish gʻoyasiga bagʻishlab, oʻlkani jaholat va qoloqlikdan olib chiqish, millatimizni gʻaflat botqogʻidan qutqarish uchun bor kuch va imkoniyatlarini safarbar etganlar. Shu yoʻlda ular oʻzlarining aziz jonlarini ham qurbon qilganlar hamda “Ilmdan boshqa najot yoʻq va boʻlishi ham mumkin emas” degan hadisi sharifni hayotiy eʼtiqod deb bilganlar. Milliy istiqlol, taraqqiyot va farovonlikka, avvalo, maʼrifat orqali, dunyoviy va diniy bilim, zamonaviy ilm-hunarlarini chuqur egallash orqali erishish mumkin, deb hisoblaganlar.

Bu davrda Abdulla Avloniy, Mahmudxoʻja Behbudiy, Munavvarqori Abdurashidxonov, Ubaydulla Xoʻjayev, Abdurauf Fitrat, Ibrat domla, Abdulhamid Choʻlpon, Abdulla Qodiriy, Usmon Nosir, Ashurali Zohiriy, Hoji Muin va boshqa yana yuzlab ulugʻ insonlar Milliy uygʻonish va Millatparvarlik harakatining oldingi saflarida turgan. Ular yangi usul maktablari bilan bir qatorda, odamlarning dunyoqarashi va turmush tarzini oʻzgartirishga qaratilgan gazeta-jurnallar, nashriyot va kutubxonalar, teatrlar tashkil etganlar.

Bugungi kunda biz uchinchi Uygʻonish davri ostonasida turibmiz. Agar Oʻzbekiston Prezidentining keyingi besh yilda hayotimizning birgina yoʻnalishi, yaʼni maʼrifat, taʼlim va ilm-fanni rivojlantirish yoʻlida imzolagan qonun, farmon va qarorlari, tasdiqlagan Davlat dasturlari, ilgari surgan yangidan-angi tashabbuslarining magʻzini toʻla chaqib koʻrsak ham, navbatdagi Maʼrifat Renessansining markazi Yangi Oʻzbekiston ekaniga hech kimda shubha qolmaydi.

Davlatimiz rahbari ta’kidlaganidek, "Xalqimizning ulug‘vor qudrati jo‘shurgan hozirgi zamonda O‘zbekistonda yangi bir uyg‘onish – Uchinchi Renessans davriga poydevor yaratilmoqda, desak, ayni haqiqat bo‘ladi. Chunki bugungi O‘zbekiston – kechagi O‘zbekiston emas. Bugungi xalqimiz ham kechagi xalq emas". Albatta, Birinchi va Ikkinchi Renessans kabi Uchinchi Renessans ham uzoq davom etadigan jarayon. Uchinchi Renessans poydevorini yaratish jarayoni besh-o‘n yil emas, ancha katta va mashaqqatli davrni talab qiladi. Buning uchun, avvalo, minglab iste’dodli kadrlar, iqtidorli zamonaviy yoshlar, fidoyi insonlar nihoyatda zarur. Prezidentimiz rahnamoligida yurtimizda ulug‘ niyatlar bilan poydevori qo‘yilayotgan Yangi Uyg‘onish davrining yorqin sahifalarga boy buyuk tarixi yaratilmoqda. Bu olamshumul samaralar kelgusi avlodlarga munosib meros qoldirishga xizmat qilishi shak-shubhasizdir.

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TELEMEDICINE AND REMOTE MONITORING: DIGITAL TRANSFORMATION AND FUTURE PROSPECTS IN MODERN HEALTHCARE

Abstract: *Telemedicine and remote monitoring have become essential components of modern healthcare, providing innovative solutions for patient care and disease management. These technologies enable real-time interaction between patients and healthcare professionals, improving accessibility, efficiency, and quality of medical services. Remote monitoring of vital signs such as blood pressure, heart rate, and blood glucose levels supports early detection, continuous supervision, and personalized treatment planning. Telemedicine platforms, including video consultations, mobile applications, and digital sensors, have been particularly effective in rural areas, emergency situations, and for patients with chronic conditions. Despite numerous advantages, challenges such as data security, technical literacy, and regulatory barriers remain. Integration with advanced digital technologies, including artificial intelligence, Internet of Things devices, and mobile health applications, offers significant potential for the future development of healthcare systems. This article analyzes the current applications, benefits, challenges, and future prospects of telemedicine and remote monitoring, highlighting their role in the digital transformation of global healthcare.*

Keywords: *Telemedicine, Remote Monitoring, Digital Health, Chronic Disease Management, Patient-Centered Care, Healthcare Technology, Mobile Health, Artificial Intelligence.*

Introduction

In recent years, the integration of information technologies into healthcare has brought significant transformations in the medical field. Telemedicine and remote monitoring facilitate distant interaction between patients and healthcare professionals, enhancing the efficiency of diagnosis, treatment, and follow-up processes. These technologies play a particularly important role in rural areas, emergency situations, and for patients with chronic illnesses. Telemedicine systems typically include video consultations, mobile applications, digital sensors, and electronic health platforms. Such tools allow patients to access medical care promptly, optimize personalized treatment plans, and ensure effective utilization of healthcare resources. Moreover, remote monitoring technologies enable real-time tracking of vital parameters such as blood pressure, blood glucose levels, and heart rate. This capability is crucial for early detection and continuous management of

chronic conditions, cardiovascular diseases, and diabetes. Therefore, telemedicine and remote monitoring are considered essential directions defining the digital prospects of modern healthcare.

Relevance

The relevance of telemedicine and remote monitoring has significantly increased in recent years due to rapid technological advancements and the growing demand for accessible healthcare services. Global health challenges, including the COVID-19 pandemic, have highlighted the need for remote medical solutions that minimize physical contact while ensuring continuous patient care. Telemedicine reduces geographical barriers, optimizes healthcare resources, and provides timely medical support for patients in remote or underserved areas. Additionally, remote monitoring of chronic diseases and vital health indicators allows for early detection, personalized treatment, and improved overall health outcomes. Therefore, exploring the role of telemedicine and remote monitoring is crucial for understanding the future trajectory of digital healthcare systems.

Objective

The main objective of this study is to analyze the current state, practical applications, and potential future developments of telemedicine and remote monitoring in modern healthcare. This includes examining their effectiveness in patient management, the integration of digital technologies into clinical practice, and their contribution to improving accessibility, quality, and efficiency of healthcare services. The study also aims to identify the challenges and limitations associated with telemedicine implementation and propose strategies for enhancing its adoption and impact in healthcare systems.

Main part

In recent years, information and communication technologies have significantly transformed the healthcare sector. Telemedicine and remote monitoring enable distant interaction between patients and healthcare professionals, enhancing the efficiency of diagnosis, treatment, and follow-up processes. These systems are particularly crucial in rural areas, emergency situations, and for patients with chronic illnesses. Remote monitoring ensures real-time observation of vital health indicators, such as blood pressure, heart rate, and blood glucose levels. This allows for early detection of diseases and the creation of personalized treatment plans. Telemedicine systems typically include video consultations, mobile applications, and digital sensors. Remote monitoring contributes to the overall efficiency of healthcare delivery. It improves communication between patients and healthcare providers. Digital technologies optimize the use of healthcare resources. Patients in remote locations can access quality medical services. Telemedicine saves time and provides convenience for patients. It enables continuous supervision of chronic conditions. These technologies define the digital prospects of modern healthcare. This article focuses on the development, application, and future directions of telemedicine and remote monitoring. It also examines their benefits, challenges, and integration with advanced digital technologies. The study

emphasizes the significance of telemedicine in improving global healthcare accessibility and quality.

Telemedicine is a system that facilitates remote medical interaction between patients and healthcare professionals. It includes video consultations, mobile applications, electronic health platforms, and digital sensors. Early forms of telemedicine emerged in the mid-20th century, primarily through radio and telephone consultations. During the 1990s, the widespread adoption of the internet expanded the capabilities of remote medical services. In the 21st century, mobile technologies and IoT devices further enhanced the effectiveness of telemedicine. Today, telemedicine is applied not only for medical consultations but also for surgical guidance and mental health services. Monitoring patients with chronic diseases has become one of the most critical applications of telemedicine. It ensures quality medical care in remote areas and supports real-time decision-making by healthcare providers. Telemedicine allows for individualized treatment plans based on real-time patient data. It enables quick patient referral and intervention when necessary. Healthcare professionals can access comprehensive patient information through telemedicine platforms. It facilitates communication and coordination among medical teams. The system reduces the need for unnecessary hospital visits. Telemedicine supports preventive care and early diagnosis. It plays a pivotal role in the digital transformation of healthcare services. By integrating modern technologies, telemedicine has become a cornerstone of contemporary healthcare.

Remote monitoring involves continuous observation of patient health parameters using digital technologies. These systems include wearable devices, smartwatches, sensors, and mobile applications. Commonly monitored parameters include heart rate, blood pressure, blood glucose levels, oxygen saturation, and respiratory rate. Remote monitoring is essential for managing chronic diseases such as diabetes, cardiovascular disorders, and hypertension. It provides healthcare providers with real-time data to evaluate patient conditions accurately. Alerts and notifications can be sent to both patients and doctors in case of abnormal readings. Telemonitoring also supports preventive healthcare by identifying potential complications early. Patients can actively participate in managing their health through digital platforms. IoT devices transmit data directly to electronic health records for analysis. Integration with mobile apps enhances accessibility and user engagement. Remote monitoring reduces the frequency of hospital visits while maintaining continuous care. It improves adherence to prescribed treatments and medication schedules. This technology empowers patients to track their progress and make informed decisions. The collected data can also support clinical research and public health monitoring. Remote monitoring is increasingly being integrated with telemedicine consultations. Its versatility makes it applicable in home care, outpatient clinics, and remote health facilities. Overall, remote monitoring enhances the efficiency and quality of modern healthcare delivery.

Telemedicine and remote monitoring are applied in various healthcare domains, including primary care, specialty care, mental health, and chronic disease management. Video consultations allow doctors to assess patients' symptoms,

provide guidance, and prescribe medications remotely. Remote monitoring tracks patient vital signs continuously, enabling timely intervention if necessary. Mental health services utilize teletherapy sessions, online counseling, and support groups. Telemedicine supports post-operative care by monitoring recovery and preventing complications. Chronic disease management benefits from daily tracking of glucose levels, blood pressure, and cardiac activity. Telemedicine also facilitates remote diagnostic services, reducing the need for in-person visits. It is widely used in emergency medicine to provide rapid consultation for urgent cases. Patients in rural and underserved regions gain access to high-quality healthcare. Telemedicine platforms often integrate AI tools to assist in diagnosis and risk assessment. Mobile health applications provide reminders, educational content, and progress tracking. Telemedicine improves patient engagement and empowers individuals to manage their health actively. It enhances communication between multidisciplinary medical teams. The integration of telemedicine with electronic health records ensures continuity of care. Remote monitoring data contributes to personalized treatment plans. Telemedicine is also valuable in infectious disease management, such as COVID-19, to reduce transmission risk. These applications demonstrate its potential to improve healthcare accessibility, quality, and efficiency.

Telemedicine and remote monitoring provide multiple advantages for both patients and healthcare providers. Patients save time and reduce travel costs by accessing care remotely. Real-time monitoring ensures early detection of complications and prevents hospital readmissions. Digital health platforms enable personalized treatment and proactive health management. Patients in remote or underserved areas gain access to specialist consultations. Telemedicine enhances patient engagement and education regarding their conditions. Remote monitoring fosters adherence to treatment plans and medication schedules. It empowers patients to track their progress and understand health trends. Telemedicine reduces the burden on healthcare facilities and optimizes resource allocation. Continuous monitoring improves management of chronic diseases and reduces health risks. Patients experience improved convenience and satisfaction with medical services. Digital platforms ensure secure communication and confidentiality of patient information. Telemedicine allows family members to participate in care and support patients remotely. It promotes preventive care through regular monitoring and timely intervention. Overall, these technologies contribute to improved health outcomes and quality of life. Telemedicine also facilitates multidisciplinary collaboration for comprehensive patient care. It enhances accessibility for vulnerable populations, including the elderly and disabled. Remote monitoring strengthens the patient-provider relationship by maintaining continuous contact. The integration of these technologies promotes efficient, effective, and patient-centered healthcare.

Despite the benefits, telemedicine and remote monitoring face several challenges. Data privacy and cybersecurity remain major concerns, as sensitive patient information is transmitted online. Limited internet connectivity in rural or underserved areas hinders the accessibility of remote services. Some patients,

particularly the elderly, may struggle with using digital devices and applications. Healthcare providers need training to effectively use telemedicine platforms and interpret remote monitoring data. Technical issues, such as software malfunctions or device failures, can interrupt care. Not all medical conditions can be adequately managed remotely, necessitating in-person consultations. Legal and regulatory frameworks vary between regions, creating challenges for cross-border telemedicine. Reimbursement policies for remote services are still inconsistent in many countries. Integration with existing electronic health records can be complex and resource-intensive. Maintaining patient engagement and compliance may be difficult in the absence of direct supervision. Ethical concerns arise regarding patient autonomy and informed consent. Continuous updates and maintenance of telemedicine systems are required. Technical literacy and access to devices may be limited among disadvantaged populations. Data overload can overwhelm healthcare providers without proper analysis tools. Despite these challenges, technological innovations continue to improve reliability and usability. Addressing these limitations is crucial for widespread adoption and effectiveness. Telemedicine must balance accessibility, safety, and quality of care to achieve its full potential.

The future of telemedicine and remote monitoring is closely linked to integration with advanced digital technologies. Artificial intelligence can assist in diagnosis, risk assessment, and predictive analytics. Big Data analytics enables evaluation of population health trends and informs preventive strategies. Internet of Things (IoT) devices provide continuous real-time monitoring and automated alerts. Virtual reality and augmented reality can enhance medical training, remote procedures, and patient engagement. Cloud computing supports secure storage and accessibility of health data from multiple sources. Mobile applications provide interactive platforms for patient education and self-management. AI algorithms can analyze monitoring data to optimize personalized treatment plans. Integration with electronic health records ensures continuity of care and facilitates decision-making. Telemedicine may expand globally, bridging gaps in access to specialist care. It can improve efficiency, reduce healthcare costs, and optimize resource allocation. Emerging technologies can enhance patient adherence and engagement. Collaboration between healthcare providers, technology developers, and policymakers is critical. Continuous innovation will address current limitations and expand telemedicine applications. Remote monitoring may incorporate wearable sensors, home-based diagnostics, and smart devices. Telemedicine can support public health surveillance and epidemic management. Future systems will emphasize security, usability, and interoperability. Overall, digital integration promises to redefine healthcare delivery globally.

Discussion and Results

The analysis of telemedicine and remote monitoring demonstrates significant improvements in healthcare accessibility, quality, and efficiency. Studies indicate that patients in rural or underserved areas experience faster medical consultations and better health outcomes due to remote services. Real-time monitoring of vital signs enables early detection of complications, which reduces hospitalization rates

and medical costs. Telemedicine platforms also enhance patient engagement, as individuals can actively track their health data and communicate with healthcare providers. Remote monitoring data contributes to personalized treatment plans and continuous care. The integration of artificial intelligence improves diagnostic accuracy and optimizes clinical decision-making. Despite these benefits, challenges such as data security, technical literacy, and regulatory inconsistencies affect the implementation of telemedicine. Research shows that training both patients and healthcare professionals in digital technologies enhances system effectiveness. Remote monitoring has been particularly effective in managing chronic diseases, such as diabetes, cardiovascular disorders, and hypertension. Patients report higher satisfaction due to convenience, reduced travel, and timely medical attention. Telemedicine also facilitates mental health services and post-operative care through virtual consultations. The combination of telemedicine and IoT devices supports preventive care and long-term health management. Analysis of recent case studies highlights that cost-effectiveness increases when remote monitoring is integrated with existing healthcare infrastructure. Results indicate that ongoing technological innovation, such as AI-driven predictive analytics, will further enhance the impact of telemedicine. Collaboration between policymakers, healthcare providers, and technology developers is essential to overcome barriers. Data shows a positive correlation between telemedicine adoption and improved population health outcomes. Continuous monitoring and evaluation of digital health programs are recommended to maintain quality and reliability. Overall, telemedicine and remote monitoring prove to be effective tools for modern, patient-centered, and technology-driven healthcare delivery.

Conclusion

Telemedicine and remote monitoring represent key directions in the digital transformation of modern healthcare. They provide convenience, accessibility, and real-time supervision for patients while optimizing resource use for providers. These technologies improve the management of chronic diseases, facilitate preventive care, and enhance overall healthcare quality. Challenges such as data privacy, technical barriers, and regulatory inconsistencies need to be addressed for effective implementation. Healthcare professionals and patients require training to fully utilize these technologies. Integration with AI, IoT, and mobile platforms will expand the scope and efficiency of telemedicine. Policymakers should establish clear regulations and reimbursement policies to promote adoption. Investments in digital infrastructure are essential to ensure equitable access. Patient engagement and education should be emphasized to maximize benefits. Remote monitoring systems should be continuously updated and maintained for reliability. Ethical and legal considerations must guide technology deployment. Telemedicine can significantly reduce the burden on hospitals and improve healthcare accessibility in remote regions. Future research should explore innovative methods to enhance effectiveness and patient outcomes. Collaboration among stakeholders is critical for sustainable implementation. Overall, telemedicine and remote monitoring have the

potential to revolutionize global healthcare delivery. They define the future of accessible, patient-centered, and technology-driven medical services.

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EVALUATION OF THE EFFECTIVENESS OF THE CRYSTALLOGRAPHY METHOD IN THE DIAGNOSIS OF NEPHROLITHIASIS

Abstract: *The crystallography method has emerged as a precise and reliable tool for analyzing the chemical composition and crystal structure of kidney stones. Its application in nephrolithiasis diagnosis allows accurate identification of stone types, including mixed and complex stones, which are often difficult to classify using conventional imaging techniques. The method supports individualized treatment strategies, preventive measures, and early detection of metabolic abnormalities contributing to stone formation. Despite certain limitations, such as the requirement for specialized equipment and trained personnel, crystallography enhances diagnostic accuracy, optimizes patient management, and reduces recurrence rates. This study evaluates the effectiveness of crystallography in clinical practice and discusses its integration with conventional diagnostic approaches to improve outcomes in nephrolithiasis care.*

Keywords: *Nephrolithiasis, Kidney Stones, Crystallography, Stone Analysis, Diagnostic Effectiveness, Personalized Treatment, Metabolic Evaluation.*

Introduction

Nephrolithiasis is a common urological disorder characterized by the formation of stones in the kidneys and urinary tract, affecting a significant number of patients worldwide. The disease can lead to chronic pain, urinary tract infections, and, in some cases, impaired renal function. Effective treatment and prevention of nephrolithiasis are directly dependent on early and accurate diagnosis. Conventional diagnostic methods, including ultrasonography, radiography, computed tomography, and laboratory analyses, help determine the location and type of stones, but they have certain limitations. Therefore, the application of new and supplementary diagnostic approaches remains highly relevant. The crystallography method is a laboratory technique that allows precise identification of the morphological and chemical composition of kidney stones. This method provides detailed information about the crystal structure and composition of the stones, which is essential for understanding the pathogenesis of nephrolithiasis and developing individualized treatment strategies. The present study aims to evaluate the effectiveness of the crystallography method, its diagnostic accuracy, and its applicability in the management of patients with nephrolithiasis.

Relevance

Nephrolithiasis is a common urological disorder that can lead to pain, infections, and kidney damage. Accurate diagnosis is essential for effective treatment and prevention. Conventional methods often cannot precisely determine stone composition. The crystallography method provides detailed information on stone structure and composition, improving diagnosis and guiding individualized therapy.

Objective

To evaluate the effectiveness of the crystallography method in diagnosing nephrolithiasis, determine stone composition accurately, and assess its potential to improve patient management and prevent recurrence.

Main part

Nephrolithiasis is a prevalent urological disorder characterized by the formation of stones within the kidneys and urinary tract. It affects millions of individuals worldwide and contributes to significant morbidity due to pain, hematuria, and urinary tract infections. Stones may vary in size, number, and composition, with clinical manifestations ranging from asymptomatic to severe renal colic. The pathogenesis involves supersaturation of urine, crystal nucleation, growth, and aggregation. Recurrence is common, making early diagnosis and effective management essential. Chronic cases can lead to obstructive uropathy and impaired renal function. Epidemiological studies show higher prevalence in males and peak incidence between 30–50 years of age. Geographic and environmental factors, including climate and hydration levels, influence stone formation. Metabolic disorders such as hypercalciuria, hyperoxaluria, and hyperuricosuria increase susceptibility. Understanding the clinical course aids in the development of preventive strategies. Imaging and laboratory tests provide preliminary information about stone size and location but often fail to reveal chemical composition. Accurate identification of stone type is crucial for individualized treatment planning. Recurrence prevention relies on understanding both systemic and local risk factors. Stones are commonly composed of calcium oxalate, uric acid, struvite, or cystine. Each type presents unique challenges in diagnosis and management. Preventive measures, including dietary modifications, fluid intake optimization, and pharmacotherapy, are tailored according to stone composition. The burden of nephrolithiasis emphasizes the need for advanced diagnostic methods. Crystallography has emerged as a complementary technique, providing detailed structural and chemical analysis. Its integration into clinical practice enhances the overall management of patients. Knowledge of stone characteristics supports both therapeutic and research initiatives.

The development of nephrolithiasis is multifactorial, involving genetic, metabolic, environmental, and dietary influences. Genetic predisposition plays a crucial role in recurrent stone formation and familial clustering. Metabolic disorders, such as hypercalciuria, hyperoxaluria, and hyperuricosuria, significantly increase the risk of stone formation. Dietary factors, including high intake of oxalate, calcium, and purine-rich foods, contribute to crystallization in the urinary

tract. Dehydration and low fluid intake are strongly associated with increased stone risk. Environmental conditions, such as warm climates and occupational heat exposure, can exacerbate urinary concentration, promoting crystallization. Age and gender also influence incidence, with higher rates reported in adult males. Comorbid conditions, including obesity, diabetes, and hypertension, further elevate the likelihood of nephrolithiasis. Recurrent infections and urinary tract obstruction contribute to struvite stone formation. Sedentary lifestyle and reduced physical activity may impact urinary calcium excretion and pH balance. Medications, such as loop diuretics and antacids, can alter urinary composition, increasing stone formation risk. Family history and genetic mutations in renal transport proteins predispose individuals to early onset. Understanding these risk factors aids in targeted prevention and patient counseling. Identifying modifiable factors allows for effective dietary and lifestyle interventions. Comprehensive assessment of risk profiles supports individualized management. Early recognition of high-risk patients enables proactive monitoring. Crystallography complements risk assessment by identifying stone composition and potential metabolic triggers. This approach enhances both treatment and prevention strategies. Integrating clinical, environmental, and laboratory data improves patient outcomes.

Conventional diagnostic methods for nephrolithiasis include ultrasonography, plain radiography, computed tomography, and laboratory analyses. Ultrasonography is non-invasive and widely used for detecting stones and hydronephrosis. Plain radiographs provide information about radiopaque stones, primarily calcium-based. Computed tomography offers high sensitivity and specificity, detecting stones regardless of composition and size. Laboratory tests, including urinalysis and serum biochemistry, provide information on metabolic abnormalities. Each method has inherent advantages and limitations regarding accuracy, cost, and radiation exposure. Imaging techniques often fail to determine the chemical composition of stones. Certain stones, such as uric acid, may be radiolucent and undetectable on X-rays. Conventional methods provide limited information for recurrence prevention and individualized therapy. Integration of imaging and laboratory data enhances diagnostic confidence. Rapid and accurate stone detection is essential for timely clinical intervention. Conventional approaches remain the standard for initial evaluation in most clinical settings. Patient compliance and accessibility affect diagnostic success. Non-invasive techniques reduce patient discomfort and procedural risks. Imaging modalities may require specialized equipment and trained personnel. Repeat imaging may be necessary to monitor progression or treatment response. Conventional diagnostics provide baseline data for further laboratory investigation. The need for additional methods arises from the limitations in composition analysis. Complementary techniques, such as crystallography, can overcome these gaps. Overall, conventional diagnostics are necessary but not sufficient for comprehensive stone management.

The crystallography method is a laboratory-based technique designed to analyze the morphological and chemical structure of kidney stones. It involves microscopic examination, polarized light analysis, and spectroscopic evaluation.

Crystals are classified according to their shape, size, and internal lattice structure. Chemical composition is determined using methods such as X-ray diffraction, infrared spectroscopy, or Raman spectroscopy. Sample preparation includes cleaning, drying, and sectioning stones into analyzable fragments. Standardized protocols ensure reproducibility and accuracy. The technique allows differentiation between calcium oxalate, uric acid, struvite, and cystine stones. Crystallography can detect mixed composition stones and trace mineral elements. This information is critical for understanding the pathogenesis of nephrolithiasis. Laboratory results guide individualized treatment and dietary recommendations. The method requires trained personnel and precise instrumentation. Quality control measures are essential to maintain reliability. Crystallography complements conventional imaging by providing definitive stone identification. The technique has been validated in multiple clinical studies. It offers high specificity and sensitivity in stone classification. Integration into routine laboratory diagnostics enhances overall patient management. Crystallography findings support metabolic evaluations and recurrence prevention. The method contributes to research in stone formation mechanisms. It is considered an essential tool in modern nephrology and urology practice.

Crystallography is widely applied in clinical practice to enhance the diagnostic accuracy of nephrolithiasis. It provides precise identification of stone type, allowing clinicians to develop individualized treatment plans. In recurrent stone formers, crystallography enables targeted interventions based on stone composition. It assists in determining metabolic abnormalities contributing to stone formation, facilitating preventive strategies. The method supports patient counseling on dietary and lifestyle modifications. Clinical studies have demonstrated higher diagnostic reliability compared to conventional imaging for stone classification. Crystallography aids in selecting pharmacological therapies tailored to specific stone types, such as uric acid stones requiring urine alkalization. It also improves monitoring of therapeutic effectiveness and recurrence risk. The technique is particularly valuable in complex or mixed-composition stones that conventional methods may not differentiate. By accurately identifying stone composition, clinicians can reduce unnecessary interventions and optimize care. Integration with metabolic evaluations enhances the overall management strategy. Crystallography findings contribute to research on pathophysiology and epidemiology of nephrolithiasis. It allows correlation between stone type and clinical outcomes. The method also supports quality control in laboratory diagnostics. Rapid reporting of crystallography results aids in timely clinical decision-making. It is effective for both adult and pediatric populations. Crystallography can guide surgical decisions when stone removal is necessary. It is compatible with standard laboratory workflows and instrumentation. Overall, the method increases diagnostic confidence and improves patient-centered care outcomes.

The main advantage of crystallography lies in its ability to precisely determine the chemical composition and crystal structure of kidney stones. This

level of detail allows clinicians to develop individualized treatment and preventive strategies. It enhances early diagnosis, reducing the risk of complications and recurrent stone formation. Crystallography provides data that are not available from conventional imaging, such as mixed composition detection and trace mineral content. The method improves understanding of stone pathophysiology and contributes to research on metabolic disorders. It supports evidence-based decisions regarding dietary recommendations, fluid intake, and pharmacological therapy. By identifying stone type accurately, crystallography reduces unnecessary procedures and optimizes resource utilization. It is particularly useful in recurrent and complex cases, where conventional diagnostics are insufficient. The technique is reproducible, reliable, and standardized, allowing comparison across laboratories. It enhances patient education and counseling by providing specific insights into stone etiology. Crystallography assists in monitoring treatment effectiveness and recurrence prevention. It integrates with metabolic evaluations to provide a comprehensive management plan. The method supports long-term follow-up and clinical decision-making. Laboratory personnel can adopt crystallography within routine diagnostic workflows. It reduces diagnostic uncertainty and increases clinician confidence. Overall, crystallography contributes significantly to improved patient outcomes. It complements conventional diagnostic tools rather than replacing them. The method is cost-effective when considering reduced recurrence and targeted therapy benefits. Its application is growing in modern nephrology and urology practice.

Despite its advantages, crystallography has several limitations and challenges. Specialized equipment is required, which may not be available in all clinical laboratories. The method requires trained personnel with expertise in crystal analysis and spectroscopic techniques. Sample preparation can be time-consuming and requires careful handling to avoid contamination. High costs associated with equipment and reagents may limit widespread adoption. Interpretation of results may vary depending on operator skill and laboratory standards. Mixed or complex stones may still present analytical difficulties. Standardization across laboratories is essential to ensure consistent results. Integration into routine clinical practice can be challenging due to workflow constraints. Turnaround time for results may be longer compared to conventional imaging. Accessibility may be limited in rural or resource-constrained settings. Some stones may be too small or fragmented for effective analysis. Quality control and calibration of instruments are critical to maintain accuracy. The method is less useful for rapid emergency diagnosis where imaging is preferred. Regulatory and accreditation requirements may limit implementation in some regions. Collaboration between clinicians and laboratory specialists is essential for effective use. Patients may require additional education about the purpose and benefits of the test. Combining crystallography with conventional diagnostics is necessary for comprehensive evaluation. Awareness among healthcare providers about its utility may still be limited. Despite these challenges, the method remains highly valuable for precise stone analysis and targeted therapy planning.

Conclusion

The crystallography method has proven to be a highly effective and reliable technique for analyzing the chemical composition and crystal structure of kidney stones. Its application in nephrolithiasis diagnosis allows precise identification of stone types, including mixed and complex stones that are often difficult to classify using conventional imaging. By providing detailed morphological and chemical information, crystallography supports individualized treatment strategies, targeted preventive measures, and improved patient outcomes. The method enhances early detection of metabolic abnormalities contributing to stone formation, thereby reducing recurrence rates and minimizing complications. Despite certain limitations, such as the need for specialized equipment and trained personnel, the benefits of increased diagnostic accuracy and evidence-based patient management are significant. Integrating crystallography with conventional diagnostic methods offers a comprehensive approach to nephrolithiasis care, bridging laboratory analysis and clinical practice. Overall, crystallography represents a critical advancement in modern nephrology, enabling better clinical decision-making, optimized therapeutic plans, and enhanced long-term patient management. Its continued use and integration into routine clinical workflows are recommended to improve outcomes and support research in stone pathophysiology and preventive strategies.

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APPLICATION OF GEOGRAPHIC INFORMATION SYSTEMS IN ASSESSING THE GEOECOLOGICAL CONDITIONS OF THE KHOREZM REGION

***Abstract:** This article examines the geoecological conditions of the Khorezm Region, with particular emphasis on land use patterns and land cover characteristics. The study substantiates the changes in land cover that have occurred over time as a result of increasing anthropogenic impacts. Using Sentinel-2 Land Use/Land Cover satellite imagery with a spatial resolution of 10 m for the years 2017 and 2024, land cover dynamics during this period were identified and quantitatively assessed. The results highlight spatial and temporal variations in major land cover categories, reflecting the influence of human activities and environmental factors on the region's geoecological state. The applied GIS-based analysis provides a reliable framework for monitoring land cover transformations and supports informed decision-making in the management of land and natural resources under arid environmental conditions.*

***Key words:** GIS, LULC, crops, built area, rangeland, Sentinel-2, Landsat, remote sensing, geoecological monitoring*

The Khorezm region is located at the boundary of Uzbekistan's arid climatic zone, where oasis landscapes play a key role in ensuring agricultural production and maintaining ecological balance. Water resources in the region are limited; however, the livelihoods of the population and up to 70% of the region's agricultural output depend on these irrigated oases. In recent decades, oasis ecosystems have undergone significant changes as a result of increasing anthropogenic pressure, climate change, and the degradation of soil and water resources. According to data from Uzhydromet, over the past 30 years the average annual air temperature in Khorezm has increased by 1,2–1,5°C, while the annual discharge of the Amu Darya River—the main source of irrigation—has decreased by 15–20%. Under such conditions, Geographic Information Systems (GIS) have become an essential tool for monitoring the geoecological state of the region and for the early detection of adverse environmental changes. According to FAO projections, water scarcity in Central Asia may reach 30–40% by 2050, which necessitates the development of adaptive strategies for natural resource management [4]. In this context, the application of modern GIS technologies in geoecological monitoring has become increasingly relevant, as it provides a scientifically grounded approach to assessing

land cover dynamics, forecasting desertification risks, and optimizing the allocation of water resources.

The aim of this study is to present a methodology for monitoring geoecological conditions in the Khorezm Region based on GIS and remote sensing data. In particular, the study analyzes indicators such as land use and land cover (LULC) changes, anthropogenic pressure, and vegetation cover dynamics, and discusses the experience of cartographic modeling of these processes using the ArcGIS Pro software.

Remote sensing and GIS technologies provide a number of advantages for geoecological monitoring. Satellite imagery acquired through remote sensing enables regular and large-scale observation of the condition of regional landscapes. For instance, studies have demonstrated that changes in vegetation cover can be monitored with an accuracy of approximately 85–90% using data from the NASA Landsat 7–8 and Sentinel-2 satellite missions [4]. In addition, the application of vegetation indices such as the Normalized Difference Vegetation Index (NDVI) has been scientifically proven to be highly effective in detecting the early stages of desertification. GIS-based monitoring approaches make it possible to assess the dynamics of oasis ecosystems under the influence of both natural–climatic and anthropogenic factors. For example, in the case of the Khorezm oases, the analysis of satellite imagery combined with GIS-based cartographic modeling has made it possible to examine the spatial structure of oasis landscapes and to identify their transformations driven by natural and human-induced processes, thereby demonstrating the effectiveness of GIS technologies in land resource management. Geo-information data obtained through GIS tools allow not only the mapping of the current environmental state, but also the modeling and forecasting of landscape processes, as well as the anticipation of changes in the reclamation status of irrigated lands and the degree of desertification.

In the Khorezm Region, the structure of land use and land cover has undergone significant changes over recent decades. Automatic classification of remote sensing imagery enables a quantitative assessment of these transformations. As shown in Figure 1, within the framework of this study Sentinel-2 satellite images acquired between 2017 and 2024 were analyzed, and an LULC classification was performed. As a result, several major changes in oasis landscapes were identified. Agricultural cropland areas decreased by 1.7% during the period 2017–2024, with the most pronounced reductions observed in the northern districts of the region (Yangiariq and Khazarasp). This trend is consistent with global desertification processes observed in arid regions. At the same time, a decline in the irrigation intensity of croplands has been recorded in recent years due to reduced water availability from the Amu Darya River. Consequently, an increase in soil salinity and a decline in soil fertility have been observed in certain agricultural areas.

In contrast, built-up and settlement areas increased by 10.18%, with particularly rapid urbanization observed around the regional center, Urgench city. This trend can be explained by the rapid growth of the region's population. In 2017, the permanent population of the Khorezm Region amounted to 1,781.9 thousand

people, whereas by 2024 it had increased to 2,002.8 thousand. Rapid population growth and economic development inevitably lead to the expansion of urban areas, thereby intensifying anthropogenic pressure on natural ecosystems. As a result, the burden on water and land resources within the region has further increased.

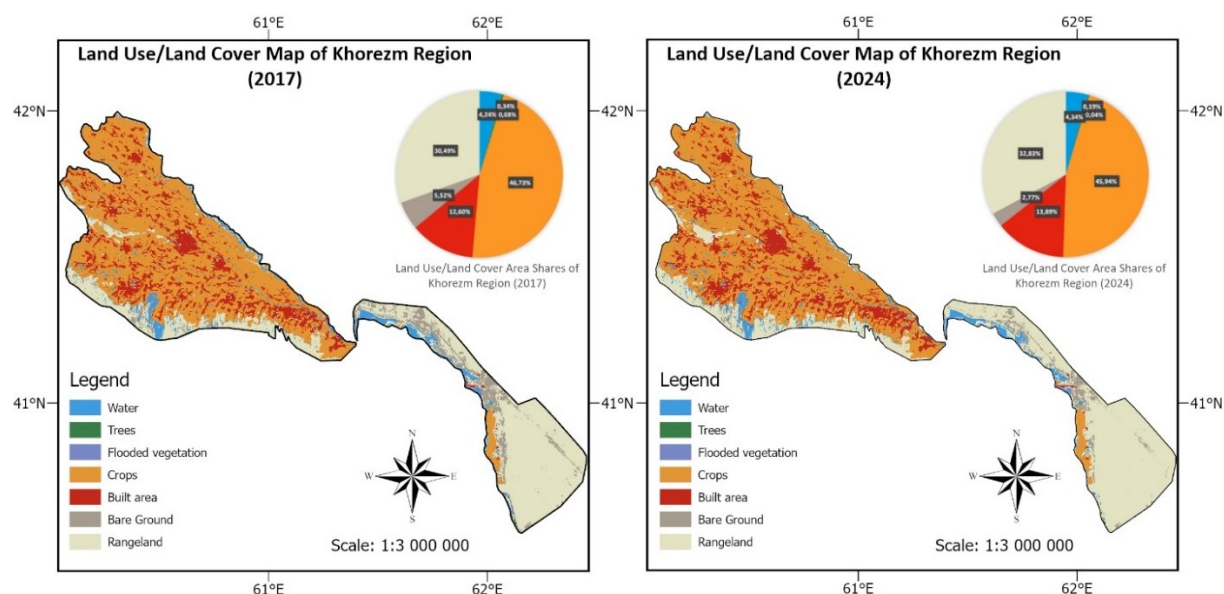


Figure 1. Map of land use/land cover changes in the Khorezm Region in 2017 and 2024.

Changes in water bodies were relatively minor. Variations in the area of water resources exhibit a pronounced seasonal character, and satellite images acquired at different times may therefore show certain discrepancies.

The area of bare ground decreased almost twofold (by 179.8 km²), while rangeland areas increased by 7.68% compared to 2017. This trend is also illustrated by the diagram presented in Figure 2. Rangeland areas are predominantly composed of desert vegetation and represent one of the key components in combating desertification within the region.

Forest areas in the region remain extremely limited. The main forested zones consist of tugai (riparian) forests along the Amu Darya River. However, in recent years, increasing demand for forest resources has led to a reduction in existing tree-covered areas. In 2017, forested land covered approximately 4.9 km², whereas by 2024 this figure had declined to 2.8 km².

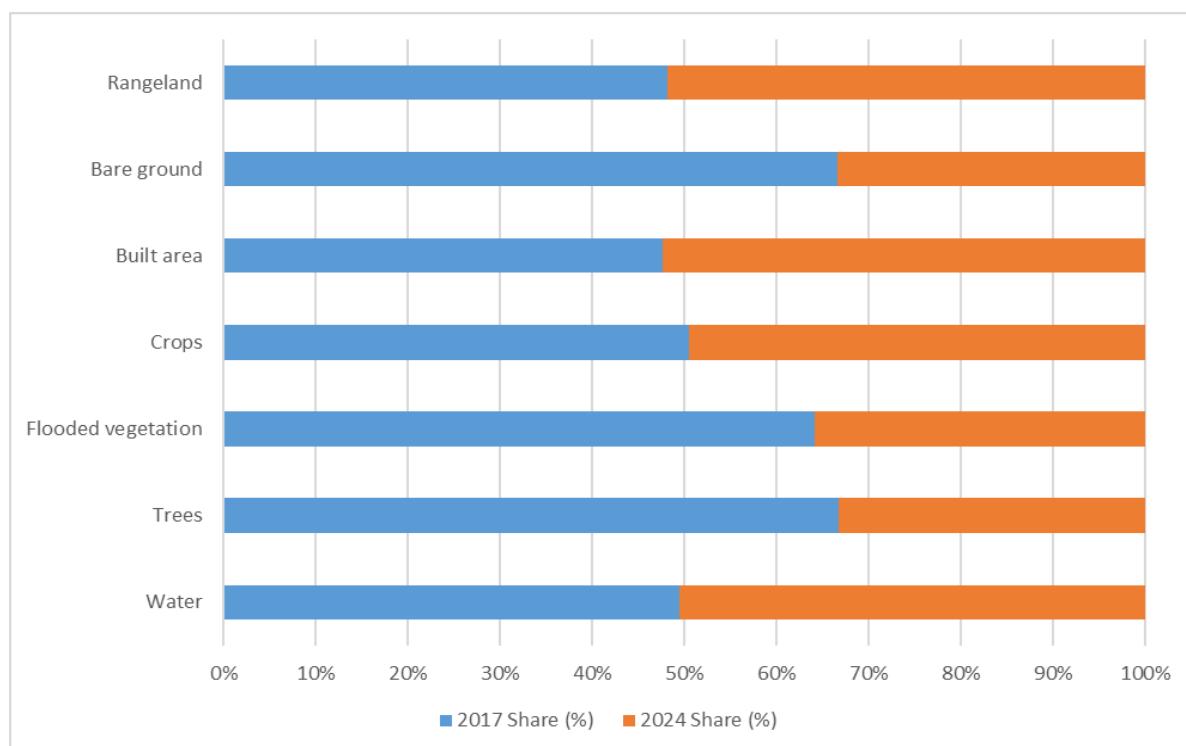


Figure 2. Changes in the Proportional Structure of Land Use/Land Cover in Khorezm Region (2017–2024)

To illustrate these changes more clearly, a table of LULC indicators was compiled (Table 1). The table presents the dynamics of the major land cover categories from 2017 to the present. Notably, while the proportion of vegetation-covered land has shown a steady decline, the share of urbanized areas has increased significantly.

Class (Name)	2017 Area (km ²)	2017 Share (%)	2024 Area (km ²)	2024 Share (%)	Change (km ²)	Change (% relative to)
Water	276,8931	4,24	283,7171	4,34	6,824	2,46
Trees	4,9721	0,08	2,8774	0,04	-2,0947	-42,13
Flooded vegetation	22,4187	0,34	12,5142	0,19	-9,9045	-44,18
Crops	3053,669	46,73	3001,731	45,94	-51,9375	-1,7
Built area	823,5752	12,6	907,4265	13,89	83,8513	10,18
Bare ground	360,5536	5,52	180,7518	2,77	-179,802	-49,87
Rangeland	1992,378	30,49	2145,441	32,83	153,0632	7,68

Table 1. Changes in the land cover structure of the Khorezm Region by years (percentage distribution of agricultural land, settlements, water bodies, and other land categories).

Maps derived from the results of the LULC classification effectively revealed the spatial distribution of the most significant changes within the study area. For instance, satellite image classification clearly demonstrated a reduction in bare ground areas in the southern districts of the Khorezm Region, while an expansion of salt-affected lands was observed in the south-western part of the region. These patterns were cartographically visualized, providing clear evidence of spatially differentiated land cover transformations.

The results of such spatial analyses serve as early-warning indicators for local authorities and environmental agencies, helping to identify areas where reclamation measures should be intensified or where land-use practices require revision. For example, the previously noted 1.7% reduction in cropland represents a regional manifestation of global aridification trends. To mitigate this process, it is recommended to identify low-productivity agricultural areas and introduce water-saving technologies, such as drip irrigation systems.

Based on all results obtained in ArcGIS Pro, a comprehensive set of final maps and table-based indicators illustrating land cover and land use conditions in 2017 and 2024 was developed. This integrated cartographic framework provides a solid basis for assessing spatial patterns of geoecological change and supporting evidence-based decision-making in land and water resource management.

The study conducted using the Khorezm Region as a case study demonstrated the high effectiveness of applying GIS and remote sensing tools in geoecological monitoring. GIS technologies enable comprehensive, accurate, and timely assessment of the current state of landscapes and their change trends. The results obtained—such as the reduction of cropland areas, the expansion of saline lands, and the decline in vegetation indices—were all represented in the form of spatial maps and quantitative indicators. This approach made it possible to identify problem areas and risk zones based on their spatial distribution. In particular, the integrated maps developed using the ArcGIS Pro software provided an effective basis for optimizing agroecological and water management planning at the regional scale.

In conclusion, it can be stated that GIS and the ArcGIS Pro platform offer significant opportunities for the efficient organization of monitoring and forecasting activities in complex geoecological systems such as the Khorezm Region. These methods allow real-time monitoring of soil salinity, vegetation cover, and water resource conditions, enabling the early identification of problematic areas and processes. The findings of this study indicate that data and map products generated using geographic information systems constitute an essential tool for decision-making aimed at sustainable natural resource management and the mitigation of environmental challenges at the regional level. Therefore, further development of GIS-based geoecological monitoring systems and their continuous enrichment with up-to-date data will provide a solid foundation for achieving sustainable development in the Khorezm Region.

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CURRENT APPROACHES TO ENDOSCOPIC TREATMENT OF BLEEDING FROM THE UPPER GASTROINTESTINAL TRACT

Abstract: *Upper gastrointestinal GI bleeding remains a medical emergency with mortality rates of 5 to 10% despite advances in therapy [1]. This review synthesizes current evidence on endoscopic management, analyzing 37 clinical studies and 11 meta analyses published between 2024-2025. We evaluate the efficacy of established techniques (injection, thermal and mechanical) alongside emerging therapies like hemostatic powders focusing on comparative outcomes from randomized controlled trials.*

Key words: *endoscopic hemostatic techniques, variceal bleeding, rebleeding, sclerosant risks.*

Introduction

Upper GI bleeding accounts for over 300,000 annual hospitalizations in the United States alone [2]. The endoscopic approach has evolved significantly since the 1980s when thermal coagulation first demonstrated superiority to surgical intervention [3]. Modern management emphasizes:

- Risk stratification using validated scales (Glasgow-Blatchford, Rockall);
- Endoscopic therapy within 24 hours [4];
- Multimodal hemostasis combining mechanical and pharmacologic methods.

Endoscopic Hemostatic Techniques

Injection Therapy

Recent meta-analysis data [5]:

- Epinephrine monotherapy: Rebleeding rate 18.4% (95% CI 15.2-21.6)
- Epinephrine + second modality: Rebleeding rate 8.7% (95% CI 6.3-11.1)

Sclerosant risks:

- Ethanol injection shows 12.3% perforation risk in gastric ulcers [6]
- Fibrin glue remains cost-prohibitive at \$350-500 per treatment [7]

Thermal Coagulation

Multicenter trial findings [8]:

- BICAP: 92.1% initial hemostasis (n=417)
 - Heater probe: 88.6% success (n=392)
- (p=0.03 for superiority)

APC limitations:

- Depth penetration limited to 2-3mm [9]

- 15.2% rebleeding in Dieulafoy lesions [10]

Mechanical Hemostasis

Clip technology advancements:

- Conventional clips: 78.4% success in Forrest Ia [11]
- OTSC: 94.2% success in same cohort [12] ($p < 0.001$).

Hemostatic Powders

TC-325 registry data [13]:

- Immediate hemostasis: 93.7% (568/606 cases)
- 7 day rebleeding: 28.9%
- Cost effectiveness ratio: \$12,500/QALY

Special Considerations: Variceal Bleeding

Esophageal Varices

Outcome	EVL (%)	Sclerotherapy (%)	p-value
Initial hemostasis	92.4	85.1	0.008
6-week rebleeding - 18.7	18.7	29.3	0.002
Strictures	1.2	14.6	<0.001

EVL vs. sclerotherapy [14]:

Gastric Varices

Cyanoacrylate outcomes [15]:

- Hemostasis rate: 89.3%
- Embolization risk: 3.1%
- 1 year mortality: 34.2% (reflects underlying cirrhosis)

Comparative Efficacy

Network meta-analysis results [16]:

Treatment Ranking

1. Combination therapy (0.32, 95% CRL 0.21-0.47)
2. OTSC (0.41, 95% CRL 0.29-0.58)
3. Thermal (0.56, 95% CRL 0.42-0.73)

Complications

Japanese nationwide survey [17]:

- Perforation: 1.4% (thermal), 0.7% (mechanical)
- Mortality: 0.3% directly procedure-related
- Aspiration: 2.1% in emergency endoscopy

Future Directions

1. Magnetic compression anastomosis (animal trial success) [18].
2. AI-assisted bleeding detection (sensitivity 96.8% in trials) [19].
3. Biodegradable hydrogels (phase II trials ongoing) [20].

Conclusion

Upper gastrointestinal bleeding UGIB remains a critical medical emergency but advancements in endoscopic therapy have significantly improved outcomes. The evidence demonstrates that:

-Combination therapy (e.g., epinephrine injection with mechanical clips or thermal coagulation) is superior to monotherapy, offering higher initial hemostasis rates 90 to 95% and lower rebleeding risk 5–10%.

-Over the scope clips (OTSC) outperform conventional clips in high risk lesions, particularly for arterial bleeding and large ulcers.

-Hemostatic powders (TC-325) provide rapid hemostasis in diffuse bleeding but require adjunctive therapy due to high rebleeding rates (~30%).

-Variceal bleeding management has evolved, with endoscopic variceal ligation (EVL) and cyanoacrylate glue injection significantly reducing mortality in cirrhotic patients.

Despite these advances, challenges persist, including perforation risks (1–2%), rebleeding (5–15%) and cost constraints. Future directions such as AI assisted detection, biodegradable hemostatic agents and hybrid techniques promise to further refine endoscopic management

For optimal outcomes, we recommend:

- Early endoscopy (<24 hours)

with risk stratification..

- Dual-modality therapy

for high-risk stigmata.

- Post-procedural PPI infusion

for ulcer-related bleeding.

- Multidisciplinary care

in variceal hemorrhage.

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TA'LIM SIFATINI NAZORAT QILISH VA BAHOLASH

Annotatsiya: *Pedagogika tarixida dastlab o'qitish sifatini va natijalarni baholash, ta'lim jarayoni natijadorligi va ahvoli, ta'lim sifatini nazorat qilish va baholash, uning monitoringini olib borish, indikatorlarni doimiy takomillashtirish, o'qitish natijalarini nazorat qilishni ta'minlash, davlat ta'lim standartlariga ko'ra o'quvchilarning bilim, ko'nikma, malaka va kompetensiyalar baholanishi zaruriyati, o'quvchilarning o'zlashtirish darajasini baholash, ta'lim sifati monitoringining modeli.*

Tayanch so'zlar: *Ilmiy-pedagogik adabiyotlarda ta'lim sifati, ta'lim sifatini baqolashni boshqarish, baholashni nazorat etish printsiplari, ijtimoiy buyurtmalarni bajarganligi tahlili, maqsad me'yorlari sifati, xalqning boy intellektual merosi va umuminsoniy qadriyatlari.*

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MONITORING AND EVALUATING THE QUALITY OF EDUCATION

Abstract: *In the history of pedagogy, initially the issues of assessing the quality of teaching and results, the effectiveness and state of the educational process, monitoring and evaluating the quality of education, conducting its monitoring, continuous improvement of indicators, ensuring control over the results of teaching, the need to assess students' knowledge, skills, qualifications and competencies according to state educational standards, assessing the level of student mastery, a model of monitoring the quality of education*

Keywords: *Quality of education in scientific and pedagogical literature, principles of assessment and control of educational quality, analysis of the fulfillment of social orders, quality of goal standards, rich intellectual heritage of the people and universal human values.*

Ta'lim berish paydo bo'lganidan boshlab o'qitishni yangi usullarini izlab topish, o'quv-tarbiya jarayonini takomillashtirish, natijalarni qiyosiy taqqoslash va o'rganilgan bilimlarni baholash muammosi bo'yicha pedagogik izlanishlar o'rganib borilgan.

Pedagogika tarixida dastlab o'qitish sifatini va natijalarni baholash o'qituvchi va o'quvchi o'rtasidagi o'zaro ishonchga asoslangan. Sharq va uning tarkibiy kismi bo'lgan O'rta Osiyo tafakkur tarixi, umumjahon va umuminsoniyat tarixida o'ziga xos o'rin tutadi. Shu sababdan kadimgi yunon naqlarida «Nur Sharqdan» deyilgan²¹. Mazkur naqlning yuzaga kelishiga ta'lim, madaniyat va san'at dastlab Misr, Xitoy, Xindiston, Markaziy Osiyo kabi ulkalarida maydonga kelganligi dalilidir.

Nazorat topshiriqlari quyidagi printsiplar asosida baholanadi:

- tekshiriladigan ta'lim mazmuni va o'quv-tarbiya jarayonini adekvat qamrab olishi;
- imkoni boricha ko'proq tadqiqotda ishtirok etayotgan davlatlarda o'rganiladigan o'quv materiallariga Xalqaro baholash dasturi asosida topshiriqlarining muvofiqligini ta'minlash;
- nazorat topshiriqlarining o'zaro aloqasini ta'minlash;
- baholanayotgan ta'lim mazmunining matematika va tabiiy fanlarning rivojlantirishdagi ahamiyatliligi;
- tayyorlangan nazorat (test, yozma so'rovnoma,...) topshiriqlarining o'quvchilarning yoshi va psixofiziologik xususiyatlari muvofiqligi;
- keng qamrovli tadqiqotlarni amalga oshirish talablariga amal qilinishi va boshqalar kiradi.

Ta'lim sifatini nazorat qilish va baholash, uning monitoringini olib borish, indikatorlarni doimiy takomillashtirib borish bugungi kundagi eng muhim yo'nalishlardan biri sanalib, ta'lim sifatining zaruriy darajasini ta'minlash, ta'lim sifati menejmenti va kvalimetriyasining samarali metodlarini ishlab chiqishga nisbatan metodologik yondashuvni shakllantirish asosiy vazifa hisoblanadi.

Ta'lim sifati: maqsadlar me'yorlar sifati; shart-sharoitlar sifati; ta'lim jarayoni sifati; yakuniy natijalar sifati.

Ta'limda sifatni boshqarish tizimi quyidagi tamoyillarga asoslanadi:

- ta'limga bo'lgan talablarni ilmiy-texnik taraqqiyot yutuqlari va xalqaro standartlarni hisobga olgan holda anglash;
- iste'molchiga mo'ljallanib olish, mehnat bozoridagi keskin raqobat boshqarish tizimidan safarbarlik va dinamiklikni talab etadi;
- monitoring natijalarini hisobga olgan holda o'quv jarayonini doimiy takomillashtirib borish.

Ilmiy-pedagogik adabiyotlarda ta'lim sifati asosan ta'lim natijalari bilan baholanishi qayd etilib, asosiy urg'u kognitiv masalalarga beriladi. Ta'lim sifati na faqat bitiruvchilarning "chiqish" natijalari bilan, balki ta'lim jarayoni sifati, yaratilgan sharoitlar bilan ham baholanishi ta'kidlanadi.

Ta'lim sifati ta'lim jarayoni natijadorligi va ahvoli, uning jamiyat va davlat talablariga mosligini belgilovchi, shaxsning fuqarolik, maishiy va kasbiy

²¹ Turgunov S.T., Maksudova L.A. va boshk. Pedagogik jarayonlarni tashkil etish va boshqarish texnologiyalari. - Toshkent: Sano-standard. 2012, 48 b

kompetensiyalarini shakllantiruvchi va rivojlantiruvchi ijtimoiy integral kategoriya sifatida talqin etiladi.

Bugungi kunda o'quvchilarning sifatli bilim olishini va ularni umumiy o'rta ta'limning davlat ta'lim standartlariga mos holda o'qitish natijalarini nazorat qilishni ta'minlash maqsadida umumiy o'rta ta'lim muassasalarida quyidagi nazorat turlari olib boriladi:

▪ *joriy nazorat* – o'quvchilarning bilim, ko'nikma va malakalarini muntazam ravishda nazorat qilish uchun so'rovlar, nazorat ishlari yoki testlar ko'rinishida o'tkaziladi;

▪ *oraliq nazorat* – chorak yakunida o'quvchilarning bilim, ko'nikma va malakalarini baholash uchun o'quv dasturining bir qismi tugaganda amalga oshiriladi va u yozma nazorat ishi yoki testlar ko'rinishida olib boriladi;

▪ *bosqichli nazorat* – o'quv yili tugaganda og'zaki, yozma imtihon hamda test sinovlari ko'rinishida amalga oshirilib, unga asosan o'quvchining yakuniy bahosi, reytingi aniqlanadi va o'quvchini keyingi sinfga o'tkazishga qaror qilinadi;

▪ *yakuniy nazorat* – umumiy o'rta ta'lim tugaganidan so'ng yakuniy davlat attestatsiyasi shaklida o'tkaziladi va bunda o'quvchilarning:

- *bilim* — o'rganilgan ma'lumotlarni eslab qolish va qayta tushuntirib berish;
- *ko'nikma* — o'rganilgan bilimlarni tanish vaziyatlarda qo'llay olish;
- *malaka* — o'rganilgan bilim va shakllangan ko'nikmalarni notanish vaziyatlarda qo'llay olish va yangi bilimlar hosil qilish;
- *kompetensiya* — mavjud bilim, ko'nikma va malakalarni kundalik faoliyatda qo'llay olish qobiliyatlari baholanishi ta'kidlangan.

Amaldagi davlat ta'lim standartlariga ko'ra o'quvchilarimizda bilim, ko'nikma, malaka va kompetensiyalar baholanishi zarur bo'lsada, amaldagi baholash tizimi mazkur amaliyotni qo'llash imkonini bermaydi. Buning asosiy sababi o'qituvchilar tomonidan asosan o'quvchining o'zlashtirgan (yodida eslab qolgan bilimlari hajmi) darajasi yoki sinfdagi eng yaxshi o'quvchiga nisbatan baholash odat bo'lib qolgan.

Ammo, bu yerda o'qituvchining aybi yo'q, chunki amaliyotga joriy etilgan baholash tizimi, normativlar boshqacha baholash metodologiyasini qo'llash imkonini bermaydi.

Ta'lim sifati monitoringi jarayonida quyidagi ijtimoiy buyurtmalarni bajarganligi o'rganiladi, tahlil qilinadi:

▪ kadrlar tayyorlash sifatiga, ta'lim mazmuniga nisbatan qo'yiladigan talablarni, ta'lim oluvchilar tayyorgarligining zarur va yetarli darajasini hamda ta'lim muassasalarini bitiruvchilarga nisbatan qo'yiladigan malaka talablarini, o'quv yuklamasining zarur xajmini, ta'lim muassasalari faoliyatini va kadrlar tayyorlash sifatini baholash;

▪ o'quvchilarda umumiy o'rta ta'limning davlat ta'lim standarti talablari asosida umumta'lim fanlari bo'yicha bilim, ko'nikma, malaka va kompetensiyalarning shakllantirganlik darajasini hamda ularga ta'sir yetgan omillarni aniqlash;

▪ o'quv-tarbiya jarayoniga ta'limning zamonaviy ilg'or shakllarini, ilg'or

pedagogik va axborot texnologiyalarini, ma'naviy-ma'rifiy tarbiyalashning samarali shakllari va usullarini joriy yetilganligi;

- tinchlik va barqarorlikni ta'minlashga, mamlakatning taraqqiyoti va xalq farovonligini oshirishga qaratilgan milliy mustaqillik g'oyalarini o'quvchilarga singdirilishi;

- ta'lim muassasalari uchun o'quv va o'quv-metodik adabiyotlarning yangi avlod adabiyotlaridan samarali foydalanish holati;

- ta'lim muassasalarida moddiy-texnik shart-sharoitlardan samarali foydalanish holati;

- tizimli asosda pedagog kadrlarning malakasini oshirish va ularni qayta tayyorlashni tashkil etish holati;

- xalqning boy intellektual merosi va umuminsoniy qadriyatlar asosida ta'lim oluvchilarni ma'naviy-axloqiy tarbiyalashning samarali shakllari va usullarini joriy yetilganligi;

- ta'limning demokratiyalashuvi, insonparvarlashuvi va ijtimoiylashuvi, ta'lim oluvchilarning huquqiy va iqtisodiy bilimlari darajasini oshirish holati;

- ta'limga va uning pirovard natijalariga, ta'lim oluvchilarning bilimi darajasini tizimli baholash, shuningdek, ta'lim faoliyati sifati ustidan nazorat qilishga nisbatan kuyiladigan tegishli talablarni belgilovchi me'yoriy bazani amaliyotga joriy yetilganligi;

- o'quvchilarda mustaqil fikrlash, faol fuqarolik pozitsiyasiga yeta bo'lish, tashabbuskorlik, mediaresurslar va axborot-kommunikatsiya texnologiyalaridan o'z faoliyatida oqilona foydalana olishdir.

Ya'ni u ta'lim jarayonini doimiy ravishda kuzatib va to'g'irlab bormasa, mavjud bo'lmaydi. *Shuning uchun professional ta'limi sifatini boshqarishning pedagogik texnologiyalari:*

- maqsadni qo'yish;
- tayanch bilimlarni dolzarblashtirish;
- erishilgan natijalarni nazorat qilish va tahlil etish;
- o'zlashtirishni baholash vazifalarining hal etilishini o'z ichiga oladi.

Mazkur harakatlar algoritimi ta'lim muassasasini amalga oshirishda ushbu maqsad va vazifalar belgilanadi hamda ularni amalga oshirish uchun pedagogik texnologiyalar nazariyasidan foydalanish lozim. U orqali diagnostikalashning strategik vazifalari belgilanadi.

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MASHINAVIY O‘QITISHDA SUN’IY INTELLEKTNI USUL SIFATIDA QO‘LLASH

Annotatsiya: Ushbu maqolada mashinaviy o‘qitish jarayonida sun’iy intellekt (SI) texnologiyalarini samarali usul sifatida qo‘llash masalalari yoritilgan. Tadqiqotda ta’lim va amaliy sohalarda mashinaviy o‘qitish modellarini yaratishda SI algoritmlarining o‘rni, ularning afzalliklari hamda cheklovlari tahlil qilinadi. Maqolaning asosiy maqsadi — sun’iy intellektni mashinaviy o‘qitishda metod sifatida qo‘llash orqali ma’lumotlarni tahlil qilish aniqligi va qaror qabul qilish samaradorligini oshirish imkoniyatlarini ilmiy asoslashdan iborat. Tadqiqot davomida nazariy tahlil, taqqoslash va amaliy misollar asosida SI usullarining mashinaviy o‘qitish jarayoniga ta’siri o‘rganildi. Natijalar shuni ko‘rsatadiki, sun’iy intellektga asoslangan yondashuvlar katta hajmdagi ma’lumotlarni qayta ishlashda yuqori samaradorlikka ega bo‘lib, bashorat aniqligini sezilarli darajada oshiradi. Xulosa sifatida, mashinaviy o‘qitishda sun’iy intellektni usul sifatida qo‘llash raqamli transformatsiya jarayonida muhim ilmiy-amaliy ahamiyat kasb etishi ta’kidlanadi.

Kalit so‘zlar: sun’iy intellekt, mashinaviy o‘qitish, algoritmlar, ma’lumotlar tahlili, raqamli texnologiyalar.

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APPLICATION OF ARTIFICIAL INTELLIGENCE AS A METHOD IN MACHINE LEARNING

Abstract: This article discusses the issues of applying artificial intelligence (AI) technologies as an effective method in the machine learning process. The study analyzes the role of AI algorithms in developing machine learning models in educational and applied fields, as well as their advantages and limitations. The main purpose of the article is to scientifically substantiate the possibilities of improving data analysis accuracy and decision-making efficiency through the application of artificial intelligence as a method in machine learning. During the research, the impact of AI methods on the machine learning process was studied based on theoretical analysis, comparison, and practical examples. The results show that AI-based approaches demonstrate high efficiency in processing large

volumes of data and significantly increase prediction accuracy. In conclusion, it is emphasized that the application of artificial intelligence as a method in machine learning has significant scientific and practical importance in the process of digital transformation.

Keywords: *artificial intelligence, machine learning, algorithms, data analysis, digital technologies.*

Kirish

So'nggi yillarda axborot-kommunikatsiya texnologiyalarining jadal rivojlanishi natijasida sun'iy intellekt (SI) va mashinaviy o'qitish (MO') tushunchalari ilm-fan, sanoat, tibbiyot, ta'lim hamda davlat boshqaruvi sohalarida keng joriy etilmoqda. Mashinaviy o'qitish — bu kompyuter tizimlarining aniq algoritmik dasturlashtirishsiz, katta hajmdagi ma'lumotlar asosida o'rganish, qonuniyatlarni aniqlash va bashorat qilish qobiliyatidir. Sun'iy intellekt esa ushbu jarayonlarni yanada murakkab va moslashuvchan darajaga olib chiqadigan usullar va texnologiyalar majmuasidir.

1959-yilda Artur Samuel (mashinaviy o'qitishning eng birinchi mutaxassislaridan biri) mashinaviy o'qitishga shunday ta'rif bergan edi: "Mashinaviy o'qitish shunday sohaki, bunda kompyuterlar to'g'ridan-to'g'ri dasturlanmasdan o'rganish qobiliyatiga ega bo'ladi".

Albatta, bu juda keng ko'lamdagi tavsif bo'lib, Tom Mitchel ancha formal xarakterga ega bo'lgan tavsif bera oldi: "Kompyuter dasturi T vazifadan E tajribani o'rganadi, bunda dastur

effektivligi P orqali o'lchanadi, agar T vazifani yechishdagi effektivlik (ya'ni P

orqali o'lchanuvchi) E tajriba orqali oshsa".

Bugungi kunda juda ko'p dasturiy mahsulotlar sun'iy intellektdan foydalanadi. Xususan, quyida sun'iy intellektdan samarali tarzda foydalanayotgan va hayotimizda keng tarqalgan dasturiy xizmatlarning qisqacha ro'yxati keltirilgan:

- Gmail xizmati. Gmail dasturi xabarlarini kategoriyalarga bo'lishda (Asosiy, ijtimoiy va h.k.)yoki spam xabarlarini aniqlashda sun'iy intellektdan foydalanadi.

- Google xizmati. Bu qidiruvda harflarni terganingiz sari Google sizga mos keluvchi eng yaxshi tavsiyalar bera boshlaydi. Ushbu funksional ham sun'iy intellekt yordamida mukammallashtirilgan.

- Tovarlar tavsiyasi. Amazon va shunga o'xshash onlayn xarid xizmatlari sizning ta'bingizdan kelib chiqib, sizga tovarlarni tavsiya eta boshlaydi.

- Avtomobillardagi o'zini o'zi boshqarish (avtoboshqaruv) xususiyati ham sun'iy intellekt orqali amalga oshiriladi.

Katta ma'lumotlar (Big Data), bulutli hisoblash va yuqori unumli hisoblash tizimlari rivoji mashinaviy o'qitishda sun'iy intellekt usullaridan foydalanish uchun qulay shart-sharoit yaratmoqda. Ayniqsa, chuqur o'qitish (Deep Learning), konvolyutsion va rekurrent neyron tarmoqlar kabi yondashuvlar murakkab muammolarni hal etishda yuqori aniqlikni ta'minlamoqda.

O'zbekiston Respublikasida ham sun'iy intellekt va raqamli texnologiyalarni rivojlantirish davlat siyosati darajasiga ko'tarilgan. O'zbekistonlik olimlar tomonidan mashinaviy o'qitish, intellektual axborot tizimlari, ma'lumotlarni intellektual tahlil qilish masalalariga bag'ishlangan qator ilmiy tadqiqotlar olib borilmoqda. Jumladan, texnik va pedagogik yo'nalishlarda SI asosida bilimlarni baholash, prognozlash va avtomatlashtirish masalalari o'rganilgan.

Mazkur maqolaning maqsadi — mashinaviy o'qitishda sun'iy intellektni usul sifatida qo'llashning nazariy va amaliy jihatlarini, shuningdek, O'zbekistonlik olimlarning ushbu sohadagi ilmiy ishlanmalarini tahlil qilishdan iborat.

Tadqiqot metodlari

Tadqiqot jarayonida mashinaviy o'qitishda sun'iy intellektni usul sifatida qo'llash masalasini chuqur o'rganish maqsadida kompleks ilmiy metodlardan foydalanildi.

Birinchidan, nazariy tahlil metodi orqali sun'iy intellekt va mashinaviy o'qitish bo'yicha xorijiy va mahalliy ilmiy manbalar, jumladan, O'zbekistonlik olimlarning monografiyalari, dissertatsiyalari va ilmiy maqolalari tahlil qilindi. Ushbu bosqichda SI algoritmlarining rivojlanish bosqichlari va ularning amaliy qo'llanishi o'rganildi.

Ikkinchidan, taqqoslash metodi asosida an'anaviy statistik mashinaviy o'qitish algoritmlari bilan sun'iy intellektga asoslangan zamonaviy yondashuvlar solishtirildi. Xususan, O'zbekistonlik tadqiqotchilar tomonidan ishlab chiqilgan intellektual axborot tizimlari va xorijiy modellar samaradorligi qiyosiy tahlil qilindi.

Uchinchidan, model asosida tahlil metodidan foydalangan holda neyron tarmoqlar, qaror daraxtlari va chuqur o'qitish modellarining ishlash tamoyillari o'rganildi. Bu jarayonda mahalliy olimlarning ta'lim jarayonida SI modellarini joriy etish bo'yicha ishlari metodik asos sifatida foydalanildi.

To'rtinchidan, amaliy kuzatuv va tajriba metodi orqali real ma'lumotlar to'plamlarida SI algoritmlarining samaradorligi baholandi. O'zbekiston ta'lim tizimi va texnik sohalariga oid ma'lumotlar asosida olib borilgan tajribalar natijalari umumlashtirildi.

Mazkur metodlar majmuasi mashinaviy o'qitishda sun'iy intellektni usul sifatida qo'llashning ilmiy asoslangan xulosalarini shakllantirish imkonini berdi.

Natijalar.

Tadqiqot natijalari shuni ko'rsatdiki, sun'iy intellektga asoslangan mashinaviy o'qitish usullari quyidagi ustunliklarga ega:

- katta hajmdagi ma'lumotlarni tez va aniq qayta ishlash;
- murakkab bog'liqliklarni aniqlash va yashirin qonuniyatlarni topish;
- bashorat aniqligining oshishi;
- moslashuvchanlik va o'z-o'zini takomillashtirish imkoniyati.

Xususan, chuqur neyron tarmoqlar asosida qurilgan modellar tasvirni aniqlash, nutqni qayta ishlash va tibbiy diagnostika kabi sohalarda yuqori natijalarni ko'rsatdi. Taqqoslash natijalariga ko'ra, SI asosidagi modellar an'anaviy statistik usullarga nisbatan samaraliroq ekanligi aniqlandi.

Muhokama

Tadqiqot davomida olingan natijalar mashinaviy o'qitishda sun'iy intellektni usul sifatida qo'llashning yuqori ilmiy-amaliy ahamiyatga ega ekanligini ko'rsatdi. Sun'iy intellekt algoritmlarining moslashuvchanligi va o'z-o'zini o'rganish xususiyati murakkab tizimlarni modellashtirishda muhim ustunlik beradi.

O'zbekistonlik olimlarning ilmiy ishlanmalarida ham sun'iy intellekt asosida ma'lumotlarni tahlil qilish, bilimlarni avtomatik baholash va prognozlash masalalari keng yoritilgan. Xususan, ta'lim jarayonida mashinaviy o'qitish modellaridan foydalanish orqali o'quvchilarning bilim darajasini aniqlash va individual ta'lim yo'nalishlarini shakllantirish imkoniyatlari asoslab berilgan.

Shu bilan birga, mahalliy tadqiqotlarda sun'iy intellekt tizimlarini joriy etishda duch kelinayotgan muammolar, jumladan, sifatli ma'lumotlar yetishmasligi, yuqori hisoblash resurslariga ehtiyoj va mutaxassislar tayyorlash masalalari ham qayd etilgan. Bu holat mashinaviy o'qitish tizimlarini yanada takomillashtirish zarurligini ko'rsatadi.

Muhokama natijalari shuni anglatadiki, O'zbekiston sharoitida mashinaviy o'qitishda sun'iy intellektni usul sifatida qo'llash istiqbollari yuqori bo'lib, ilmiy-tadqiqot ishlari va amaliy loyihalarni integratsiyalash muhim ahamiyat kasb etadi. Kelgusida ushbu yo'nalishda olib boriladigan tadqiqotlar sun'iy intellekt tizimlarining shaffofligi, ishonchliligi va izohlanishini ta'minlashga qaratilishi lozim.

Xulosa

Xulosa qilib aytganda, mashinaviy o'qitishda sun'iy intellektni usul sifatida qo'llash zamonaviy raqamli jamiyatning muhim talabi hisoblanadi. Tadqiqot natijalari SI asosidagi yondashuvlar ma'lumotlarni tahlil qilish va qaror qabul qilish jarayonlarida yuqori samaradorlikni ta'minlashini ko'rsatdi.

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MAKTABGACHA TA'LIM TASHKILOTIDA TARBIYALANAYOTGAN BOLALARNING AQLIY RIVOJLANISHINI ANIQLASH VA MUSTAHKAMLASH

***Annotatsiya:** Ushbu maqolada maktabgacha yoshdagi bolalarning aqliy rivojlanish jarayoni, uning pedagogik va psixologik asoslari, bilish jarayonlarining (sezgi, idrok, tafakkur, xotira, xayol) rivojlanish xususiyatlari, shuningdek bolalarni maktab ta'limiga aqliy va psixologik jihatdan tayyorlash masalalari keng yoritilgan. Maktabgacha ta'lim muassasalari va oila hamkorligining ahamiyati, aqliy tarbiyaning vazifalari va uni amalga oshirish yo'llari ilmiy-nazariy jihatdan tahlil qilingan.*

***Kalit so'zlar:** aql, bilish jarayonlari, sezgi, idrok, tafakkur, xotira, xayol, aqliy tarbiya, maktabga tayyorgarlik, maktabgacha ta'lim.*

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DETERMINATION AND STRENGTHENING OF THE MENTAL DEVELOPMENT OF CHILDREN EDUCATED IN A PRESCHOOL EDUCATIONAL ORGANIZATION

***Annotation:** This article examines the process of intellectual development of preschool children and the pedagogical and psychological foundations for identifying and strengthening it. The study highlights the role of cognitive processes such as sensation, perception, thinking, memory, and imagination in the mental development of children. Special attention is paid to the importance of intellectual education in preparing preschool children for school, as well as to the formation of independent thinking, learning motivation, and social readiness.*

The article also analyzes the significance of preschool educational institutions and family cooperation in supporting children's intellectual growth. Various educational activities, including play, creative work, and guided learning, are considered as effective means of enhancing children's cognitive abilities. The findings emphasize that systematic and purposeful intellectual education during the preschool period plays a crucial role in ensuring successful adaptation to school education and the overall development of a well-rounded personality.

***Keywords:** intellect, cognitive processes, sensation, perception, thinking, memory, imagination, intellectual development, preschool education, school readiness.*

Yosh avlodni har tomonlama yetuk, mustaqil fikrlovchi, intellektual salohiyatga ega shaxs sifatida tarbiyalash bugungi jamiyatning muhim ijtimoiy

ehtiyojlaridan biridir. Ayniqsa, globallashuv sharoitida bilimli, tafakkuri rivojlangan, ijodkor shaxslarni voyaga yetkazish masalasi dolzarb ahamiyat kasb etmoqda. Bu jarayonning poydevori esa maktabgacha ta'lim davrida qo'yiladi.

O'zbekiston Respublikasining "Maktabgacha ta'lim va tarbiya to'g'risida"gi Qonunida maktabgacha ta'lim bolalarni intellektual, ma'naviy-axloqiy, estetik va jismoniy jihatdan rivojlantirishga qaratilgan uzluksiz ta'lim turi sifatida belgilangan. Shu bois, maktabgacha yoshdagi bolalarning aqliy rivojlanishini aniqlash va uni mustahkamlash masalasi pedagogika va psixologiya fanlarining muhim tadqiqot obyektiga aylangan.

Aqliy tarbiya tushunchasi va uning ahamiyati. Aqliy tarbiya — bu bolalarning bilish faoliyatini rivojlantirish, ularni atrof-muhitni anglashga, bilimlarni o'zlashtirishga, mustaqil fikrlashga yo'naltirilgan maqsadli pedagogik ta'sirdir. Aql tushunchasi keng ma'noda sezgi va idrokdan tortib, tafakkur va xayolgacha bo'lgan bilish jarayonlarining majmuasini o'z ichiga oladi.

Sharq mutafakkirlari ta'lim va tarbiya masalasiga alohida e'tibor qaratganlar. Abu Nasr Forobiy "Fozil shahar ahlining qarashlari" asarida tarbiya orqali insonda shakllanadigan fazilatlarini tahlil qilgan. Abdulla Avloniy esa pedagogikani "bola tarbiyasining fani" deb ta'riflab, ta'lim va tarbiyaning uzviy bog'liqligini ta'kidlagan. Uning fikricha, tarbiya yoshlikdan berilmasa, kutilgan natijaga erishish qiyin bo'ladi.

Maktabgacha yoshda aqliy rivojlanishning psixologik asoslari. Maktabgacha yosh davri bolaning psixik rivojlanishida eng muhim bosqichlardan biridir. Aynan shu davrda bolaning bilish jarayonlari jadal rivojlanadi. Bola atrof-muhitni sezgi organlari orqali bilishni boshlaydi. Sezgi — bu tashqi olamdagi buyum va hodisalarning alohida xususiyatlarini aks ettiruvchi dastlabki bilish jarayonidir.

Idrok sezgilar asosida shakllanib, bolaning buyumni yaxlit holda anglashiga imkon beradi. Masalan, bola olmani nafaqat ko'radi, balki ushlab ko'radi, hidlaydi va ta'mini his qiladi. Natijada buyum haqida to'liq tasavvur hosil bo'ladi. Bu jarayonda ko'rish, eshitish, hid bilish, ta'm bilish analizatorlari birgalikda faoliyat yuritadi.

Xotira maktabgacha yoshdagi bolalarning aqliy rivojlanishida muhim o'rin tutadi. Bu yoshda xotira asosan beixtiyor xarakterga ega bo'lib, bola qiziqarli va emotsional jihatdan ta'sirchan ma'lumotlarni oson eslab qoladi. Shu bilan birga, 5–6 yoshdan boshlab ixtiyoriy xotira elementlari ham shakllana boshlaydi.

Xayol esa bolaning ijodiy faoliyati, syujetli-rolli o'yinlari, ertak va hikoyalarni idrok etish jarayonida rivojlanadi. Xayol bolaning kelajakdagi ijodiy tafakkuri va muammoli vaziyatlarda mustaqil yechim topish qobiliyatiga zamin yaratadi.

Maktabgacha ta'lim tashkilotlarida aqliy tarbiyani amalga oshirish. Maktabgacha ta'lim tashkilotlarida aqliy tarbiya bolalarning yosh va individual xususiyatlarini hisobga olgan holda tashkil etiladi. O'yin, ta'limiy mashg'ulotlar, mehnat faoliyati, rasm chizish, qurish-yasash kabi faoliyat turlari bolaning tafakkuri va nutqini rivojlantirishga xizmat qiladi.

Aqliy tarbiyaning asosiy vazifalari quyidagilardan iborat:

1. Bolalarda tabiat va jamiyat haqidagi bilimlar tizimini shakllantirish.
2. Bilish jarayonlari va aqliy qobiliyatlarni rivojlantirish.
3. Mustaqil fikrlash va aqliy mehnat madaniyatini tarbiyalash.
4. Bilim, ko'nikma va malakalarni shakllantirish va mustahkamlash.

Ta'lim jarayonida bolalarda kuzatuvchanlik, qiziquvchanlik, sinchkovlik va tanqidiy fikrlash kabi sifatlar rivojlanadi. Bu sifatlar keyinchalik maktab ta'limida muvaffaqiyatli o'qish uchun muhim omil hisoblanadi.

Bolalarni maktab ta'limiga aqliy va psixologik tayyorlash.

Bolaning maktabga tayyorligi faqatgina bilim hajmi bilan emas, balki uning shaxsiy va ijtimoiy rivojlanganlik darajasi bilan belgilanadi. Psixologik tayyorgarlik bolaning diqqatining barqarorligi, xotirasining rivojlanganligi, tafakkurining moslashuvchanligi va nutqining ravonligi bilan ifodalanadi.

5–7 yoshli bolalarda maktabga bo'lgan qiziqish kuchayadi. Ular o'zlarini “o'quvchi” sifatida tasavvur qila boshlaydilar. O'yin faoliyati orqali esa irodaviy sifatlar, mas'uliyat, jamoada ishlash ko'nikmalari shakllanadi. K.D.Ushinskiy ta'kidlaganidek, bolaning maktabga tayyorligi uning alohida psixik jarayonlari emas, balki shaxsining umumiy rivojlanish darajasi bilan belgilanadi.

Oila va maktabgacha ta'lim tashkiloti hamkorligi. Bolalarning aqliy rivojlanishini ta'minlashda oila va maktabgacha ta'lim tashkiloti hamkorligi muhim ahamiyatga ega. Ota-onalar bolaning qiziqishlarini qo'llab-quvvatlashi, kitob o'qishga, savol berishga undashi lozim. Tarbiyachi va ota-ona o'rtasidagi hamkorlik bolani maktab ta'limiga muvaffaqiyatli tayyorlashga xizmat qiladi.

Xulosa. Xulosa qilib aytganda, maktabgacha ta'lim tashkilotida bolalarning aqliy rivojlanishini aniqlash va mustahkamlash ularni maktab ta'limiga tayyorlashning muhim sharti hisoblanadi. Aqliy tarbiya tizimli, izchil va maqsadga yo'naltirilgan tarzda tashkil etilgandagina bolaning bilish qobiliyatlari, tafakkuri, nutqi va shaxsiy sifatleri har tomonlama rivojlanadi. Bu jarayonda tarbiyachi, ota-ona va jamiyatning o'zaro hamkorligi hal qiluvchi ahamiyat kasb etadi.

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YASSI IGNADONLI MASHINALARDA TORTISH MEXANIZMINI TAKOMILLASHGAN KONSTRUKSIYASINI ISHLAB CHIQISH

***Annotatsiya.** Ushbu maqolada paltobop trikotaj to'qimalarini ishlab chiqarish jarayonida namunalar qalinligini ortishi natijasida tortish sifatiga ta'sir ko'rsatishi va halqalar notekis shakllanishi kabi muammolarning asosiy sabablari aniqlandi.*

***Kalit so'zlar:** To'qima, trikotaj, mato, tortish kuchi, rolik. trikotaj mashinasi, hisob sxema.*

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DEVELOPMENT OF AN IMPROVED DESIGN OF THE TRACTION MECHANISM OF FLAT-BED MACHINES

***Abstract.** In this article, the main causes of problems in the production of coat knitted fabrics were identified, such as the influence of an increase in the thickness of the samples on the quality of stretching and the uneven formation of loops.*

***Keywords:** Fabric, knitwear, fabric, tension, roller. knitwear machine, calculation scheme.*

Trikotaj ishlab chiqarish sohasi kundan kunga rivojlanib bormoqda. Bunga ko'ra trikotaj mashinalari bozori xam yildan yilga zamonaviy xamda yuqori

samaradorlik beruvchi uskunalar bilan boyimoqda. Olib borilgan ilmiy ishda tanlangan trikotaj to'quv mashinasi etib Germaniyaning Stoll firmasining CMS 502 Hp Plus Multi Gauge 7 va 12 klass mashinalari tanlab olindi.

Hozirgi kundagi eng sunggi texnologiyalar qo'llanilgan trikotaj mashinasining qo'yidagi texnik ko'rsatkichlarga ega :

1-jadval.

Yassi ignadonli Stoll CMS 502 Hp Plus Multi Gauge trikotaj mashinasining texnik ko'rsatkichlari

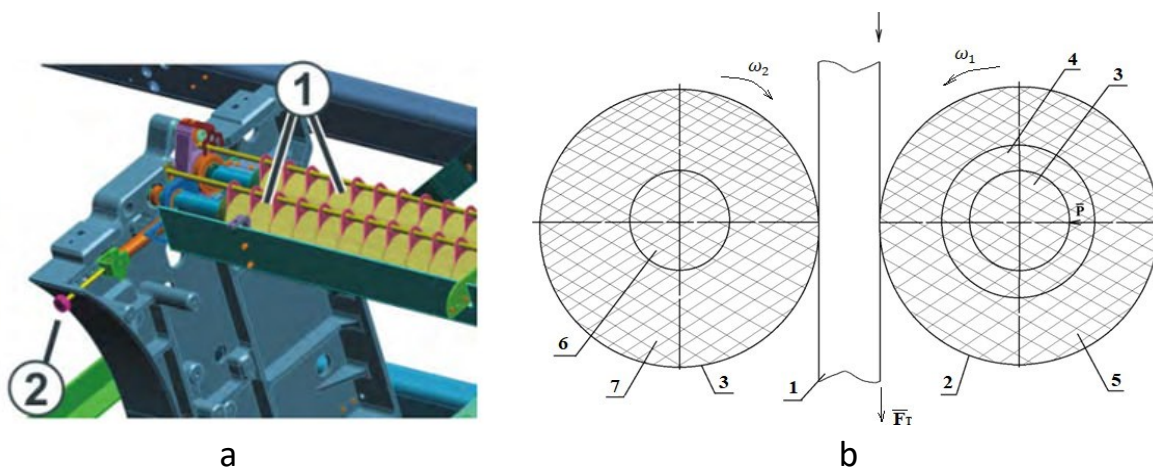
№	Modeli	E5.2	E7.2
1	Klassi	7	12
2	Sistemalar soni	2	2
3	Ignalar soni	628	1258
4	To'quv chegarasi o'lchami	1150 mm	1150 mm
5	Ip uzatuvchilar soni	8	8
6	To'quv karetkasi tezligi	1,2 m/s	1,2 m/s
7	Tortish mexanizmi	avtomatik	Avtomatik
8	O'lchamlari	2370x909x2050	2370x909x2050

Malumki, [1;13-66 b., 2-4] trikotaj matosini tortish mexanizmi asosiy ishchi a'zolari ikki o'zaro qarama-qarshi tomonga aylanuvchi roliklardan iborat bo'lib, ular orasidan o'tgan trikotaj matosi tortiladi. Bunda birinchi rolik yetaklovchi bo'lib, ma'lum bosimda matoga ta'sir qiladi. Roliklar qoplamasi o'zak val va unga qoplangan rezinali vtulkadan tashkil topgan. Mavjud tortish uskunasi asosiy kamchiligi tortilayotgan trikotajni qalinligi va zichligini o'zgarishi hisobiga roliklar bilan trikotaj orasidagi ishqalanish kuchiga ta'sir etadi, natijada trikotaj matosida notekisliklar yuzaga keladi (1-rasm).



1-rasm. Trikotaj matosini ishlab chiqarishda tortish jarayonida yuzaga kelgan nuqsonlar ko'rinishi.

Olib borilgan izlanishlar orqali trikotajni bir me'yorda tortilishini ta'minlovchi tortish mexanizmini konstruksiyasi va ko'rsatkichlari ishlab chiqildi (2-rasm).



2-rasm. Mavjud (a) va tavsiya qilingan (b) tortish mexanizmini konstruktiv sxemasi

Tortish mexanizmi tuzilishi - trikotaj matosi 1, ikki o'zaro qarama-qarshi yunalishda aylanuvchi 2 va 3 roliklardan iborat. Bunda rolik 2 yetakchi bo'lib aylanma xarakatni yuritgichdan, mato esa, rolik bilan o'zaro ishqalanish xisobiga harakatni oladi. Rolik 2 trikotaj 1 va rolik 3 ga tashqi $\bar{P}$ kuchi ta'sir etadi. Natijada materialni tortish kuchi $\bar{F}_T$ xosil bo'ladi. Uning qiymati roliklar 2 va 3 lar trikotaj orasidagi ishqalanish kuchlariga bog'liqdir. Rolik 2 tarkibli bo'lib, val 3 ga o'rnatilgan, 4 va 5 ga rezinali vtulkalardan iborat bo'lsa, rolik 3 tarkibiga o'q 6 va uning sirtiga o'rnatilgan 7 rezinkali vtulkadan iborat. Mexanizm ishlash jarayonida yuritgichdan aylanma xarakat rolik 2 ga uzatiladi. Rolik 2 ni $\bar{P}$ bosim kuchi natijasida trikotaj 1 va rolik 3 orasida ishqalanish kuchi xosil bo'lib, rolik 3 xam teskari tomonga aylanadi va bunda trikotaj 1 pastga tortiladi. Trikotajni bir tekisda tortilishini taminlash uchun $\omega_1 = \omega_2$ bo'lishi kerak bo'ladi. Lekin unda $\omega_1 > \omega_2$ bo'lib, ularning farqi ishqalanish kuchlarini farqiga bog'liq bo'ladi. Rolik 2 bilan trikotaj orasidagi ishqalanish kuchi rolik 3 bilan trikotaj orasidagi ishqalanish kuchidan katta bo'ladi. Ularni tenglashtirish maqsadida rolik 3 ning 7 rezinkali vtulkasi bikrligi, rolik 2 ning ichki rezinali vtulkasi 4 bikrligi bilan bir xil olingan, lekin rezinali vtulka 5 bikrligi kattaroq qilib tanlangan[5-6]. Bunda rezinali vtulka 4 bilan trikotaj 1 orasidagi bog'lanish yuzasi kichik bo'lib, rezinali vtulka 7 bilan trikotaj 1 orasidagi bog'lanish yuzasi kattaroq bo'ladi. Natijada rolik 2 va 3 lar bilan tortilayotgan trikotaj 1 orasidagi ishqalanish kuchlari o'zaro tenglashadi. Bu o'z navbatida trikotajni bir xil tortilishini taminlaydi.

Paltobop trikotaj to'qimalarini ishlab chiqarish jarayonida namunalar qalinligini ortishi natijasida tortish sifatiga ta'sir ko'rsatishi va halqalar notekis shakllanishi kabi muammolarning asosiy sabablari aniqlandi.

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LASTIK TO'QIMASI ASOSIDA OLINGAN YANGI TUZILISHDAGI PALTOBOP TRIKOTAJ TO'QIMALARINING SIFAT KO'RSATKICHLARINI KOMPLEKS BAHOLASH

***Annotatsiya.** Ushbu maqolada mashina klassi va ipning chiziqli zichligini paltobop lastik trikotaj to'qimalarining fizik-mexanik xususiyatlariga ta'siri natijasida yangi tuzilishli paltobop lastik trikotaj to'qimalarining sifat ko'rsatkichlarini yaxshilashga erishildi. Texnologik ko'rsatkichlari bo'yicha I va II variantlarning qiymatlari eng yaxshi natijalarni qayd etgan bo'lsa, fizik-mexanik ko'rsatkichlari bo'yicha esa, aksincha III va IV variantlarning qiymatlari yuqoriligi tahlillar natijasida ma'lum bo'ldi.*

***Kalit so'zlar:** To'qima, trikotaj, lastik, kompleks baholash, fizik-mexanik, mashina klassi, chiziqli zichlik.*

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COMPREHENSIVE ASSESSMENT OF THE QUALITY INDICATORS OF NEW STRUCTURED COAT KNITTED WORKS OBTAINED ON THE BASIS OF LASTIC WEAVING

***Abstract.** In this article, as a result of the influence of the machine class and linear density of yarn on the physical and mechanical properties of coat elastic knitted fabrics, an improvement in the quality indicators of coat elastic knitted fabrics with a new structure was achieved. In terms of technological indicators, the values of variants I and II showed the best results, while in terms of physical and*

mechanical indicators, on the contrary, the values of variants III and IV were higher.

Keywords: *Weaving, knitwear, elastic, complex evaluation, physical-mechanical, machine class, linear density.*

Mashina klassi va ipning chiziqli zichligi o'zgarishini paltobop lastik trikotaj to'qimalarining texnologik ko'rsatkichlari va fizik-mexanik xususiyatlariga ta'sirini tadqiq etish maqsadida, STOLL CMS 502 Hp Plus Multi Gauge rusumli 12 klass yassi ikki ignadonli trikotaj to'quv mashinalaridan foydalanib, paltobop trikotaj to'qimalarining navbatdagi 4 ta varianti to'qib olindi. Ushbu variantlarni ishlab chiqarishda trikotaj mashinasining klassidan kelib chiqib, hom ashyo turi sifatida chiziqli zichligi 56tex poliakrilonitril ipidan foydalanildi [1-2].

Tadqiqotlar davomida mashina klassi va ipning chiziqli zichligi o'zgarishini paltobop lastik trikotaj to'qimalarining texnologik ko'rsatkichlari va fizik-mexanik xususiyatlariga ta'siri tadqiq etildi. Shu maqsadda tadqiqotlar davomida yangi tuzilishli paltobop lastik trikotaj to'qimalarining texnologik ko'rsatkichlari "KOR-UZ" texnoparki sinov laboratoriyasida mavjud asbob-uskunalarda aniqlandi va olingan natijalar jadvali dissertatsiyaning asosiy qismida keltirildi.

Mashina klassi va ipning chiziqli zichligi o'zgarishini paltobop lastik trikotaj to'qimalarining texnologik ko'rsatkichlariga ta'siri natijasida hom ashyo sarfi 17,5% dan 24,9% gacha kamayganligi ma'lum bo'ldi.

Natijada, yangi tuzilishli paltobop lastik trikotaj to'qimalarini olish texnologiyasini ishlab chiqish orqali texnologik ko'rsatkichlarini yaxshilash va assortiment turlarini kengaytirishga erishildi.

Tadqiqotlar davomida mashina klassi va ipning chiziqli zichligi o'zgarishini yangi tuzilishli paltobop lastik trikotaj to'qimalarining fizik-mexanik xususiyatlariga ta'siri tadqiq etildi.

Paltobop trikotaj to'qimalarining fizik-mexanik xususiyatlari "KOR-UZ" texnoparki sinov laboratoriyasida aniqlandi va olingan natijalar jadvali dissertatsiyaning asosiy qismida keltirildi.

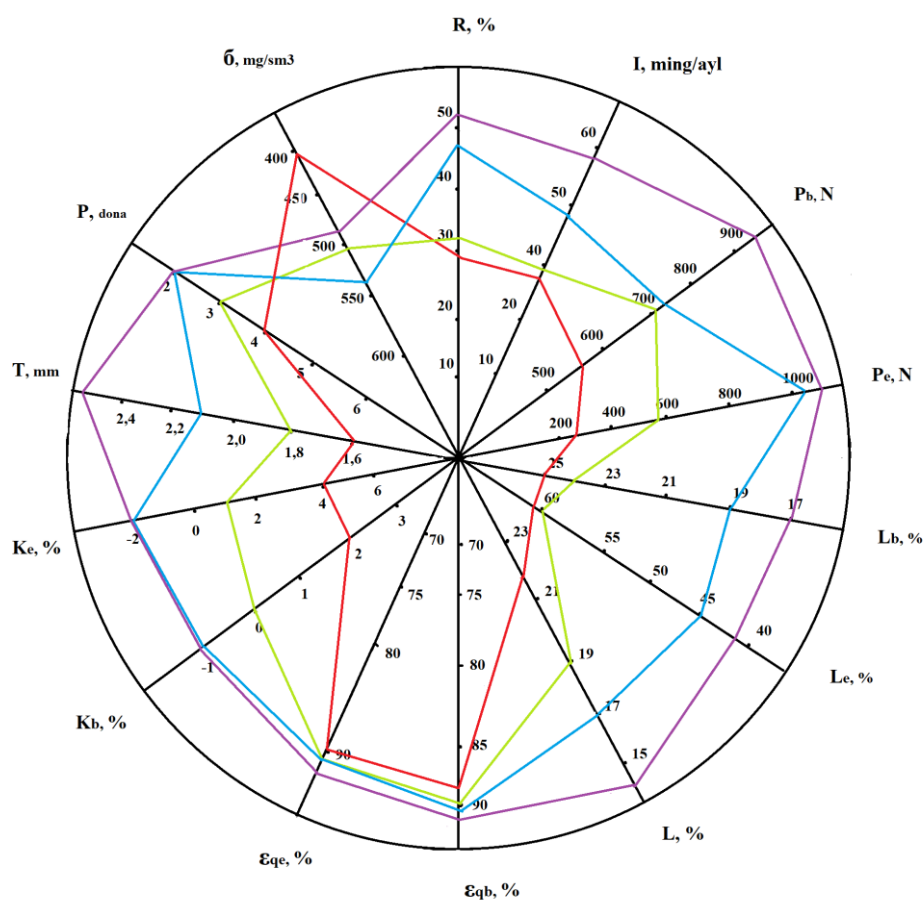
Mashina klassi va ipning chiziqli zichligi o'zgarishini paltobop lastik trikotaj to'qimalarining fizik-mexanik xususiyatlariga ta'sirini tadqiq etib, xulosa qilish mumkinki, trikotajni bo'yi va eni bo'yicha mustaxkamliklari 1,69 barobardan 4,1 barobarga, issiqlik o'tishiga ko'rsatiladigan qarshiligi 1,7 barobarga, ishqalanishga chidamlilik ko'rsatkichini 1,62 barobarga, deformatsiya ko'rsatkichlarini 1,4 barobardan 1,7 barobarga yaxshilanib yuqoriligi, havo o'tkazuvchanligi 1,3 barobarga, uzilishdagi uzayishi 1,47 barobardan 1,5 barobarga, kirishuvchanligi 0,5 barobardan 4 barobarga, pillinganishi 2 barobarga yaxshilanib, kamayganligi ma'lum bo'ldi. Bu esa, paltobop lastik trikotaj to'qimalarini 12 klass trikotaj mashinalarida olish texnologiyasini ishlab chiqilishi, namunalarni tuzilishi va rapportida qatorlar sonini qo'shilishi bilan asoslanadi [3-4].

Mashina klassi va ipning chiziqli zichligini paltobop lastik trikotaj to'qimalarining fizik-mexanik xususiyatlariga ta'siri natijasida yangi tuzilishli

paltobop lastik trikotaj to'qimalarining sifat ko'rsatkichlarini yaxshilashga erishildi [5].

Texnologik ko'rsatkichlari bo'yicha I va II variantlarning qiymatlari eng yaxshi natijalarni qayd etgan bo'lsa, fizik-mexanik ko'rsatkichlari bo'yicha esa, aksincha III va IV variantlarning qiymatlari yuqoriligi tahlillar natijasida ma'lum bo'ldi.

Bunda holatda namunalar orasidan eng yaxshi bo'lgan variantlarni aniqlashda sifat ko'rsatkichlarini kompleks baxolash usulidan foydalanish bir qator olimlar tomonidan taklif etilgan. Ushbu tadqiqot ishida ham paltobop trikotaj to'qima namunalari ichidan eng yaxshi variantlarni aniqlashda kompleks baholash usulidan foydalanildi (1-2-rasmlar).



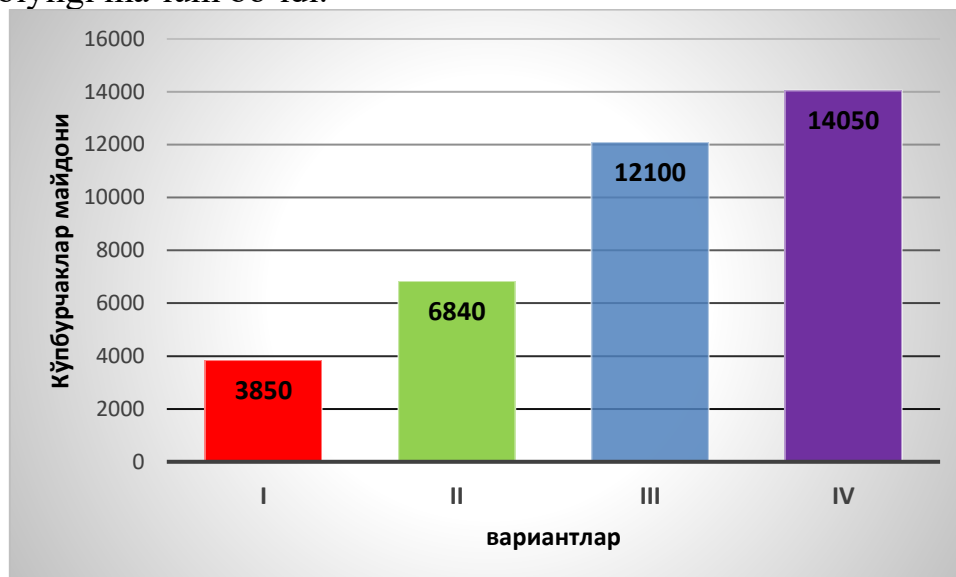
I	—————	IV	—————
II	—————	V	—————

1-Rasm. Lastik to'qimasi asosida olingan yangi tuzilishdagi paltobop trikotaj to'qimalarining sifat ko'rsatkichlarini kompleks baholash diagrammasi

Quyida kompleks baholash natijalarini aks ettiruvchi gistogramma keltirilgan (2-rasm).

Paltobop trikotaj to'qima namunalarini sifat ko'rsatkichlarini kompleks baholash diagrammasi va qiyosiy taqqoslash gistogrammalari tahlil qilindi. Unga

ko'ra 56 tex chiziqli zichlikka ega bo'lgan poliakrilonitril hom ashyosidan olingan namunalarning baholash ko'rsatkichlari 3850 mm² dan 14050 mm² gacha oraliqda o'zgardi. Eng katta ko'rsatkich IV-variantda 14050 mm², eng kichik ko'rsatkich esa I variantda qayd etilib 3850mm² ni tashkil qildi. Natijada I variantga nisbatan IV variantning kompleks baholashdagi yuzasi sifat chegarasiga 72,6% ga yaqinligi, ya'ni ijobiyliги ma'lum bo'ldi.



2-Rasm. Lastik to'qimasi asosida olingan yangi tuzilishdagi paltobop trikotaj to'qimalarining sifat ko'rsatkichlarini qiyosiy taqqoslash gistogrammasi.

Shu bilan birga, II va III variantlarning ham birinchi variant to'qimasiga nisbatan yuzalari sifat chegarasiga mos ravishda II-variantda 43,7%ga, III-variantda esa, 68,2% ga yaqinligi va sifat ko'rsatkichlari yuqori ekanligi aniqlandi.

Eng yaxshi variant sifatida barcha sifat ko'rsatkichlari talablarga javob bergan III, IV variantlar ekanligi aniqlandi va ishlab chiqarishga tavsiya etildi. Ushbu variantlarni ishlab chiqarishga tavsiya etish orqali shakl saqlash xususiyati va xomashyo sarfi kam bo'lgan yangi tuzilishli paltobop lastik trikotaj to'qimalarini ishlab chiqarish va assortiment turlarini kengshaytirish mumkinligi aniqlandi. Ushbu yangi tuzilishli trikotaj namunasi ayollar uchun paltobop mahsulot ishlab chiqarishga tavsiya etildi.

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YASSI IGNADONLI TRIKOTAJ MASHINASINI TORTISH MEXANIZMI SIQUVCHI ROLIGINI TEBRANISHLARINI TAXLILI

Annotatsiya. Ushbu maqolada Tortuvchi rolikning matematik modeli va hisoblash sxemasi tuzilib, olingan natijalar asosida tortuvchi rolik tebranish qamrovini o'zgarishi qonuniyatlari aniqlandi.

Kalit so'zlar: To'qima, trikotaj, mato, tortish kuchi, tebranish, rolik. trikotaj mashinasi, hisob sxema, qonuniyat.

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ANALYSIS OF THE OSCILLATIONS OF THE COMPRESSIVE ROLL OF THE PULLING MECHANISM OF THE FLAT KNITTING MACHINE

Abstract. In this article, a mathematical model and calculation scheme of the traction roller were compiled, and based on the obtained results, the regularities of changes in the vibration coverage of the traction roller were determined.

Keywords: Fabric, knitwear, fabric, tension, vibration, roller, knitting machine, calculation scheme, regularity

Tavsiya etilgan tortish mexanizmida roliklar sirtidagi rezinali vtulkalarni bikrlilik koeffitsientlari tortuvchi rolik va trikotaj matosi orasidagi ishqalanish

kuchlarini teng bo'lishini hamda trikotaj matosini bir me'yorda tortilishini hisobga olib bir xil olinmagan. Shuning uchun yetaklanuvchi rolik rezinali vtulkasi bikrliklarini aniqlash muhim hisoblanadi. Buning uchun tortish zonasida bikrlik kuchlarini o'zaro ta'sir kuchi hisob sxemasi ishlab chiqildi.

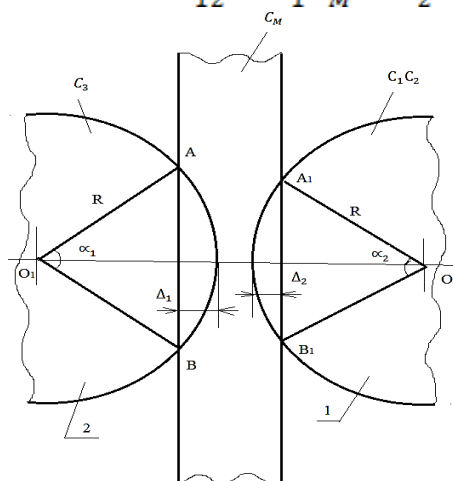
Keltirilgan sxemani olsak yetaklovchi yetaklovchi rolik 1 ning rezinkali vtulkalari bikrlik koeffitsientlari $C_1 C_2 C_M$ xamda trikotaj matosi bikrligi o'zaro tasirlari keltirilgan bikrlik koeffitsienti quyidagi ifoda orqali aniqlanadi:

Ular ketma-ket joylashgani uchun [1-2]: 1-rasmda tortish zonasidagi bikrlik kuchlarini o'zaro ta'sir kuchi hisob sxemasi keltirilgan.

$$\frac{1}{C_{\Pi}'} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_M}$$

(1)

$$C_{\Pi}' = \frac{C_1 * C_2 * C_3}{C_{12} + C_1 C_M + C_2 C_M}$$



1-rasm. Tortish zonasidagi bikrlik kuchlarini o'zaro ta'sir kuchi hisob sxemasi

Bu yerda, $C_1 C_2 C_M$ - yetaklovchi rolik 1 ning rezinali vtulkalari va tortilayotgan material bikrlik koeffitsientlari. Mos ravishda yetaklanuvchi rolik 2 rezinali vtulkasi va trikotaj bikrlik koeffitsientlari keltirilgan qiymati [3-4]

$$\frac{1}{C_{\Pi}''} = \frac{1}{C_3} + \frac{1}{C_M}; \quad C_{\Pi}'' = \frac{C_3 C_M}{C_3 + C_M}$$

Bu yerda C_3 - yetaklovchi rolik rezinali vtulkasi bikrlik koeffitsienti.

$$P_1 = C_{\Pi}'' * \Delta_1; \quad P_2 = C_{\Pi}' * \Delta_2$$

Takidlash lozimki rezinkali vtulkalarini tortilayotgan trikotaj matosi bilan o'zaro deformatsiyalanishida 1-rasmdagi sxemaga asosan bikrlik kuchlari:

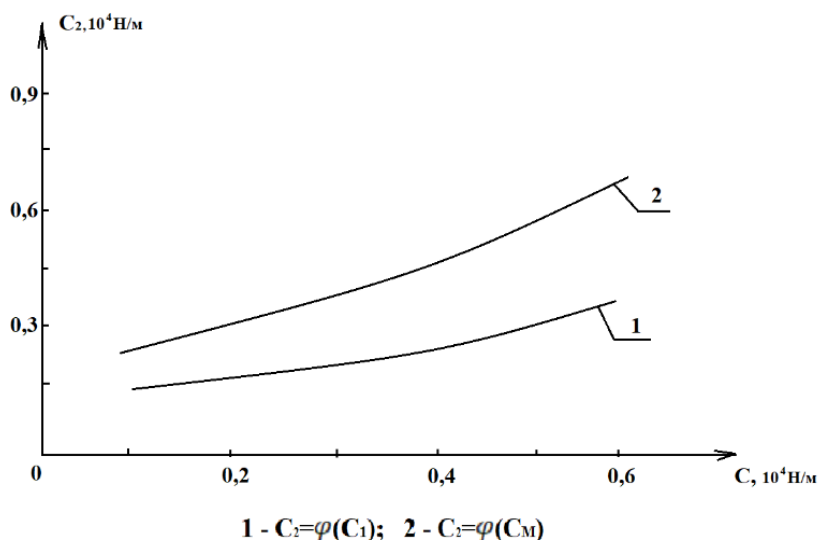
Bu yerda, Δ_1, Δ_2 - material deformatsiyalari. Xisob sxemasida $\Delta O_1 A B$ va $\Delta O_2 A_1 B_1$ lardan: $\Delta_1 = R(1 - \cos \alpha_1)$; $\Delta_2 = R(1 - \cos \alpha_2)$

Mos ravishda ikkala roliklar rezinali vtulkalari va totiluvchi materialning bikrlik kuchlari muvozanat nuqtasidan $P_1 = P_2$ va $C_1 > C_2$, $C_2 = C_3$ bikrligini inobatga olib roliklar bikrliklarini xisoblash formulasi hosil qilindi:

$$C_2 = \frac{C_M C_1 (\cos \frac{\alpha_1}{2} + \frac{\alpha_2}{2})}{C_M (1 - \cos \frac{\alpha_2}{2}) - C_1 [(1 - \cos \frac{\alpha_1}{2}) - (\cos \frac{\alpha_2}{2})]} \quad (2)$$

Masalani sonli yechimi parametrlarining quyidagi boshlang'ich qiymatlarida amalga oshirildi: $R=5 \cdot 10^{-2} \text{ M}$, $\Delta=(1,5 \div 5,5) \cdot 10^{-3} \text{ M}$; $P=(15 \div 20) \text{ N}$; $C_1=(0,28 \div 0,32) \cdot 10^4 \text{ N/m}$; $C_2=(0,22 \div 0,25) \cdot 10^4 \text{ N/m}$; $C_2 = C_3$; $C_M=(0,85 \div 1,37) \cdot 10^4 \text{ H/M}$; $\alpha=(0,05 \div 0,15)$.

Masalani yechimi asosida parametrlarining o'zaro bog'lanish grafiklari qurildi. Jumladan 2-rasmda yetaklanuvchi va yetaklovchi rolik rezinali vtulkasi va materialni bikrlilik ko'effitsientlari bog'liqlik grafiklari keltirildi. Bunda C_1 qiymatlari $0,05 \cdot 10^4 \text{ N/m}$ dan $5,5 \cdot 10^4 \text{ N/m}$ gacha ko'payganida yetaklanuvchi rolik rezinali vtulka bikrlilik ko'effitsienti $0,015 \cdot 10^4 \text{ N/m}$ dan $0,29 \cdot 10^4 \text{ N/m}$ gacha bog'lanishda ortib borishini ko'rish mumkin.



2-rasm. Tortuvchi rolik rezinali vtulkasi bikrlilik ko'effitsientlari va materialni bikrliligiga bog'liqlik grafigi.

Mos ravishda trikotaj matosi bikrlilik ko'effitsienti qiymatlari ortganda yetaklanuvchi rolik rezinali vtulkali bikrlilik ko'effitsienti qiymatlari $0,28 \cdot 10^4 \text{ N/m}$ dan $0,59 \cdot 10^4 \text{ N/m}$ gacha qonuniyatida ortib bordi. C_3 ning qiymatlarini kamaytirish orqali yetaklanuvchi rolik rezinali vtulkasini deformatsiyalanishidan trikotaj mato bilan qamrovi kamayadi. Bunda ishqalanish kuchi ortib, matoni tortishi meyorlashadi. Shuning uchun tavsiya qiymatlari: $C_1=(0,32 \div 0,34) \cdot 10^4 \text{ N/m}$; $C_2 = C_3=(0,2 \div 0,24) \cdot 10^4 \text{ N/m}$ bikrligi maqsadga muvofiqdir.

Materialni bir tekisda tortishni taminlash uchun ushbu ishqalanish kuchlari o'zaro teng bo'lishi maqsadga muvofiqdir. Bunda ta'sir qiluvchi kuchlar: P -bosim kuchi, F_1, F_2 -rezinali vtulkalar qayishqoqligini tiklovchi kuchlar, F_{MK} -markazdan qochma kuch, $m_1 g, m_2 g, m_y g$ - rezinali vtulkalar va siquvchi rolik o'qini og'irlik kuchlari, F_{M1} - materialni deformatsiyalanishidan tiklovchi kuch. $F_{иш1}$ -siquvchi

zonadagi material bilan rolik orasidagi ishqalanish kuchi. Ushbu kuchlarni muvozanat shartiga asosan [115;186-195b.,116;257-262b.] ularga qo'llaniladi:

$$F_1 + F_2 - P - F_{M1} + F_{MQ1} = N_1$$

$$F_{Ish1} - (m_1 + m_2 + m_{y1})g = \varphi N_1 \dots\dots\dots (3)$$

Mos ravishda ikkinchi rolik bilan materialni o'zaro tasir kuchlari muvozanat sharti [117,118;30-34 b.]:

$$F_{M2} - F_3 - F_{M2} = N_2;$$

$$F_{Ish2} - (m_3 + m_{y2})g = \varphi N_2 \dots\dots\dots (4)$$

bu yerda, m_1, m_2, m_3 - rezinkali vtulkalar massasi. m_{y1}, m_{y2} - rezinkalar o'qlari massasi, φ - ishqalanish koeffitsienti, N_1, N_2 -mos reaksiya kuchlari. Anton-Kulan shartini qo'llab, ishqalanish kuchlarini aniqlash uchun ifoda olindi:

$$F_{Ish1} = (m_1 + m_2 + m_{y1})g + \varphi(P + m_{K1} * \omega^2 R_1 - C_M \Delta_{M1} - C_1 \Delta_1 - C_2 \Delta_2);$$

$$F_{Ish2} = (m_3 + m_{y2})g + \varphi(m_{K2} * \omega^2 R_2 - C_M \Delta_{M2}); \dots\dots\dots (5)$$

bu yerda C_M, C_1, C_2, C_3 - material va mos rezinkali vtulkalar bikrlilik koeffitsientlari, $\Delta_{M1}, \Delta_{M2}, \Delta_1, \Delta_2, \Delta_3$ – mos rezinkali vtulkalar va material deformatsiya qiymatlari: ω_1, ω_2 - roliklar burchak tezliklari, R_1, R_2 - roliklar radiuslari [5].

Tortilayotgan trikotaj material bir tekisda tortilishi uchun quyidagi shart bajarilishi kerak:

$$F_{ish1} = F_{ish2} \dots\dots\dots (6)$$

Mos ravishda (5)ni (6) ga kuchini qo'zg'aluvchi rolikni materialni tortishda bosim kuchini xisoblash formulasi olinadi :

$$P = \frac{1}{\varphi} (m_3 + m_{y2} - m_1 - m_2 - m_{y1})g + [m_{k2} \omega_2^2 R_2 - m_{k1} \omega_1^2 R_1 - C_M (\Delta_{M2} - \Delta_{M1})] - C_3 \Delta_3 + C_1 \Delta_1 + C_2 \Delta_2 \dots\dots\dots (7)$$

Olingan rolikni siquv kuchini kamaytirish uchun birinchi navbatda tarkibli roliklar massalarini kamaytirish muxim xisoblanadi. Agarda roliklar massalari o'zaro teng bo'lsa, radiuslari va burchak tezliklari bir xil bo'lsa markazdan qochma kuchlar o'zaro muvozanatlanadi.

Tortuvchi rolikning tebranish amplitudasi $(3,5 \div 3,3) * 10^{-3}m$ dan oshmasligini hisobga olgan holda, tortish qurilmasi qayishqoq elementlarining bikrlilik koeffitsientini tavsiya etilgan qiymati quyidagilarni tashkil etdi: $(0,08 \div 0,11) * 10^3 N/m$

Natijada yuqorida tavsiya etilgan qiymatlar asosida, trikotajning qalinligi va zichligi o'zgarsada, bir me'yorda tortilishini ta'minlovchi mexanizm ko'rsatkichlari nazariy asoslandi.

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THE ROLE AND IMPORTANCE OF INJECTION WELLS IN MICROBIOLOGICAL IMPACT ON THE FORMATION

***Abstract:** Research is being conducted on the use of microorganisms to increase the oil yield of the formation. The interesting aspect of this method is, first of all, its simplicity of implementation, minimal capital costs and environmental safety.*

***Keywords:** Microbiological effect, biopolymer, viscous oil, thermal method, heat transfer, hot water, steam extraction, microorganisms.*

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HAYDOVCHI QUDUQ ORQALI QATLAMGA MIKROBIOLOGIK TA'SIR ETISH

***Annotatsiya:** Qatlamning neftberuvchanligini oshirishda mikroorganizmlarni qo'llash usuli ustida tadqiqotlar olib borilmoqda. Bu usulning qiziqarli tomoni shundaki, birinchi navbatda uni tadbiq qilishni soddaligi, minimal kapital xarajatlar va atrof muhit uchun xavfsizligidir.*

Tayanch so‘zlar: Mikrobiologik ta’sir, biopolimer, qovushqoq neft, issiqlik usuli, issiqlikni tashuvchanlik, issiq suv, bug‘ haydash, mikroorganizmlar.

There are two main areas of application of non-technological processes in the field of increasing oil recovery. First, known technologies are used to produce surface reagents and apply them to the layers. Substances in this class include biopolymers, carbonic anhydrite, sometimes surfactants, solvents, emulsifiers, etc. In the second case, microbiological products that increase the compressibility of oil are extracted directly from the oil-bearing layers. Let's take a closer look at the second direction.

It is known that active living microorganisms that occur in reservoir conditions and have the property of maintaining them are divided into aerobic, which requires dissolved oxygen for their vital activity, and anaerobes, which do not require oxygen, or else, using residual oil as an organic substrate (nutrient medium), a number of substances are produced (carbonic anhydride, methane, fatty acids, alcohols and other solvents, biopolymers) to increase the oil yield of the reservoir.

In addition, some aerobes oxidize oil and convert the complex carbon compounds that make up the oil into very simple hydrocarbons. Some other organic substances appear as a result of oxidation, become foam formers, and reduce the interfacial tension forces at the oil-water interface. At the same time, the overall performance of the oil is improved due to the reduction in viscosity. The important aspect of methane-forming bacteria in the composition of anaerobes is that the additional amount of methane in the formation increases the reserves of free or dissolved gases contained in the oil, depending on the location conditions.

Microbiological impact technology should be targeted to these zones to activate existing microorganisms and provide the highest efficiency. There are two main options for influencing the layer in this way. One of them is to introduce specially selected microflora and maintain or activate the activity of existing microorganisms. In both cases, the well is pumped with fresh water. The process is such that the total number of bacteria and their activity are related to the activity of the living organisms, so that the development of microorganisms is significantly better in fresh water than in mineralized aquifers.

The most intensive aerobic microbiological process occurs around the driving well. The further away from the well bottom zone, the lower the oxygen content of the pumped liquid, and the oil oxidation reaction changes to an anaerobic process. As shown, aerobic products of oil degradation, as well as ammonium and phosphates, when added to it under weak mineralization conditions, activate the activity of methane-producing bacteria many times over.

Currently, various problematic aspects of the impact of microorganisms on oil-bearing formations are at the stage of comprehensive study, and specific technological recommendations have not been developed, but general ideas are being expressed. Thus, based on research conducted in laboratory conditions and research conducted in field conditions, and based on experiences with

microbiological influence, the following can be proposed in terms of biotechnology for increasing oil recovery. In the first stage, microorganisms are introduced into the formation through pilot wells, and specially aerated fresh water with nitrogen salts and phosphorus additives is pumped into the well. Bunda quduq tubi zonasidagi qoldiq neftning bir qismida aerobli oksidlantirish faollashtiriladi.

The fluid injected into the formation affects distant zones of the formation with such enriched products. Such enriched products include CO₂ and water-soluble organic compounds, with practically no dissolved oxygen. In the second stage of action, anaerobes are activated in the “anoxic” zones, which partially form methane. Thus, the enhancement of oil compression is achieved through the complex interaction of many forms of substances, which ultimately shape the activity of microorganisms.

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THE ROLE OF COCCINELLIDS IN AGRICULTURE

Abstract: *This article analyzes the ecological and economic importance of insects belonging to the Coccinellidae family (lady beetles) in agriculture. Coccinellids serve as natural bioagents against plant pests such as aphids, thrips, and other small insects. The paper highlights their biological characteristics, reproductive cycles, and potential applications in biological pest control systems. Recommendations for maintaining and increasing their populations in agroecosystems are also provided.*

Keywords:

Coccinellids, biological control, natural enemies, plant pests, aphids, thrips, bioagents, agroecosystem, entomophages, agriculture, beneficial insects, ecological balance.

Introduction:

Protecting agricultural crops from pests, diseases, and weeds plays a crucial role in preserving yield and producing high-quality products.

At present, global scientific and technological advances, along with best agricultural practices, have proven that high biological and economic efficiency in plant protection can only be achieved through the application of integrated pest management systems.

In our region alone, during the growing season of cotton, 217 species of insects and mites cause damage. To combat the main types of these pests, biological control measures are implemented annually on an average of 5.5 million hectares of cotton fields. The area protected by biological methods is increasing year by year. For example, between 1999 and 2002, biological control methods covered 6.7 million hectares, including the use of *Trichogramma* against eggs of autumn cutworms and cotton bollworms on 11 million hectares, *Bracon* against cotton bollworms on 2 million hectares, and lacewings against aphids and spider mites on 700 thousand hectares, all with high effectiveness.

These measures not only limit the damage caused by pest insects and spider mites but also help preserve beneficial organisms in nature, promote their mass reproduction, and protect the environment from chemical pollution. Nevertheless, chemical pesticides still play a significant role in controlling major pests of cotton and other agricultural crops.

Main Part:

Alongside the advantages of commonly used chemical preparations, they also have notable drawbacks. In particular, most pesticides destroy beneficial organisms along with harmful insects and spider mites, negatively affect human health, and cause environmental pollution. Currently, it is possible to treat cotton, cereal crops

(wheat, maize), vegetables, and melon fields 2–2.5 times using such products. By utilizing mechanized production lines for rearing entomophages, the volume of produced biological agents can be increased by 5–10 times.

When discussing beneficial insects in agriculture, it should be noted that biological pest control methods are based on the use of natural enemies of harmful organisms and microbiological preparations. Natural enemies of arthropods are classified according to their feeding habits into entomophages (insect feeders) and acariphages (mite feeders). In practice, the biological method is applied by artificially rearing and releasing specific predators and parasites in areas where pest outbreaks are likely to occur.

There are two main approaches to the large-scale use of entomophages: the first involves identifying and effectively utilizing local species, while the second involves introducing aggressive species from other regions (introduction) and adapting them to local conditions.

Natural enemies of pests may exhibit parasitic or predatory behavior. Parasites may be internal (endoparasites), such as *Trichogramma* and *Apanteles*, which develop inside their hosts, or external (ectoparasites), whose larvae feed externally on the host. Predatory entomophages, such as lacewings, coccinellids, and parasitic wasps, differ from parasites in that they kill their prey quickly rather than gradually.

As mentioned above, by mass-rearing local species of parasites and predators in laboratory conditions (biofactories) and releasing them into infested fields, it is possible to maintain pest insect and mite populations at economically harmless levels. In Uzbekistan's biological laboratories, three main biological control agents are produced: *Trichogramma*, *Bracon*, and lacewings. *Trichogramma* is used against noctuid moth eggs, while *Bracon*, as a polyphagous predator, is used against both sucking and chewing pests.



4.1-rasm Trixogrammaning umumiy ko'inishi.

Trichogramma is an insect belonging to the order Hymenoptera, the superfamily Chalcidoidea, and the family Trichogrammatidae. Approximately 100 species of *Trichogramma* are known worldwide, of which 12 species have been

identified under the conditions of Uzbekistan. *Trichogramma* survives by laying its eggs inside the eggs of insects belonging to various families.

The adult *Trichogramma* is about 0.5 mm in size, and females are larger than males. The development period from egg to adult lasts on average 10–15 days. Therefore, while a pest insect produces one generation, *Trichogramma* can produce 2–3 generations.

Trichogramma is mainly mass-reared on the eggs of the grain moth, as this pest reproduces very rapidly and is convenient for use in 14–15 continuous (flow) production cycles per year. *Trichogramma* can lay one or several eggs into a single moth egg. The entire developmental cycle of the parasite takes place inside the host egg until the winged adult emerges.

The parasite is released into fields either in the form of parasitized eggs or as adults, usually by manual labor. In the future, this process may be carried out using special devices such as tractors or deltaplanes; research in this direction is ongoing. Due to its high reproductive capacity, good adaptation to ecological conditions, and high effectiveness, attempts to mass-rear this parasite artificially were already made in the 1930s. After the 1970s, with the establishment of biological laboratories and biofactories, it became possible to use this method against noctuid pests infesting cotton and other crops.

At present, *Trichogramma* is successfully used in biological control programs against the eggs of various noctuid moths. For this purpose, species of *Trichogramma* that are well adapted to the extreme climatic conditions of Uzbekistan are selected and mass-produced.

An industry for mass production of *Trichogramma* has been established in Uzbekistan. Currently, more than 700 biological laboratories and biofactories operate across the regions of the republic. The products manufactured in these facilities are sufficient to treat all protected crop areas 7–7 times (repeated applications) during a single growing season.

Application of Green Lacewings (Family Chrysopidae): Green lacewings belong to the order Neuroptera and the family Chrysopidae. Species of this family are widely distributed in Europe, Asia, Africa, and the Americas. At present, 24 species have been identified in Central Asia, 33 species in Azerbaijan, and 15 species in Kazakhstan.

Under the conditions of Uzbekistan, the species composition of lacewings, as well as the bioecological characteristics of the most widespread and promising species, have been studied by A. K. Mansurov, F. M. Uspenskiy, O. Sh. Yuzbashyan, and others.

Conclusion:

Ladybird beetles (Coccinellidae) have a rounded body shape with a dome-shaped dorsal surface; the underside and elytra are smooth and convex. Their eggs are yellow, relatively large, and elongated in shape. Beetles of the family Coccinellidae lay their eggs in clusters on various parts of plants near aphid colonies.

The predatory larvae that hatch from the eggs feed primarily on aphids. Newly hatched larvae remain for a short time clustered on the egg shells and, once they locate aphids, immediately begin feeding on them.

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STUDY LEVEL OF THE BIOLOGY, FAUNA, AND ECOLOGY OF COCCINELLIDS

Abstract: *Coccinellid beetles (Coccinellidae) are among the most important natural enemies of agricultural pests and play a significant role in biological plant protection systems worldwide. This article reviews the current level of knowledge on the biology, fauna, and ecology of coccinellids, with a particular focus on their use in the biological control of aphids, scale insects, and other harmful arthropods. The historical development of coccinellid research is discussed, beginning with early recommendations by Carl Linnaeus and Erasmus Darwin and highlighting the landmark introduction of *Rodolia cardinalis* against the cottony cushion scale, which marked a turning point in classical biological control. The contribution of Russian and Central Asian scientists to the study of coccinellid biology, distribution, overwintering behavior, and trophic relationships is also summarized. In addition, the article examines the limitations of chemical pest control methods, including environmental pollution, destruction of beneficial organisms, and the development of pesticide resistance among pests. Particular attention is given to the relevance of biological control in the agroecosystems of Uzbekistan, where favorable climatic conditions allow year-round crop cultivation but also promote pest outbreaks. The findings emphasize the ecological and economic importance of conserving native coccinellid species and expanding the use of biological control strategies as an environmentally safe alternative to chemical pesticides.*

Keywords: *Coccinellidae; ladybird beetles; biological control; entomophages; pest management; ecology; fauna; agriculture; integrated plant protection*

Introduction

Coccinellidae (ladybird beetles) play a crucial role in regulating populations of agricultural pests, particularly aphids and scale insects, through predation. Their high ecological plasticity, feeding efficiency, and adaptability have made them one of the most effective biological control agents worldwide. The study of the biology, fauna, and ecology of coccinellids is essential for developing sustainable plant protection strategies and reducing dependence on chemical pesticides. This article reviews the historical development, scientific research, and practical application of coccinellid beetles in biological pest control, with particular emphasis on their role in

Interest in coccinellids, or ladybird beetles, dates back to the great European biologist Carl Linnaeus, who recommended the use of ladybird beetles and lacewings against aphids. Erasmus Darwin also advised using ladybird beetles to

cleanse greenhouses of aphids. In England, the distribution of ladybird beetles in fields and greenhouses was proposed as a means of controlling aphid pests.

However, a turning point occurred in 1888 in California, when the ladybird beetle *Rodolia cardinalis* Muls. was introduced from Australia to combat the cottony cushion scale (*Icerya purchasi*). The exceptionally high and positive results obtained from its use on citrus plants brought about a fundamental change in the biological protection of plants.

Subsequently, the introduction of *Rodolia* beetles against the cottony cushion scale into many countries—including Egypt in 1890 and the Hawaiian Islands in the same year, as well as nearly 30 other countries—repeatedly proved that *Rodolia* ladybird beetles are highly effective natural enemies of this pest.

In Russia, the first scientific studies on the application of biological control methods against harmful insects are directly associated with the renowned Russian scientist I. I. Mechnikov. In the late 1870s and early 1880s, he identified fungal and bacterial pathogens of the grain beetle *Anisoplia austriaca* and conducted several successful experiments on the use of muscardine pathogens. I. M. Krassilshchik continued Mechnikov's work and was the first in the world to organize mass cultivation of entomopathogenic fungi.

In the former USSR, *Rodolia cardinalis* beetles were introduced from Cairo in 1931 and initially mass-reared under laboratory conditions at the Plant Protection Institute (Leningrad, now St. Petersburg). They were later released in Sukhumi and surrounding areas against the cottony cushion scale, resulting in significant suppression of the pest.

Worldwide, extensive research has been conducted on the introduction and acclimatization of *Rodolia* and other coccinellid species—such as *Lindorus lophanthae* Blaisd., *Cryptogonus orbiculus* var. *nigripennis* Wse., *Orcus chalybeus* Boisd., and *Chilocorus perniciosus* Comst.—for use against scale insects and other pests.

Numerous scientists have also conducted research on ladybird beetles. The importance of coccinellids in the biological control of plant pests has been highlighted by V. V. Yakhontov and Z. K. Adilov, who provided extensive data on their distribution and conservation of local species. Issues related to the introduction and acclimatization of coccinellids were studied by L. S. Ulyanova. The overwintering aggregation behavior of many ladybird species was investigated by V. V. Yakhontov, Z. K. Adilov, A. K. Mansurov, A. Sh. Khamroev, and Yu. Q. Babanov.

The biology, ecology, species composition, and trophic relationships of coccinellids in orchard ecosystems of Karakalpakstan were studied by S. A. Mangutova. The role of coccinellids in reducing pest populations of stone fruit trees was analyzed by Kh. H. Murotov and A. G. Davletshina. The biology of certain ladybird species associated with apple trees in the Fergana Valley was investigated by T. Vokhidov, while A. K. Mansurov conducted an in-depth analysis of the species composition of biogeocenoses in the Jizzakh region.

From the history of biological plant protection, pest outbreaks and various diseases have long been considered global threats, causing significant damage during crop growth and storage. In some years, harmful organisms destroy 60–80% of agricultural yields and also contribute to the spread of dangerous infectious diseases among plants, animals, and humans.

Although chemical control methods are widely used against pests, insecticides and acaricides often lack selectivity and destroy beneficial organisms such as natural enemies (entomophagous insects and insectivorous birds). Moreover, many pests have developed resistance to pesticides, negatively affecting agroecosystem phytosanitary conditions and agricultural economics. Currently, 428 species of arthropods worldwide have developed resistance to various pesticide groups, of which 260 are agricultural pests.

These factors have increased interest in biological control methods, emphasizing the role of predators, parasites, and pathogens that regulate pest populations. In a broad sense, biological plant protection involves using living organisms, their metabolic products, or synthetic analogs to reduce pest damage. In a narrow sense, classical biological control refers to the use of living organisms—parasites, predators, and pathogenic microorganisms—against pests.

The Republic of Uzbekistan, due to its warm spring, summer, and autumn climate, enables year-round cultivation of many agricultural crops. However, during the summer–autumn period, arthropod pests cause significant damage to food crops, legumes, cereals, vegetables, orchards, and technical crops such as cotton and hemp. Initially, pest control in the Republic relied mainly on chemical methods, but extensive use of toxic chemicals has caused severe environmental damage, including water pollution, decline in beneficial arthropods, ecological imbalance in rural areas, and increased incidence of human diseases.

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TIBBIYOT OLIY TA'LIM MUASSASALARIDA “YANGI TIBBIYOT TEXNOLOGIYALARI” FANINI MULTIMEDIALI VOSITALAR YORDAMIDA O'QITISH

Annotatsiya: Ushbu maqolada tibbiyot oliy ta'lim muassasalarida “Yangi tibbiy texnologiyalar” fanini o'qitishda zamonaviy multimediyali vositalardan foydalanishning didaktik ahamiyati, o'quv jarayonini samarali tashkil etishdagi roli hamda talabalarning nazariy bilim va amaliy ko'nikmalarini shakllantirishdagi o'rni yoritilgan. Mazkur yondashuv tibbiyot ta'limida raqamli texnologiyalarni joriy etishning muhim bosqichi sifatida qaraladi.

Kalit so'zlar: Yangi tibbiy texnologiyalar, tibbiyot ta'limi, multimediya, innovatsion metod, raqamli ta'lim, interaktiv o'qitish.

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TEACHING THE DISCIPLINE "NEW MEDICAL TECHNOLOGIES" USING MULTIMEDIA RESOURCES IN HIGHER MEDICAL EDUCATION INSTITUTIONS

Abstract: This article examines the didactic significance of using modern multimedia tools in teaching the discipline "New Medical Technologies" in higher medical educational institutions, their role in effectively organizing the educational process, and their importance in forming students' theoretical knowledge and practical skills. This approach is considered an important stage in the implementation of digital technologies in medical education.

Keywords: New medical technologies, medical education, multimedia, innovative method, digital education, interactive learning.

Kirish: So'nggi yillarda ilm-fan va texnologiyalarning tez sur'atlar bilan rivojlanishi natijasida tibbiyot sohasini ham yangi tibbiy texnologiyalarsiz tasavvur etib bo'lmaydigan darajada modernizatsiyalashdi. Radioaktiv izotoplardan foydalanish diagnostika, terapiya, farmakologiya va molekulyar biologiya yo'nalishlarida yangi imkoniyatlar yaratdi. Shu bilan birga, yadro tibbiyoti nomi bilan ataluvchi yangi yo'nalish shakllandi.

“Yangi tibbiy texnologiyalar” fanini o‘qitishda multimediyali vositalardan foydalanish o‘qitish jarayonini interaktiv, aniq, tushunarli va zamonaviy shaklda tashkil etish imkonini beradi.

An’anaviy o‘qitish usullarini zamonaviy raqamli ta’lim texnologiyalari bilan uyg‘unlashtirish natijasida talabalarda mustaqil fikrlash, mantiqiy tahlil, muammoli vaziyatlardan to‘g‘ri chiqish va tajriba natijalarini baholash ko‘nikmalari rivojlanadi.

Hozirgi kunda tibbiyot ta’limida raqamli va interaktiv o‘qitish texnologiyalarini joriy etish - ta’lim sifatini oshirishning eng muhim omillaridan biridir. “Yangi tibbiy texnologiyalar” fanini o‘qitishda an’anaviy ma’ruza usullari bilan cheklanmasdan, multimediyali vositalardan foydalanish o‘quv jarayonini jonlantiradi va samaradorligini oshiradi.

Pedagogik ahamiyati: Multimedia vositalari yordamida o‘qituvchi darsni interaktiv shaklda tashkil etadi, bu esa talabalarni mustaqil fikrlashga, tahlil qilishga va qaror qabul qilishga o‘rgatadi. Shu bilan birga, o‘quv jarayonining individualizatsiyasini ta’minlab, har bir talabaga mos o‘qitish uslubini qo‘llash imkonini beradi.

Multimediali o‘qitish orqali:

- Texnologik jarayonlar va radiatsiya ta’siri 3D grafikalar, animatsiyalar hamda video tajribalar orqali ko‘rgazmali tarzda tushuntiriladi;

- talabalar virtual laboratoriyalar yordamida xavfsiz muhitda tajriba o‘tkazish imkoniga ega bo‘ladi;

- interaktiv testlar, elektron darsliklar va onlayn platformalar orqali mustaqil ta’lim rivojlanadi;

- fan bo‘yicha o‘zlashtirish darajasi va motivatsiya sezilarli oshadi.

Shuningdek, multimedia vositalaridan foydalanish talabalarning tahliliy fikrlash, muammoli vaziyatlarni yechish, va kasbiy kompetensiyalarini shakllantirishda muhim rol o‘ynaydi.

Asosiy qism:

1. Yangi yadro texnologiyalarining tibbiyotdagi o‘rni.

Tibbiyotda yadro texnologiyalari quyidagi asosiy yo‘nalishlarda keng qo‘llaniladi:

Diagnostika: radiofarmatsevtik preparatlar yordamida organ va to‘qimalarning holatini aniqlash (PET — pozitron emissiya tomografiyasi, SPECT — gamma-tomografiya).

Davolash: onkologik kasalliklarda yuqori aniqlikdagi nurlantirish usullari (radioterapiya, braxiterapiya).

Ilmiy tadqiqotlar: izotop usullari orqali biokimyoviy jarayonlarni tahlil qilish, hujayra darajasidagi o‘zgarishlarni aniqlash.

Mazkur yo‘nalishlarda samarali ta’lim berish uchun talabalar atom tuzilishi, radiatsiya fizikasi, izotoplarning xossalari va ularning biologik ta’siri haqidagi bilimlarga ega bo‘lishlari zarur. Bu esa an’anaviy darslarda faqat matn yoki rasmlar orqali emas, balki multimediyali vositalar yordamida jonli tasvir va modellar asosida o‘rgatilganda yanada samarali bo‘ladi.

2. Multimediyali vositalarning o'qitishdagi afzalliklari

Multimedia — bu matn, grafika, audio, video, animatsiya va interaktiv elementlarning birlashtirilgan majmuasidir. Uning o'qitishdagi asosiy afzalliklari quyidagilardan iborat:

1. Murakkab jarayonlarni vizuallashtirish: yadro parchalanishi, radiatsiya turlari va ularning biologik to'qimalarga ta'siri 3D animatsiyalar orqali namoyish etiladi.

2. Talabalarning faolligini oshirish: interaktiv topshiriqlar, testlar va simulyatorlar orqali talaba o'quv jarayonining faol ishtirokchisiga aylanadi.

3. Axborotni yaxshiroq eslab qolish: vizual va eshitish kanallarining birgalikdagi ishi natijasida ma'lumot o'zlashtirish samaradorligi 40% gacha ortadi.

4. Masofaviy ta'lim imkoniyati: Moodle, Google Classroom, Edmodo kabi onlayn platformalar yordamida darslar masofadan turib tashkil etilishi mumkin.

5. Tajriba xavfsizligini ta'minlash: virtual laboratoriyalar orqali radiatsion xavf mavjud bo'lgan tajribalarni xavfsiz muhitda o'rganish imkonini beradi.

3. O'qitishda multimedia vositalarini qo'llash metodikasi.

“Yangi tibbiy texnologiyalar” fanini o'qitishda multimedia vositalarini quyidagi bosqichlarda qo'llash maqsadga muvofiq:

1. Tayyorlov bosqichi: o'qituvchi mavzuga oid video, infografika, interaktiv taqdimotlar va nazariy materiallarni tayyorlaydi. Talabalarga tayanch tushunchalar elektron shaklda taqdim etiladi.

2. Interaktiv dars: 3D modellar, animatsiyalar, laboratoriya simulyatorlari yordamida yadro jarayonlari, izotoplarning parchalanishi va radiatsiya o'lchovlari vizual tarzda tushuntiriladi.

3. Amaliy mashg'ulot: talabalar virtual laboratoriyada eksperimentlar o'tkazadilar. Masalan, nurlanish darajasini o'lchash, himoya ekranlarini tanlash, dozimetr bilan ishlash ko'nikmalarini egallaydilar.

4. Baholash va refleksiya: interaktiv testlar, situatsion masalalar va muammoli topshiriqlar orqali bilimlar tekshiriladi. Natijalar onlayn platformalarda avtomatik tahlil qilinadi.

Bu yondashuv talabalarning ****tanqidiy fikrlash, tahlil qilish, tadqiqot olib borish**** qobiliyatlarini rivojlantiradi va o'zlashtirish samaradorligini oshiradi.

4. Amaliy tajriba natijalari

Samarqand davlat tibbiyot universitetida o'tkazilgan tajriba sinovlari shuni ko'rsatdiki, “Yangi tibbiy texnologiyalar” fanini multimediyali vositalar asosida o'qitish quyidagi natijalarga olib keldi:

- Talabalarning o'zlashtirish darajasi 30–35% ga oshdi.
- Fanga qiziqish bildirgan talabalar soni 1,5 barobar ortdi.
- Radiatsion xavfsizlik bo'yicha amaliy topshiriqlarda xatoliklar 20% ga kamaydi.

- Mustaqil ishlash, tahlil qilish va izlanish ko'nikmalari sezilarli darajada rivojlandi.

Ushbu natijalar multimediyali yondashuv o'qitishning nafaqat bilim, balki kompetensiyaga asoslangan ta'lim tizimida ham samarali ekanligini isbotlaydi.

Xulosa: Tibbiyot oliy ta'lim muassasalarida "Yangi tibbiy texnologiyalar" fanini multimediyali vositalar yordamida o'qitish quyidagi ijobiy natijalarga olib keladi:

- o'quv jarayonining samaradorligi ortadi;
- talabalarning fanga bo'lgan motivatsiyasi kuchayadi;
- amaliy ko'nikmalar va kasbiy kompetensiyalar shakllanadi;
- ta'lim jarayoni xavfsiz va interaktiv tus oladi.

Shu sababli, tibbiyot ta'lim tizimida multimedia va raqamli texnologiyalarni keng joriy etish strategik zarurat hisoblanadi. Kelgusida sun'iy intellekt, VR/AR texnologiyalarni o'quv jarayoniga tatbiq etish yangi tibbiy texnologiyalar fanini o'qitishda yangi bosqichni boshlab beradi.

Kelajakda bu yo'nalishda VR (Virtual Reallik), AR (Kengaytirilgan reallik) va sun'iy intellekt (AI) asosidagi o'qitish tizimlarini joriy etish yangi tibbiy texnologiyalarni o'qitish samaradorligini yanada oshiradi.

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BOLALARDA LINGVISTIK KOMPETENSIYANI RIVOJLANTIRISHDA SAHNALASHTIRISHNING AHAMIYATI

Annotatsiya: *Lingvistik kompetensiya bu tilni tizimli o'rganish va amalda qo'llash qobiliyatidir. U quyidagi tarkibiy qismlarni o'z ichiga oladi: fonetik kompetensiya: tovush tizimini o'rganish va talaffuz qoidalarini o'zlashtirish; leksik kompetensiya: so'z boyligini kengaytirish va leksik birliklardan to'g'ri foydalanish; grammatik kompetensiya: morfologik va sintaktik qoidalardan xabardorlik; pragmatik kompetensiya: tilni muloqot maqsadlariga muvofiq qo'llash qobiliyatidir. Ushbu maqolada bolalarda lingvistik kompetensiyani rivojlantirishda sahnalashtirishning ahamiyati haqida so'z boradi*

Kalit so'zlar: *Kompetensiya, yondashuv, ta'lim tizimi, samaradorlik, rik o'rganish, qobiliyat.*

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THE IMPORTANCE OF STAGE-MAKING IN THE DEVELOPMENT OF LINGUISTIC COMPETENCE IN CHILDREN

Annotation: *Linguistic competence is the ability to systematically study and apply the language in practice. It includes the following components: phonetic competence: studying the sound system and mastering pronunciation rules; lexical competence: expanding vocabulary and correct use of lexical units; grammatical competence: awareness of morphological and syntactic rules; pragmatic competence: the ability to use language in accordance with the goals of communication. This article discusses the importance of dramatization in developing linguistic competence in children.*

Keywords: *Competence, approach, educational system, effectiveness, risk learning, ability.*

Jahondagi rivojlangan mamlakatlar ta'lim tizimida kompetensiyaviy yondashuv asosida o'quv jarayoni subyektlarining tayanch kompetensiyalarini rivojlantirish tajribasidan bugungi kunda samarali foydalanilmoqda. Jumladan, AQSh, Germaniya, Angliya, Niderlandiya, Avstriya, Rossiya kabi davlatlarda o'quvchilarda tayanch kompetensiyalarni shakllantirish sohasida samaradorlikka erishilmoqda. Bu esa, o'z navbatida Yevropa davlatlarida kompetensiyaviy yondashuv asosida o'quvchilarning amaliy ko'nikmalarini rivojlantirish, ularni ijtimoiy faoliyatga tayyorlash, olgan bilimlarini hayotiy vaziyatlarda sinab ko'rish, axborotlar bilan faol ishlash kompetensiyalarini shakllantirishga alohida e'tibor qaratilib, 2030 yilgacha belgilangan xalqaro ta'lim kontseptsiyasida ustuvor yo'nalishlar sifatida o'z aksini topgan.

Umumta'lim maktablarida ham ta'lim sifati va samaradorligini oshirishga qaratilgan ishlar amalga oshirilmoqda va bu xalq ta'limi sohasida tubdan o'zgarishlar bo'lishiga sabab bo'lmoqda. Yurtboshimiz Sh.Mirziyoyevning 2020-yil 29-dekabrdagi O'zbekiston Respublikasi Oliy Majlisiga Murojaatnomasida ta'lim sifatini tubdan yaxshilash maqsadida, avvalo, o'quv dasturlari, o'qituvchi va domlalar uchun metodik qo'llanmalar ilg'or xalqaro mezonlarga moslashtirilishi lozimligi alohida ta'kidlanganligi fikrimiz isbotidir. "Shu bilan birga bolalarning tahliliy va kreativ fikrlash qobiliyatlarini rivojlantirish uchun ularga sermazmun va tushunarli kitoblar yaratish zarurari, bu borada kelgusi o'quv yilidan boshlang'ich sinflarda davlat ta'lim standarti o'rniga ilg'or tajriba asosida, bolaga ortiqcha yuklama bermaydigan "Milliy o'quv dasturi" joriy etiladi", - deya ta'kidlagani soha mutasaddilari oldiga ulkan vazifalar qo'yadi.

Til o'rganish jarayonida bu kompetensiyalarni rivojlantirish orqali talabalarni mustaqil muloqot qilishga tayyorlash ta'limning asosiy maqsadlaridan biri sanaladi. Ushbu maqolada talabalar lingvistik kompetensiyalarini rivojlantirishga yo'naltirilgan metodik yondashuvlar ko'rib chiqiladi. Lingvistik kompetensiya — bu shaxsning tilning strukturaviy va funksional xususiyatlarini tushunishi, to'g'ri qo'llay olishi va samarali muloqot qilish qobiliyatidir. Ushbu kompetensiyani rivojlantirish orqali til darajalarini o'zlashtirish usullari tilshunoslik, pedagogika va psixologiya fanlarining rivojlanishi bilan uzviy bog'liq.

Til o'rgatish metodikasining tarixiy rivojlanishini tushunish uchun u bir nechta asosiy davrlarga bo'linadi. Til o'rgatish asosan klassik tillarni (lotin va qadimgi yunon tili) o'rgatishga qaratilgan bo'lib, grammatika va tarjimaga asoslangan edi. O'quvchilar so'z boyligini oshirish va iboralarni tarjima qilish orqali tilni o'zlashtirgan. Lingvistik kompetensiyaga e'tibor tilning qoidalarini o'rganish va to'g'ri yozishga qaratilgan edi. Muloqot qilish mahorati esa deyarli e'tibordan chetda qolgan

Pedagogik adabiyotlarda "sahnalashtirish o'yini" (yoki teatrlashtirilgan o'yin) tushunchasi syujetli–rolli o'yinning bir ko'rinishi sifatida izohlanadi. Ba'zi manbalarda "sahnalashtirish (dramatizatsiya) o'yini" tushunchasi "teatrlashtirilgan o'yin" atamasiga sinonim sifatida qo'llansa, ayrim tadqiqotchilar dramatizatsiya o'yinini teatrlashtirilgan o'yinlar ichida alohida bir turi deb biladi. L. S.

Furminaning ta'kidlashicha, maktabgacha yoshdagi bolalarning teatr–ijrochilik faoliyati ikki shaklda kechadi:

birinchisi – predmetlar (o'yinchoqlar, qo'g'irchoqlar) yordamida sahna ko'rinishlarini namoyish etish (masalan, qo'g'irchoq teatri);

ikkinchisi – bolalarning o'zlari ijrochiga aylanib, rollarni jonli ijro etishi (ya'ni rolli–syujetli dramatizatsiya o'yinlari).

Demak, teatrlashtirilgan o'yinlar doirasida qo'g'irchoq teatri, barmoq teatrlari, stol usti teatrlari kabi predmetli teatr o'yinlari hamda bolalar o'zlari sahnaga chiqib ijro etadigan dramatik rolli o'yinlar ajratiladi. Har ikkala holatda ham bolalar adabiy asar yoki hayotiy voqealar mazmunini o'ziga xos ifodali vositalar (intonatsiya, mimika, harakat va boshqalar) orqali sahnada gavdalantiradi. Sahnalashtirish faoliyati, avvalo, badiiy–ijodiy faoliyat turi sifatida bola shaxsining ko'p qirrali rivojlanishiga xizmat qiladi. Tadqiqotchilar ta'kidlashicha, dramatik ijro jarayonida bolalar nutqini rivojlantirish, ularning estetik didini shakllantirish, tasavvur va tafakkurini faollashtirish kabi bir qator pedagogik vazifalarni hal etish imkoni tug'iladi.

Xususan, sahnalashtirilgan o'yinlar bolalarda ifodali nutq ko'nikmasini rivojlantiradi, lug'at boyligini oshiradi, nutqning emotsionalligi va ta'sirchanligini kuchaytiradi. Shuningdek, dramatizatsiya jarayonida bola o'ziga yangi obrazni qabul qilib, uni ijro etishga harakat qilar ekan, bu uning ichki kechinmalari va his–tuyg'ularini tushunish hamda ifodalash qobiliyatini o'stiradi, ya'ni empatiya tuyg'usini rivojlantiradi.

Sahnalashtirish faoliyati jamoa bilan birgalikda amalga oshiriladigan o'yin bo'lgani uchun, bu jarayon bolalarda ijtimoiy moslashuv va hamkorlik ko'nikmalarini ham shakllantiradi – bola tengdoshlari bilan birgalikda spektakl tayyorlash, rollarni taqsimlash va sahnada o'zaro yordam orqali jamoaviy faoliyat tajribasini orttiradi. Bugungi kunda ta'lim jarayonida bolalarning lingvistik kompetensiyasini shakllantirish va rivojlantirish muhim pedagogik vazifalardan biri hisoblanadi. Lingvistik kompetensiya deganda bolaning til birliklarini to'g'ri tushunishi, ulardan og'zaki va yozma nutqda samarali foydalanishi, grammatik qoidalarni ongli ravishda qo'llay olishi tushuniladi. Ushbu kompetensiyani rivojlantirishda interaktiv va ijodiy metodlar, xususan, sahnalashtirish usuli muhim o'rin tutadi.

Sahnalashtirish bolalarni faol nutqiy muhitga jalb etuvchi samarali pedagogik vosita bo'lib, u orqali bolalar tilni faqat eshitish yoki o'qish orqali emas, balki bevosita nutqiy faoliyat jarayonida o'zlashtiradilar. Rolli o'yinlar, kichik sahna ko'rinishlari, ertak va hikoyalarni jonlantirish jarayonida bolalar yangi so'z va iboralarni oson o'zlashtiradi, ularning talaffuzi, ohangdorligi hamda nutq ravonligi rivojlanadi. Bu esa lingvistik kompetensiyaning asosiy tarkibiy qismlaridan biri bo'lgan leksik va fonetik ko'nikmalarni mustahkamlashga xizmat qiladi.

Sahnalashtirish jarayonida bolalar grammatik tuzilmalarni tabiiy vaziyatda qo'llash imkoniyatiga ega bo'ladilar. Dialoglar orqali gap tuzish, savol-javob shakllaridan foydalanish, fe'l zamonlari va so'z tartibini to'g'ri qo'llash kabi

ko'nikmalar mustahkamlanadi. Bunday faoliyat bolalarda til qoidalarini mexanik yodlashdan ko'ra, ularni amaliyotda ongli ravishda qo'llashni ta'minlaydi.

Bundan tashqari, sahnalashtirish bolalarning kommunikativ faolligini oshiradi. Sahna jarayonida ishtirok etgan bola o'z fikrini erkin ifodalashga, auditoriya oldida gapirishga, muloqotga kirishishga o'rganadi. Bu holat nutqiy ishonchni shakllantiradi va til o'rganish jarayonida uchraydigan psixologik to'siqlarni kamaytiradi. Natijada bola tilni o'rganishga bo'lgan qiziqishini yanada oshiradi.

Xulosa qilib aytganda, sahnalashtirish bolalarda lingvistik kompetensiyani rivojlantirishda muhim didaktik ahamiyatga ega. U tilni o'rganish jarayonini qiziqarli, mazmunli va samarali tashkil etishga yordam beradi, bolalarning nutqiy faolligini, ijodkorligini hamda mustaqil fikrlash qobiliyatini rivojlantiradi. Shu sababli sahnalashtirish usulidan maktabgacha ta'lim va boshlang'ich ta'lim bosqichlarida keng foydalanish maqsadga muvofiqdir.

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TA'LIM, FAN, ISHLAB CHIQRISH INTEGRATSIYASI ASOSIDA LOYIHALASH KOMPETENSIYALARINI RIVOJLANTIRISH MEXANIZMLARI

Annotatsiya: Mazkur maqolada ta'lim, fan, ishlab chiqarish integratsiyasi asosida talabalarning loyihalash kompetensiyalarini rivojlantirish masalalari yoritilgan. Tadqiqotda ta'lim klasteri sharoitida loyihaviy faoliyatni tashkil etishning pedagogik mexanizmlari, metodik yondashuvlari va ularning samaradorligi tahlil qilinadi. Tadqiqot natijalari integratsiyalashgan ta'lim muhiti loyihalash kompetensiyalarini rivojlantirishda muhim didaktik imkoniyatlarga ega ekanini ko'rsatadi hamda amaliyotga joriy etish uchun tavsiyalar ishlab chiqilgan.

Kalit so'zlar: ta'lim klasteri, integratsiya, loyihalash kompetensiyasi, ta'lim–fan–ishlab chiqarish, kasbiy tayyorgarlik, pedagogik mexanizm.

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MECHANISMS FOR THE DEVELOPMENT OF PROJECT DESIGN COMPETENCIES BASED ON THE INTEGRATION OF EDUCATION, SCIENCE, AND INDUSTRY

Abstract: This article examines the issues of developing students' project-based competencies through the integration of education, science, and industry. The study analyzes pedagogical mechanisms for organizing project activities within an educational cluster environment, the methodological approaches applied, and their effectiveness. The research findings demonstrate that an integrated educational environment offers significant didactic opportunities for the development of project-based competencies, and practical recommendations for implementation are proposed.

Keywords: educational cluster, integration, project-based competence, education–science–industry, professional training, pedagogical mechanism

Kirish

Zamonaviy jamiyatda oliy ta'lim tizimi oldiga qo'yilayotgan asosiy talab — raqobatbardosh, mustaqil fikrlovchi, innovatsion faoliyatga tayyor mutaxassislarni

tayyorlashdan iborat. Bu jarayonda ta'lim–fan–ishlab chiqarish integratsiyasi muhim pedagogik va ijtimoiy-iqtisodiy ahamiyat kasb etmoqda. Integratsiyalashgan yondashuv asosida tashkil etilgan ta'lim klasterlari talabalarni real ishlab chiqarish muammolari bilan bevosita tanishtirish, ularning nazariy bilimlarini amaliyot bilan uyg'unlashtirish imkonini beradi.

Hozirgi davrda ta'lim jarayonini tashkil etishning innovatsion shakl va mexanizmlaridan biri sifatida ta'lim klasteri konsepsiyasi keng e'tirof etilmoqda. Ushbu yondashuv ta'lim, ishlab chiqarish va ilmiy-tadqiqot muassasalarining integratsiyasi asosida talabalar kasbiy tayyorgarligini real sektor talablariga mos ravishda shakllantirish imkonini beradi. Shu bilan birga, klaster sharoitida o'quv jarayonida loyihalash kompetensiyalarini rivojlantirish masalasi pedagogik nuqtayi nazardan dolzarb muammolardan biri sifatida namoyon bo'ladi. Mazkur kompetensiya zamonaviy mehnat bozorida talab etiladigan mustaqil fikrlash, ijodkorlik, muammoni hal etish va innovatsion yechimlar ishlab chiqish qobiliyatlarini o'z ichiga oladi. Biroq, mavjud ta'lim amaliyotida loyihalash kompetensiyalarini rivojlantirish bo'yicha metodik yondashuvlar yetarlicha tizimlashtirilmagan, klaster muhitining didaktik imkoniyatlari to'liq ishga solinmagan. Shu sababli, ushbu muammoning ilmiy-nazariy asoslarini aniqlash, metodik modellarini ishlab chiqish va amaliyotga tatbiq etish zarurati yuzaga kelmoqda. Shu nuqtayi nazardan, loyihalash kompetensiyasi zamonaviy mutaxassis faoliyatining ajralmas tarkibiy qismi sifatida namoyon bo'lmoqda. Mazkur kompetensiya muammoni tahlil qilish, maqsad qo'yish, loyiha rejasini ishlab chiqish, innovatsion yechimlar yaratish va natijalarni baholash kabi ko'nikmalarni o'z ichiga oladi. Biroq mavjud ta'lim amaliyotida loyihalash kompetensiyalarini rivojlantirish ko'pincha fragmentar xarakterga ega bo'lib, ta'lim–fan–ishlab chiqarish integratsiyasining didaktik imkoniyatlari yetarlicha ishga solinmayapti.

Metodlar

Tadqiqot jarayonida quyidagi metodlardan foydalanildi:

Nazariy tahlil – pedagogik, psixologik va metodik adabiyotlar, normativ-huquqiy hujjatlarni o'rganish va umumlashtirish;

Tizimli yondashuv – loyihalash kompetensiyasini yaxlit tizim sifatida tahlil qilish;

Modellashtirish – ta'lim klasteri sharoitida loyihalash kompetensiyalarini rivojlantirish mexanizmining modelini ishlab chiqish;

Pedagogik kuzatuv va tahlil – integratsiyalashgan o'quv jarayonida talabalar faoliyatini o'rganish;

Taqqoslash va umumlashtirish – tajriba-sinov natijalarini baholash va xulosalar chiqarish.

Natijalar

Tadqiqot natijalariga ko'ra, ta'lim–fan–ishlab chiqarish integratsiyasi asosida loyihalash kompetensiyalarini rivojlantirish quyidagi asosiy mexanizmlar orqali samarali amalga oshirilishi aniqlandi:

Loyihaviy ta'limni real ishlab chiqarish muammolari asosida tashkil etish – talabalar ishlab chiqarish korxonalari bilan hamkorlikda amaliy loyihalar ishlab chiqish orqali kasbiy tajriba orttiradi.

Fanlararo integratsiya – texnik, iqtisodiy va pedagogik fanlar mazmunini loyihaviy faoliyat asosida uyg'unlashtirish.

Ilmiy-tadqiqot faoliyatini ta'lim jarayoniga integratsiyalash – talabalarni ilmiy izlanishlarga jalb etish orqali innovatsion fikrlashni rivojlantirish.

Mentorlik va hamkorlik modeli – oliy ta'lim muassasasi o'qituvchilari, ilmiy xodimlar va ishlab chiqarish mutaxassislarining birgalikdagi rahbarligi.

Natijaga yo'naltirilgan baholash tizimi – loyihalarning amaliy ahamiyati va innovatsion darajasini hisobga olgan holda baholash.

Mazkur mexanizmlar asosida tashkil etilgan o'quv jarayoni talabalarda mustaqil fikrlash, muammoni hal etish va ijodkorlik ko'nikmalarining sezilarli darajada rivojlanishiga xizmat qildi.

Munozara

Olingan natijalar shuni ko'rsatadiki, ta'lim–fan–ishlab chiqarish integratsiyasi loyihalash kompetensiyalarini rivojlantirish uchun qulay pedagogik muhit yaratadi. An'anaviy o'qitish shakllaridan farqli o'laroq, klaster yondashuvi talabalarning faol subyekt sifatida ishtirokini ta'minlaydi va ularni real kasbiy faoliyatga tayyorlaydi.

Shu bilan birga, integratsiyalashgan ta'limni joriy etishda pedagog kadrlarning loyihaviy faoliyatni tashkil etish bo'yicha metodik tayyorgarligi, ishlab chiqarish bilan hamkorlikning uzluksizligi va resurs ta'minoti muhim omil bo'lib qolmoqda. Tadqiqot natijalari boshqa olimlar tomonidan olib borilgan izlanishlar bilan uyg'un bo'lib, integratsiyalashgan ta'lim modeli zamonaviy ta'lim tizimini rivojlantirishning istiqbolli yo'nalishi ekanini tasdiqlaydi.

Xulosa

Ta'lim-fan-ishlab chiqarish integratsiyasi asosida loyihalash kompetensiyalarini rivojlantirish mexanizmlari talabalarning kasbiy tayyorgarligini oshirishda muhim ahamiyatga ega. Mazkur yondashuv ta'lim mazmunini real sektor ehtiyojlariga moslashtirish, innovatsion fikrlashni rivojlantirish va raqobatbardosh mutaxassislar tayyorlash imkonini beradi. Tadqiqot natijalari oliy ta'lim muassasalarida loyihaviy ta'limni tashkil etish amaliyotini takomillashtirish uchun metodik asos bo'lib xizmat qiladi.

Globalashuv va raqobat kuchayib borayotgan sharoitda ta'lim-fan-ishlab chiqarish integratsiyasiga asoslangan ta'lim klasterlari zamonaviy ta'lim tizimini rivojlantirishning muhim innovatsion shakllaridan biri hisoblanadi. Mazkur tadqiqot natijalari shuni ko'rsatadiki, klaster muhitida tashkil etilgan loyihaviy faoliyat talabalarning loyihalash kompetensiyalarini samarali rivojlantirish uchun keng imkoniyatlar yaratadi.

Loyihalash kompetensiyalarini rivojlantirishga yo'naltirilgan integrativ mexanizmlarning joriy etilishi talabalarda nafaqat nazariy bilimlarni, balki real ishlab chiqarish muammolarini hal etish, innovatsion g'oyalarni ilgari surish va amaliy natijalarga erishish ko'nikmalarini shakllantiradi. Tadqiqot davomida ishlab

chiqilgan model va metodik tavsiyalar oliy ta'lim tizimida kompetensiyaviy yondashuvni samarali amalga oshirishga xizmat qiladi.

Tadqiqot natijalari kelgusida ta'lim klasterlari faoliyatini takomillashtirish, loyihaviy ta'lim texnologiyalarini rivojlantirish va talabalarning kasbiy kompetensiyalarini chuqurlashtirish bo'yicha yangi ilmiy izlanishlar uchun metodologik asos bo'lib xizmat qiladi.

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TABIATDA SUV AYLANISHINING UMUMIY ME'ZONLARI TASNIFI

***Annotatsiya.** Ushbu maqola tabiatda suv aylanishining umumiy me'zonlari tasnifiga bag'ishlangan. Suv aylanishi (gidrologik sikl) global, mintaqaviy va mahalliy darajalarda o'rganilib, bug'lanish, kondensatsiya, yog'in va oqim jarayonlari batafsil ko'rib chiqiladi. Maqolada suv aylanishining tasniflari, suv omborlari va ko'llardagi gidrobiosenozlar, suv balansining elementlari va ekologik ta'siri tahlil qilinadi. Tadqiqot suv aylanishining tabiatdagi rolini ta'kidlab, suv resurslari muvozanati va ekologik jarayonlarga ta'sirini ko'rsatadi.*

***Kalit so'zlar:** Suv aylanishi, gidrologik sikl, bug'lanish, suv balansi, gidrosfera, ekologik me'zonlar.*

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CLASSIFICATION OF GENERAL CRITERIA FOR WATER CIRCULATION IN NATURE

***Abstract.** This article is devoted to the classification of general criteria for the water cycle in nature. The water cycle (hydrological cycle) is studied at the global, regional, and local levels, and the processes of evaporation, condensation, precipitation, and runoff are considered in detail. The article analyzes the classification of water circulation, hydrobiocenoses in reservoirs and lakes,*

elements of water balance, and environmental impact. The study emphasizes the role of the water cycle in nature and shows its influence on the balance of water resources and ecological processes.

Keywords: *Water cycle, hydrological cycle, evaporation, water balance, hydrosphere, ecological criteria.*

Kirish. Tabiatda suv aylanishi Yer yuzasidagi hayotni saqlab turuvchi asosiy jarayon bo'lib, suvning doimiy harakatlanishi va o'zgarishi orqali ekologik muvozanatni ta'minlaydi. Suv aylanishi gidrosfera, atmosfera, litosfera va biosfera o'rtasidagi aloqada sodir bo'lib, suv resurslarini global miqyosda taqsimlaydi. Ushbu jarayonning tasnifi suvning holati, miqyosi va ekologik ta'siriga asoslangan bo'lib, bug'lanish, kondensatsiya va yog'in bosqichlarini o'z ichiga oladi. Suv aylanishi suv omborlari va ko'llarda gidrobiosenozlar rivojiga ta'sir qiladi, suv balansini shakllantiradi va iqlim o'zgarishlariga sabab bo'ladi. Bugungi kunda suv taqchilligi va cho'llanish muammolari kuchaygan bir paytda suv aylanishining tasnifi dolzarbdir, chunki suv siklining buzilishi ekologik falokatlariga olib keladi.

Suv aylanishi nafaqat tabiiy jarayon, balki ekologik muvozanatni saqlovchi tizim bo'lib, bu jarayonni o'rganish zamonaviy geografik tadqiqotlar uchun muhimdir.

Adabiyotlar tahlili va metodologiyasi. Ushbu maqolada suv aylanishining umumiy me'zonlari tasnifi P. Baratov va A. Soatovning "Umumiy tabiiy geografiya" kitobi va Namangan Davlat Universiteti o'quv-uslubiy majmuasi asosida o'rganiladi, suv siklining turlari va ekologik xususiyatlari batafsil ko'rib chiqiladi.

Tabiatda suv aylanishining umumiy me'zonlari tasnifi mavzusi bo'yicha mavjud tadqiqotlar asosan umumiy tabiiy geografiya va gidrologiya kitoblarida o'rganilgan, ammo tasnifning ekologik va fizik jihatlari batafsil ko'rib chiqilmagan. O'zbek adabiyotlarida suv aylanishi gidrosfera va biosfera o'rtasidagi aloqa sifatida tasvirlangan, ammo global va mahalliy sikllarning farqlari kam muhokama qilingan. "Umumiy tabiiy geografiya fanidan o'quv-uslubiy majmua" (2019) da suv aylanishi ma'ruzalar va amaliy mashg'ulotlar orqali o'rganilgan, ammo suv omborlari va ko'llardagi gidrobiosenozlar batafsil emas. Bu ish suv aylanishining global tasnifini ijobiy baholagan, lekin mintaqaviy va mahalliy sikllarning ekologik ta'siri yo'qligini ko'rish mumkin.

Maqolada qiyosiy tahlil, taqqoslash, baholash kabi metodologiyalardan foydalanilib, mavzu batafsil va atroflicha o'rganildi.

Muhokama va natijalar. Tabiatda suv aylanishi suvning Yer yuzasida, atmosferada va yer ostida doimiy harakatlanishi bo'lib, gidrosfera va uning tarkibiy qismlarini bog'laydi. Suv aylanishi global miqyosda okean, quruqlik va atmosfera o'rtasida sodir bo'lib, suvning suyuq, gazsimon va qattiq holatlariga o'tishini o'z ichiga oladi. Suv aylanishining asosiy bosqichlari bug'lanish (suvning havoga o'tishi), kondensatsiya (bulutlar hosil bo'lishi), yog'in (yomg'ir, qor) va oqim (yer usti va yer osti oqimi) bo'lib, bu jarayonlar ekologik muvozanatni saqlaydi. Suv aylanishining tasnifi miqyos, holat va ekologik ta'sirga asoslangan bo'lib, global

sikl okeanlardan boshlanib, quruqlik orqali qaytadi. Mintaqaviy sikl daryo havzalarida, mahalliy sikl esa ko'llar va suv omborlarida sodir bo'ladi. Suv aylanishi suv omborlarida loyqa bosish va suv balansini ta'sir qiladi, bug'lanish va filtratsiyani oshiradi. "Suvning aylanishi (gidrologik sikl) Yerdagi doimo harakatda bo'ladi. Suvning tabiiy aylanma harakati Yerning yuqori qismida, yuzasida hamda ostida suvning uzluksiz harakatini tavsiflaydi".

Suv aylanishining tasnifi suvning holatiga ko'ra suyuq (okean va daryo oqimi), qattiq (muzlik va qor) va gazsimon (atmosfera bug'i) turlarga bo'linadi, bu tasnif suvning tabiatdagi o'zgarishini tavsiflaydi. Global tasnifda suv aylanishi katta sikl (okean-atmosfera-quruqlik), kichik sikl (okean-atmosfera-okean) va ichki sikl (quruqlik-atmosfera-quruqlik) bo'lib, katta sikl suvni global miqyosda taqsimlaydi. Mintaqaviy tasnif daryo havzalarida oqim va yog'inlar orqali sodir bo'ladi, mahalliy tasnif esa ko'llar va suv omborlarida bug'lanish va cho'kindi jarayonlarini o'z ichiga oladi. Suv aylanishining me'zonlari suv balansini elementlariga asoslangan, kiritim (yog'in, oqim) va chiqim (bug'lanish, filtratsiya) nisbatini hisoblaydi. Suv omborlarida suv aylanishi loyqa bosishni oshiradi, suv sifatini pasaytiradi va ekologik muvozanatni buzadi. Ko'llarda suv aylanishi tuzlilik va gidrobiosenozlarni ta'sir qiladi, oligotrof ko'llarda suv aylanishi sekin, evtrof ko'llarda tez bo'ladi. "Suv aylanishi global miqyosda okean, quruqlik va atmosfera o'rtasida sodir bo'lib, suvning suyuq, gazsimon va qattiq holatlariga o'tishini o'z ichiga oladi".

Suv aylanishining ekologik me'zonlari suvning tabiatdagi ta'sirini baholaydi, gidrosfera va biosfera o'rtasidagi aloqani ko'rsatadi. Suv aylanishi tasnifi ekologik guruhlariga asoslangan, gigrofitlar (nam muhit o'simliklari) suv bug'lanishini oshiradi, kserofitlar (qurg'oq muhit o'simliklari) suvni tejaydi. Suv omborlarida suv aylanishi tasnifi quyilma va o'zanli turlarga bo'linadi, quyilma omborlarda suv aylanishi tez, o'zanli omborlarda loyqa bosish bilan sekinlashadi. Ko'llarda suv aylanishi tuzlilik bo'yicha tasniflanadi, chuchuk suv ko'llarda suv aylanishi tez, tuzli ko'llarda sekin bo'ladi. Suv aylanishining umumiy me'zonlari suv balansini tenglamasiga asoslangan, kiritim va chiqim nisbatini hisoblaydi. Suv omborlarida suv aylanishi bug'lanish va transpiratsiya orqali suv isroflarini oshiradi, ekologik muvozanatni buzadi. Ko'llarda suv aylanishi gidrobiosenozlarni shakllantiradi, plankton va bentoslarga ta'sir qiladi. "Suv aylanishi ekologik muvozanatni saqlashda muhim rol o'ynaydi, suv resurslarini okean, qit'a, yer osti va biosfera o'rtasida taqsimlaydi".

Suv aylanishining tasnifi miqyosi bo'yicha global (okean sikli), mintaqaviy (daryo havzalari sikli) va mahalliy (ko'l sikli) turlarga bo'linadi, global sikl suvni butun Yer bo'ylab taqsimlaydi. Suv omborlarida suv aylanishi konfiguratsiya bo'yicha adog'li, vodiydagi va ko'lsimon turlarga bo'linadi, adog'li omborlarda suv aylanishi tezroq. Ko'llarda suv aylanishi gidrobiosenozlar bo'yicha oligotrof, evtrof va tuzli turlarga bo'linadi, oligotrof ko'llarda suv aylanishi sekin va kislorod boy. Suv aylanishining me'zonlari suvning fizik-kimyoviy xossalari asoslangan, tuzlilik va harorat suv aylanish tezligini belgilaydi. Suv omborlarida suv aylanishi loyqa bosishni oshiradi, suv sathini pasaytiradi va ekologik o'zgarishlarga olib keladi. Ko'llarda suv aylanishi tabaqalashuvni shakllantiradi, suv usti va tubi

qatlamlarda suv aylanishi farq qiladi. Suv aylanishining umumiy me'zonlari suvning holati (suyuq, qattiq, gazsimon) va jarayonlar (bug'lanish, yog'in) nisbatini hisoblaydi. "Suv omborlar tasnifi: Quyilma suv omborlari - Suv maxsus kanallar orqali nasoslar yordamida yetkaziladi. O'zanli suv omborlari - Oqim oldini to'sib, suvni ushlab qolish orqali hosil qilinadi".

Suv aylanishining tasnifi suv omborlarida suv balans elementlariga asoslangan, kirim (yog'in, oqim) va chiqim (bug'lanish, filtratsiya) nisbatini belgilaydi. Ko'llarda suv aylanishi tuzlilik bo'yicha chuchuk, tuzli va gigrofil turlarga bo'linadi, chuchuk suv ko'llarda suv aylanishi tez. Suv aylanishining me'zonlari suvning ekologik roli bilan bog'liq, gigrofitlar suv bug'lanishini oshiradi, kserofitlar suvni tejaydi. Suv omborlarida suv aylanishi loyqa bosishni oshiradi, suv sifatini pasaytiradi. Ko'llarda suv aylanishi gidrobiosenozlarni shakllantiradi, plankton va bentosni ta'sir qiladi. Suv aylanishining umumiy me'zonlari suvning tabiatdagi taqsimlanishini baholaydi, global sikl okean va quruqlik o'rtasidagi aloqani ta'minlaydi. Suv aylanishi tabiatdagi hayotni saqlaydi, suv resurslarini taqsimlaydi va iqlimni shakllantiradi. Suv tabiatda bug', suyuq va qattiq kristal shaklida mavjuddir.

Suv aylanishining tasnifi ekologik guruhlarga asoslangan, suv o'simliklari (gidrofitlar) suv aylanishini ta'sir qiladi, suv usti va tubi qatlamlarda aylanish farq qiladi. Suv omborlarida suv aylanishi konfiguratsiya bo'yicha tasniflanadi, vodiydagi omborlarda suv aylanishi loyqa bosish bilan sekinlashadi. Ko'llarda suv aylanishi hayot sikliga asoslangan, vegetativ va jinsiy ko'payish suv aylanishini oshiradi. Suv aylanishining me'zonlari suvning fizik xossalariga asoslangan, harorat va tuzlilik aylanish tezligini belgilaydi. Suv omborlarida suv aylanishi bug'lanish va transpiratsiyani oshiradi, suv isroflarini hisoblaydi. Ko'llarda suv aylanishi tabaqalashuvni shakllantiradi, epilimnion va gipolimnion qatlamlarda aylanish farq qiladi. Suv aylanishining umumiy me'zonlari suvning tabiatdagi rolini baholaydi, suv balansini saqlaydi va ekologik muvozanatni ta'minlaydi.

Gidrosfera suvlari uzluksiz va tez harakat qilib, tabiatda aylanib turadi va atmosfera, litosfera va biosfera bilan chambarchas bog'lanishda bo'ladi.

Suv aylanishining tasnifi suv omborlarida suv sikli elementlariga asoslangan, kirim va chiqim nisbatini hisoblaydi. Ko'llarda suv aylanishi gidrobiosenozlar bo'yicha tasniflanadi, oligotrof ko'llarda suv aylanishi sekin. Suv aylanishining me'zonlari suvning kimyoviy xossalariga asoslangan, ionlar va tuzlilik aylanishni ta'sir qiladi. Suv omborlarida suv aylanishi loyqa bosishni oshiradi, suv sathini pasaytiradi. Ko'llarda suv aylanishi plankton va bentosni ta'sir qiladi, suv sifatini belgilaydi. Suv aylanishining umumiy me'zonlari suvning tabiatdagi taqsimlanishini baholaydi, global sikl okean va quruqlik o'rtasidagi aloqani ta'minlaydi. Suv aylanishi tabiatdagi hayotni saqlaydi, suv resurslarini taqsimlaydi va iqlimni shakllantiradi. Chuchuk suvlarning qayta tiklanishi tabiatda suv aylanishi tufayli sodir bo'ladi.

Suv aylanishining tasnifi suvning tabiatdagi jarayonlariga asoslangan, bug'lanish va yog'in bosqichlarini o'z ichiga oladi. Suv omborlarida suv aylanishi suv balansi bo'yicha tasniflanadi, suv kirimi va chiqimi nisbatini belgilaydi.

Ko'llarda suv aylanishi tuzlilik bo'yicha tasniflanadi, chuchuk suv ko'llarda suv aylanishi tez. Suv aylanishining me'zonlari suvning ekologik roli bilan bog'liq, gidrofitlar suv bug'lanishini oshiradi. Suv omborlarida suv aylanishi ekologik o'zgarishlarga olib keladi, suv sifatini pasaytiradi. Ko'llarda suv aylanishi hayot sikliga asoslangan, vegetativ ko'payish suv aylanishini oshiradi. Suv aylanishining umumiy me'zonlari suvning tabiatdagi rolini baholaydi, suv balansini saqlaydi va ekologik muvozanatni ta'minlaydi. Suv aylanishi tabiatning asosiy muvozanatini saqlaydi, o'simliklar va hayvonlar orqali biosferik aylanishni o'z ichiga oladi.

Suv aylanishi tabiatdagi asosiy jarayon bo'lib, gidrosfera va biosfera o'rtasidagi aloqani ta'minlaydi. Suv aylanishining tasnifi miqyos bo'yicha global va mahalliy turlarga bo'linadi, global sikl okean va atmosfera o'rtasida sodir bo'ladi. Suv aylanishining me'zonlari suvning holati va jarayonlariga asoslangan, suv omborlarida aylanish loyqa bosishni oshiradi. Ko'llarda suv aylanishi gidrobiosenozlarni shakllantiradi, tuzlilik va harorat ta'sir qiladi. Suv aylanishi ekologik muvozanatni saqlaydi, suv resurslarini taqsimlaydi va iqlimni shakllantiradi. Suv omborlarida suv aylanishi suv balansini buzadi, bug'lanish isroflarini oshiradi. Ko'llarda suv aylanishi plankton va bentosni ta'sir qiladi, suv sifatini belgilaydi. Suv aylanishi tabiatdagi hayotni saqlaydi, suv resurslarini taqsimlaydi va ekologik muvozanatni ta'minlaydi. Suv aylanishining tasnifi suvning ekologik rolini baholaydi, gidrofitlar suv bug'lanishini oshiradi. Suv omborlarida suv aylanishi ekologik o'zgarishlarga olib keladi, suv sifatini pasaytiradi. Ko'llarda suv aylanishi hayot sikliga asoslangan, vegetativ ko'payish suv aylanishini oshiradi. Suv aylanishining umumiy me'zonlari suvning tabiatdagi taqsimlanishini baholaydi, global sikl okean va quruqlik o'rtasidagi aloqani ta'minlaydi. Suv aylanishi tabiatdagi hayotni saqlaydi, suv resurslarini taqsimlaydi va iqlimni shakllantiradi. Suv aylanishining tasnifi suvning tabiatdagi jarayonlariga asoslangan, bug'lanish va yog'in bosqichlarini o'z ichiga oladi.

Natijada, tabiatda suv aylanishining umumiy me'zonlari tasnifi suvning global va mahalliy sikllarini ta'kidlaydi, suv omborlari va ko'llarda aylanish loyqa bosish va tuzlilikni oshiradi. Suv aylanishi tasnifi miqyos bo'yicha global (okean sikli), mintaqaviy (daryo havzalari) va mahalliy (ko'l sikli) turlarga bo'linadi, suv balansini saqlaydi. Suv aylanishining me'zonlari suvning holati va ekologik ta'siriga asoslangan, gidrofitlar suv bug'lanishini oshiradi. Suv omborlarida suv aylanishi suv sifatini pasaytiradi, ko'llarda gidrobiosenozlarni shakllantiradi. Suv aylanishi tabiatdagi hayotni saqlaydi, suv resurslarini taqsimlaydi va iqlimni shakllantiradi. Suv aylanishining umumiy me'zonlari suvning tabiatdagi rolini baholaydi, suv balansini saqlaydi va ekologik muvozanatni ta'minlaydi. Suv aylanishi tabiatdagi hayotni saqlaydi, suv resurslarini taqsimlaydi va iqlimni shakllantiradi. Suv aylanishi gidrosfera va biosfera o'rtasidagi aloqani ta'minlaydi, ekologik jarayonlarni boshqaradi va tabiiy muvozanatni saqlaydi.

Xulosa. Xulosa qilib aytganda, tabiatda suv aylanishining umumiy me'zonlari tasnifi suvning global va mahalliy sikllarini ta'kidlaydi, suv omborlari va ko'llarda aylanish loyqa bosish va tuzlilikni oshiradi. Suv aylanishi tasnifi miqyos bo'yicha global (okean sikli), mintaqaviy (daryo havzalari) va mahalliy

(ko‘l sikli) turlarga bo‘linadi, suv balansini saqlaydi. Suv aylanishining me‘zonlari suvning holati va ekologik ta‘siriga asoslangan, gidrofitlar suv bug‘lanishini oshiradi. Suv omborlarida suv aylanishi suv sifatini pasaytiradi, ko‘llarda gidrobiosenozlarni shakllantiradi. Suv aylanishi tabiatdagi hayotni saqlaydi, suv resurslarini taqsimlaydi va iqlimni shakllantiradi. Suv aylanishining umumiy me‘zonlari suvning tabiatdagi rolini baholaydi, suv balansini saqlaydi va ekologik muvozanatni ta‘minlaydi. Suv aylanishi tabiatdagi hayotni saqlaydi, suv resurslarini taqsimlaydi va iqlimni shakllantiradi. Suv aylanishi gidrosfera va biosfera o‘rtasidagi aloqani ta‘minlaydi, ekologik jarayonlarni boshqaradi va tabiiy muvozanatni saqlaydi.

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QASHQADARYO VILOYATI LANDSHAFTINING SHAKLLANISHIDA TOG' JINSLARI VA RELYEFNING O'RNI

Annotatsiya. Qashqadaryo viloyati geologik rivojlanish tarixiy taraqqiyotining qanday kechganligi, hozirgi kundagi shakllangan relyef tuzilishi jihatdan qanday jarayonlarni boshdan kechirganligini, viloyat miqyosidagi holati haqida keltirib o'tilgan. Geologik davrlarning bosqichlaridagi evolutsiyasi O'rta Osiyo tabiiy geografik o'lkasi va O'zbekiston tabiiy geografiyasi geologik taraqqiyoti bilan hamohang rivojlangan. Tog' burmalanishlar davrida paydo bo'lgan tog'lar va ularning nurash ta'sirida energiya boshqa funksional ta'sirlarga ko'chishi haqida yoritib o'tilgan va landshaftlarning hozirgi kundagi holati haqida fikr borgan. Nurash jinslarining qalinligi qaysi hududda qanday yotadi hamda ularning qalinligi, cho'kindi jinslarning xususiyatlari yoritib o'tilgan.

Kalit so'zlar. Relyef, geologiya, nurash, nurash qalinligi, tub jinslar, geologik taraqqiyot davrlari, yotqiziqalar, cho'kindi jinslar, landshaft.

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FEATURES OF GEOLOGY AND RELIEF OF KASHKADARYA REGION

Annotation. *It is told about the historical development of geoecological development of Kashkadarya region, the processes that have taken place in terms of the current relief structure, the situation in the region. The evolutionary phenomena of each stage of the geoecological epochs are described, and the natural geography of Central Asia and the natural geography of Uzbekistan are developed in parallel with the geoecological development. First, the mountains formed during mountain erosion and their transfer of energy to other functional effects under the influence of erosion and their transfer of energy to other functional effects under the influence of erosion are described.*

Keywords. *Relief, geology, weathering, erosion thickness, bedrock, geoecological age, periods of geological development, deposits, landshaft.*

Kirish. Qashqadaryo viloyati hududi O'rta Osiyoning tekislik va tog'li qismlari tarkibida murakkab paleogeografik taraqqiyotni bosib o'tgan. Geomorfologiyasi, geologiyasi kabi tabiiy komponentlar landshaftlarning morfologik holatini kelib chiqishida birlamchi komponentlar sanaladi. Ayniqsa antropogen ta'sir evaziga balandlik mintaqalaridagi geokologik vaziyatning kelib chiqishi, ushbu vaziyatni chuqurroq o'rganishni, aniqlashni taqozo etmoqda. Geologik davrlar davomida tog' jinsi, relyef, iqlim, o'simlik va hayvonot olami, mikroorganizmlar shakllangan. Antropogen landshaftlarning ko'lami ortib borarkan geokologik monitoring ko'lami ham kengayishi zarur. Bu esa tabiiy komponentlarning ma'lum vaqt davomida o'zgarishga uchrashi va komponentlar orasidagi o'zaro aloqalarini tasniflash avvalo landshaftlar qobig'ining "markaziy o'qi"dan boshlanishi lozim, ammo geoxronologik davrlarda yerning ichki kuchlarining ham taraqqiyoti ya'ni tog' jinslari ham relyefni o'zgartirib gohida asosiy birlamchi komponentga aylanadi.

Qashqadaryo viloyati hududining geomorfologik, geologik o'tmishining bugungi kunda inson tomonidan qulay muhit yaratishga asoslangan antropogen ta'sir ko'lamini va geokologik holatlarning sabablari ko'rib chiqilishi zarur hisoblanadi. Hududning balandlik mintaqalarida geokologik vaziyatning tarqalishi geomorfologik, geologik jarayonlar bilan bog'liq bo'lgan qanday yotqiziqlar joylashganligi hamda antropogen ta'sirning oshishi hisobiga tabiatdan oqilona munosabat shaklida olib borish kerakligi haqida yoritish, tog' jinslarining landshaft hosil bo'lishidagi ishtirokini aniqlash kerak.

Asosiy qism. Qashqadaryo viloyati hududining katta qismi Qashqadaryo tektonik botig'ida joylashgan hududdir, botiq Oloy – Hisor tog' tizimining sharqiy tizmalarini hosil qiladigan Zarafshon va Hisor tog' tizmalariga mansub tog'lar bilan o'ralgan. Genetik jihatdan janubiy Tyanshan tog'liklaridan biri Hisor Qashqadaryo tektonik botig'i g'arbda ochiq yarim halqasimon shaklda Qarshi, Nishon, Malik, Qarnob ka'bi cho'llari bilan tutashgan. Havzani o'rgangan olimlardan geomorfologik jihatdan O.Y.Poslavskaya (1959) uchta asosiy mintaqaga ajratadi:

- 1) tog',
- 2) tog' oldi va past tog'lar,
- 3) tekislik mintaqasi.

Olima tog' mintaqasi sifatida Zarafshon va Hisor tizmalariga mansub bo'lgan o'rtacha baland va baland tog'larni o'z ichiga olgan tog'liklarni kiritgan. Bu tizmalar geologik tuzilishining xususiyatlari va neotektonik harakatlarning tabaqalashuvi ularning relyefining xilma-xilligiga sabab bo'lgan. Relyefining strukturaviy, denudatsion va akkumulyativ shakllari mavjud bo'lgan turli xillari tarqalgan. Ushbu tog'larda parchalanish chuqurligi o'rtacha 600 m gacha yetadi.

M.Abdujabborov ma'lumotlariga ko'ra vertikal parchalanishning chuqurligi Qoratepa tog'larining g'arbida 300 m, sharqiy qismida 600 – 700 m, Chaqilkalon tog'larida 700 – 1100 m ni tashkil etadi. Zarafshon tizmasining Jom botig'idan g'arbdagi eng chekka qismini Ziyovuddin – Zirabuloq tog'lari hosil qiladi. Bu tog'lardagi Zindontog' (1116 m) eng baland tog'dir. Ziyovuddin – Zirabuloq tog'lari past tog'lar toifasiga mansub bo'lib, vertikal parchalanish chuqurligi Ziyovuddin tog'larida 100 – 200 m, Zirabuloq tog'larida esa 150 - 300 m (Abdujabborov, 1986).

Hisor tizmasi O'zbekiston hududidagi eng baland tog' tizmasi bo'lib, undagi ko'pgina cho'qqilarning balandligi 4000 m dan ortadi. Tizma Qashqadaryo havzasi doirasida Sumsar – SHertog' (2500 – 2800 m), Hazratistulton (4000 m), Yakkabog' - Osmontarosh, Beshnov, Eshakmaydon, Xontaxti, Toytalash, Kurek, Maydonoq, G'uzor va Boysun tog'larining tarmoqlaridan iborat. Vertikal parchalanish o'rtacha chuqurligi uning g'arbiy qismidagi tog'larda 600 m ga, sharqiy qismidagi tog'larda esa 1200 m ga yetishi mumkin.

Paleogen va neogen davrlarining tog' jinslari ohaktoshlar, dolomitlar, gips va qumli – gilli konglomeratlar, shag'alltoshlar va lyossdan tashkil topgan. Baland va o'rtacha baland tog'larda burmaga nisbatan ko'ndalang cho'zilgan vodiylarning ko'pligi ko'zga tashlanadi. Bunday holat ayniqsa tog'li mintaqaning janubi – sharqida yaqqol ifodalangan bo'lib, G'uzordaryo, Langardaryo, Qizilsuv, Tanxozdaryoning vodiylarini hosil qiladi. Burmaga nisbatan ko'ndalang bo'lgan vodiylarning vujudga kelishini O.Y.Poslavskaya daryolarning antitsedentligi, ayrim hollarda esa epigenetik joylashuvi bilan izohlaydi.

Qashqadaryo havzasining relyef hosil qiluvchi jarayonlari orasida fizikaviy nurash jarayonlari muhim o'rin tutadi. Bu jarayonlarning intensiv namoyon bo'lishining izlari barcha joylarda kuzatiladi. Landshaftlarning esa rivojlanishi doimo bir biri bilan chambarchas bog'liq komponentlar va ularni shakllantiruvchi omillarga bog'liq. Landshaftning dinamikasi tushunchasiga A.A.Krauklis qisqacha qilib quyidagi ta'rif beradi: dinamika - bu ichki va tashqi kuchlar ta'sirida landshaft holatining o'zgarishidir deb ta'kidlagan edi. G.D.Rixter esa tabiiy jarayonlarning dinamikasi deb faqat jarayonlar jadalligining fasllarda o'zgarishini tushunadi. Bunday o'zgarishlar asosan havo harorati yog'in-sochin va bug'lanishning yil davomida o'zgarishi bilan bog'liqdir. Lekin bu qaysidir tomonlama bir yoqlama fikrlilikni keltirib chiqaradi.

Masalan adirlar lyoss va lyossimon jinslar bilan qoplangan, yuzasi tekislangan yassi tepa marjonlardir. Lyoss qoplamining qalinligi sharqda 2 – 5 m dan g'arbda 10 – 15 m gacha etadi. Adirlarning zamini har xil kattalikdagi tosh bo'laklari, shag'al va qum aralashmasi – konglomeratdan tashkil topgan. Bu esa

nurashning tog' mintaqasidan boshlangan migratsiyasini davomi sifatida adir mintaqasida namoyon bo'lishini anglatadi. Landshaft dinamikasi tushunchasining shunga yaqin izohini biz V.V.Sochavaning geotizimlar va ularning dinamikasi kitobida ham uchramiz. Uning fikricha geotizimning dinamikasi deganda landshaftdagi bir invariantga bo'ysungan o'zgaruvchan holatlar tushuniladi. Landshaftning dinamikasiga landshaftning ma'lum bir tarkibi mavjud bo'lib, shu vaqt mobaynida ro'y berishi mumkin bo'lgan o'zgarishlarnigina kiritish mumkin. Agar ichki va tashqi jarayonlar ta'sirida landshaftning ichki tuzilishiga putur yetsa bunday o'zgarishlarni V.B.Sochava evolyutsion o'zgarish deb ataydi. Boshqacharoq qilib aytganda landshaftdagi dinamik o'zgarish bir invariant doirasida bo'lganligi uchun landshaftning tubdan sifat o'zgarishiga olib kelmaydi. Evolyutsion o'zgarishlar esa landshaftning ichki tuzilishini o'zgarishiga, bir landshaftning o'rniga boshqasini hosil bo'lishiga sabab bo'ladi. Bunday o'zgarishlar esa ko'pincha geologik vaqtni o'z ichiga oladi.

Qashqadaryo viloyati hududini juda ko'p vaqt davomida dengiz qoplab yotgan hamda vaqti – vaqti bilan chekingan. Hozirgi ko'rinishdagi landshaftlarning shakllanishi esa neogen va to'rtlamchi davrlarning kontinental yotqiziqlaridan tarkib topgan adirlar sohilbo'yi jarayonlarining hosilasidir. Chunki ular hozirgi Kitob – Shahrisabz tektonik botig'i o'rnidagi dengizning sharqiy qirg'oqlarning yemirilishi natijasida hosil bo'lgan jinslardan tuzilgan. Adirlar paleogen, neogen va to'rtlamchi davrlarning jinslaridan tuzilgan bo'lib, Qashqadaryo havzasining ichki va g'arbiy tekislik qismini o'rab turadi. Adirlar joylanishiga ko'ra Qoratepa, Miroqi, Yakkabog' adirlariga ajratiladi (Mamatov, 1994). Litologik tarkibiga ko'ra, bu adirlar bir – biridan keskin farq qiladi. Tog' jinslarining har hil omillar ta'sirida parchalanishi va migratsiyasi turli davrlarda turlicha kechgan. Xususan ma'lum bir hududning iqlimi bunda ishtiroki yuqori potentsiallikka egadir. Tabiiy omillar harakat jarayoni ushbu dinamik kuchni "yurg'izgan".

Binobarin, tekislik mintaqasi Qashqadaryo havzasining katta g'arbiy qismini o'z ichiga olib, akkumulyatsiyaning hosilaviy hududidir. Mintaqaning asosiy qismi Qarshi cho'lining qiya tekisligi bilan band. Aslida Qarshi qiya tekisligi Qizilqum cho'lining janubi – sharqiy chekkasi hisoblanib, deflatsion kuchlar ta'siri ham mavjud. Tektonik jihatdan cho'kish oblastida joylashgan Qarshi cho'lining qiya tekisliklari to'rtlamchi davrning qalin prolyuvial, prolyuvial – allyuvial, allyuvial va delyuvial yotqiziqlari bilan qoplangan. Ushbu yotqiziqlar ikki fatsiyadan iborat, qadimiy fatsiya tog'oldi tekisliklari va daryo vodiylarida tarqalgan. Yoshroq fatsiya qalinligi 30 m gacha yetadigan lyoslar va lyosli suglinkalardan iborat hamda tog'oldi qiya tekisliklarida va yuqori yuqori terrasalarda tarqalgan. Qarshi cho'lining Ko'kdala tog'oldi tekisligida lyoslar ayniqsa keng tarqalgan.

Qarshi shahridan shimolda va shimoli g'arbda uzoq geologik o'tmishda sharqdan g'arbgacha cho'zilgan tog' tizmasining qoldiqlari sifatida bir–biridan ajralib turadigan «orol» ko'rinishidagi burmalangan (gumbazsimon) qoldiq tog'lar - Qo'ng'irtov, Kosontov, Maymanoqto'v, Oloviddintov va boshqa qirlar joylashgan. Bu qadimiy qoldiq tog'lar Qarshi cho'lining sharqiy qismini ikki qismga ajratib turadi. Qoldiq tog'larning tarkibi ohaktosh, mergel, dolomit va boshqa jinslardan

tashkil topgan. Landshafti cho'lga xos bo'lgan landshaftdan iborat. Tekislik hududining antropogen ta'sirga uchrashi cho'l landshaftini o'zgartirgan. Asosan bir paytlar cho'l hududdagi bu dashtlar ekin maydoni sifatida qariyb ellik yildan ortiq xizmat qilib kelayotgan bo'lsada, ba'zi joylarning landshafti muqaddam bo'lgan landshaftga yaqin ko'rinishga kelib qolmoqda. Buning boisi esa inson tomonidan olib borilgan bir yoqlama qarash va noto'g'ri foydalanish ka'bilar hisoblanadi.

Qarshi cho'lining shimoli - g'arbidagi SHo'rsoy doirasidagi qirlar boshqacharoq sajiyaga ega. Bu qirlarning nisbiy va mutlaq balandligi uncha katta emas, relyefi qiya to'lqinsimon, yonbag'irlar tikligi 5 – 60. Bu qirlarda eroziya jarayonlari yaqqol ifodalanmagan, deflyatsiya jarayonlari ancha kuchli kechadi.

Platosimon relyef shakllarini vujudga kelishi yotiq holda mavjud bo'lgan ohaktosh, qumtosh, konglomeratlarning eroziyaga berilishiga bog'liq.

Qarshi cho'lining janubi – sharqiy qismi Nishon cho'li bilan band. Bu cho'lining yuza tuzilishi uchun tekisliklar va ular orasidagi platosimon balandliklar xos. Platosimon qirlar orasida eng balandlari Do'ltalitov, va Qoraqirdir. Qoraqirning yuzasi suv eroziyasi tufayli kuchli parchalangan va uning jarlar bilan kuchli parchalangan qismini sharqda Saksondara hosil qiladi.

Qarshi cho'lining janubi – g'arbida Sandiqli cho'li joylashgan. Bu qumli cho'lining yuzasi qator – qator qum tepalari va marzalardan iborat. Bundan tashqari, bu yerda ko'chma qumlar va taqirlar ham uchraydi.

Lyosli jinslar bilan qoplangan yassi yuzalar qumtepa marjonlari katta – katta ko'chma qumli massivlar bilan almashinib turishi ham Qarshi cho'li relyefi uchun xos bo'lgan asosiy xususiyatlardir. Ko'pgina hollarda xilma – xil relyef tiplari o'zaro tutash yoki bir – biri bilan aralash holda tarqalgan. Qumli yuzalar orasida Xo'jamuborak, Oqqum, Deyqum, Shokircha, Gulbodom, Suxta, Pomuq, Chodirliqum, Darvozaqum yirikroq qumli maydonlardir. Tekislikning chekka g'arbiy qismi ham buzuvchi (deflyatsiya), ham vujudga keltiruvchi (eol akkumlyutsiyasi) kuchga ega bo'lgan eol jarayonlari ustuvorlik qiladigan maydonlardir. Taqir hamda sho'rxoq hosil bo'lishi jarayonlari uncha katta ahamiyatga ega emas.

O'zlashtirilayotgan va sug'orilayotgan hududlarda relyef hosil qiluvchi jarayonlarning sajiyasi ham o'zgargan. Ariqlar va kanallar hamda zovurlar yaqinidagi maydonlarda jarlarning rivojlanish jarayonlari sug'orish eroziyasining faolligi bilan bevosita bog'liq. Sug'oriladigan maydonlarda sug'orish eroziyasi, qayta sho'rlanish botqoqlanish, shamol eroziyasi kabi dehqonchilik nomaqbul jarayonlarning kuchayotganligi kuzatilmoqda. Tekislik relyefida o'tmish tarixiy davrlarda inson tomonidan barpo etilgan tepaliklarning tez – tez uchrashi ham relyefning muhim belgilaridandir. Landshaftlarga bu tahlit o'zgarishlarning qilinishi o'z "natijasi"ni bermoqda. Geologik yotqiziqlarning nurash, eroziya, deflyatsiya ka'bi ta'sirida parchalanishi, tashilishi va yotqizilishi geomorfologik ko'rinishda aks etgan. Bu jarayon esa landshaft komponentlarining taraqqiyoti, dinamikasi va omillariga bevosita a'loqadordir.



1-rasm. Qashqadaryo viloyatining GIS asosida olingan relyef surati.

Manba: *Google Earth.Yandex*

Umuman landshaftlarda turli holatlarning bo'lishi haqidagi fikrlarni landshaftshunoslikka asos solgan olimlarniig dastlabki yillarda yuzaga kelgan ilmiy ishlarida ham uchratishimiz mumkin. Masalan, L.S.Berg landshaftda bo'ladigan o'zgarishlarning ikki hili mavjudligini ko'rsatib o'tadi: takrorlanadigan va takrorlanmaydigan.

Takrorlanadigan o'zgarishlarga asosan fasllar almashinishi bilan bog'liq bo'lgan o'zgarishlarni kiritadi. Bunday o'zgarishlar landshaftda mavjud bo'lgan ichki tartibda aytarlik biror yangilik kiritmaydi. Takrorlanadigan o'zgarishlarga halokatli tavsifdagi zilzila, katta yong'inlar, dovul, suv toshqini ka'bi o'zgarishlarni ham qo'shadi. Chunki landshaftlar bunday o'zgarishdan keyin yana oldingi holatiga qaytishga harakat qiladi degan edi.

Xulosa qilib aytganda, Qashqadaryo viloyati hududining geologik, geomorfologik genezisi landshaft komponentlarning aks etishida namoyon bo'ladi.

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KITOB GEOLOGIYA MILLIY TABIAT BOG'I HUDUDIDA TARQALGAN FLORA HAMDA FAUNALAR TARQALISHI

Annotatsiya. Ushbu maqolada Kitob geologiya milliy tabiiy bog'i hududida tarqalgan geologik turfaliklar, o'simlik va hayvonot dunyosi tarqalishi haqida ma'lumotlar bayon etilgan.

Kalit so'zlar: geologiya, paleontologiya, litologiya, stratigrafiya, paleozoy, era, devon, ordovik, davr, soy, Tetis dengizi, paleontologik-stratigrafik obyektlar, Qizil kitob, Xo'ja Qo'rg'on darasi, Zinzilboy soyi.

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DISTRIBUTION OF FLORA AND FAUNA IN THE TERRITORY OF KITOB GEOLOGICAL NATIONAL NATURE PARK

Abstract. This article presents information on the distribution of geological diversity, flora, and fauna in the territory of the Kitab Geology National Natural Park.

Keywords: geology, paleontology, lithology, stratigraphy, Paleozoic, era, Devonian, Ordovician, period, stream, Tethys Sea, paleontological-stratigraphic objects, Red Book, Khoja Kurgan Gorge, Zinzilboy stream.

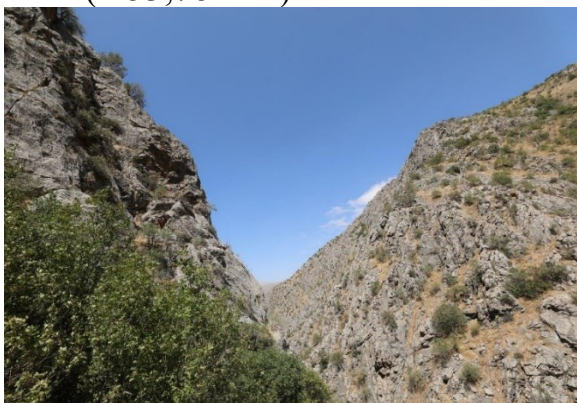
Kirish. O'zbekiston janubida Zarafshon tog'ining janubiy – g'arbiy yonbag'rida Markaziy Osiyo bo'yicha yagona bo'lgan Kitob geologiya milliy tabiat

bog'i joylashgan. Bu milliy bog' hozirgi kunda butun Mustaqil davlatlar hamdo'stli (MDH) da yagona bo'lib, unda boshqa qo'riqxonalarda olib borilmaydigan ilmiy – geologik ishlar bajariladi. Yer kurrasining tabiiy – ilmiy yodgorliklari bo'lgan paleontologik litologik va stratigrafik yodgorliklarni muhofaza etadi va reja asosida ular ustida ilmiy – tekshirish ishlari olib boriladi.

Kitob geologiya milliy tabiat bog'i O'zbekiston Respublikasi Davlat Geologiya va Mineral Resurslar Qo'mitasi tasarrufida bo'lib, Qashqadaryo viloyatining Kitob tumanida joylashgan. Qo'riqxona 1976-yilda tashkil etilgan bo'lib, uning asosiy maqsadi noyob geologik obyektlarni, stratigrafik kesmalarni va paleontologik topilmalarni muhofaza qilish va ilmiy tadqiqotlar olib borishdir

Asosiy qism. Kitob geologiya milliy tabiat bog'i O'zbekiston Respublikasi Qashqadaryo viloyatining Kitob tumanida joylashgan bo'lib, u mamlakatning eng noyob va ilmiy ahamiyatga ega tabiiy-madaniy meros obyekti sanaladi. Qo'riqxona 1979-yilda O'zbekiston Respublikasi Vazirlar Mahkamasining 206-sonli qarori bilan tashkil etilgan va u beqiyos geologik obidalarini, stratigrafik kesmalarni, paleontologik topilmalarni asrab-muhoafaza qilish hamda ilmiy tadqiqotlar uchun yaratilgan tabiat qo'riqonasidir.

Qo'riqxona hududi Zarafshon tog' tizmasining janubi-g'arbiy etaklarida, 1300 dan 2650 metr balandlikda joylashgan bo'lib, uning maydoni taxminan 3938 gektar ($\approx 53,78 \text{ km}^2$) ni tashkil etadi.



Kitob geologiya milliy tabiat bog'i hududidan lavhalar



Kitob geologiya milliy tabiat bog'i hududidan lavhalar

Ushbu geologik hudud O'zbekiston Respublikasi Geologiya va minerallar resurslari davlat qo'mitasiga bevosita qaraydi va boshqa tabiiy qo'riqxonalar orasida o'zining noyob ilmiy ahamiyati bilan ajralib turadi.

Stratigrafik va geologik ahamiyati. Hudud geologik jihatdan dunyoda juda noyob bo'lgan uzluksiz paleozoy stratigrafik kesmalarga ega. Bu yerda Yer tarixining qadimgi davrlari, xususan ordovik, devon va karbon (toshko'mir) davrlariga oid tog' jinslari, qatlamlar va ularning tarkibida saqlangan organik dunyo qoldiqlari keng tarqalganligi bilan ahamiyatli.

Bog' hududidagi kesmalar tarkibida qadimiy dengiz hayotidan qolgan o'ta yaxshi saqlangan o'simlik va hayvon izlari (braxiopodalar, trilobitlar, marjonlar, foraminiferalar va boshqalar) mavjud bo'lib, ular Yerning 300- 407 million yillik geologik tarixini o'rganishda beqiyos ilmiy ahamiyatga ega.



Kitob geologiya milliy tabiat bog'i hududda ilmiy o'rganishlar



Kitob geologiya milliy tabiat bog'i hududda ilmiy o'rganishlar

Zinzilban bo'lagi hududi xususan Devon davrining pastki o'tish oralig'ining global stratigrafik etaloni sifatida tan olingan. Bu kesma 1989-yilda Xalqaro Geologiya Kengashi tomonidan etalon sifatida qabul qilingan va 1996-yilda Xalqaro Geologik Fanlar Ittifoqi tomonidan tasdiqlangan.

Ushbu stratigrafik qoldiqlar orqali olimlar Yerning geologik tuzilishi, tog'larning shakllanish jarayoni, dengiz sathining o'zgarishi hamda hayotning evolyutsiyaviy yo'nalishlari haqida aniq va chuqur ma'lumotlarni oladi.

Paleontologik boylik. Milliy bog' hududidagi qatlamlarda minglab geologik topilmalar saqlangan. Bu topilmalar dengiz tubida yashagan qadimgi organizmlarning izlarini aks ettiradi va ular:

- keng doiradagi hayvon va o'simlik turlarini,
- ular qoldirgan skelet, iz va strukturalarini,

-mikro organizmlarni o‘z ichiga oladi.

Paleontologik topilmalar nafaqat O‘zbekiston, balki Markaziy Osiyo, Rossiya, Xitoy va Yevropa olimlari orasida ham keng tadqiq etiladi va xalqaro ilmiy loyihalarda qo‘llaniladi.

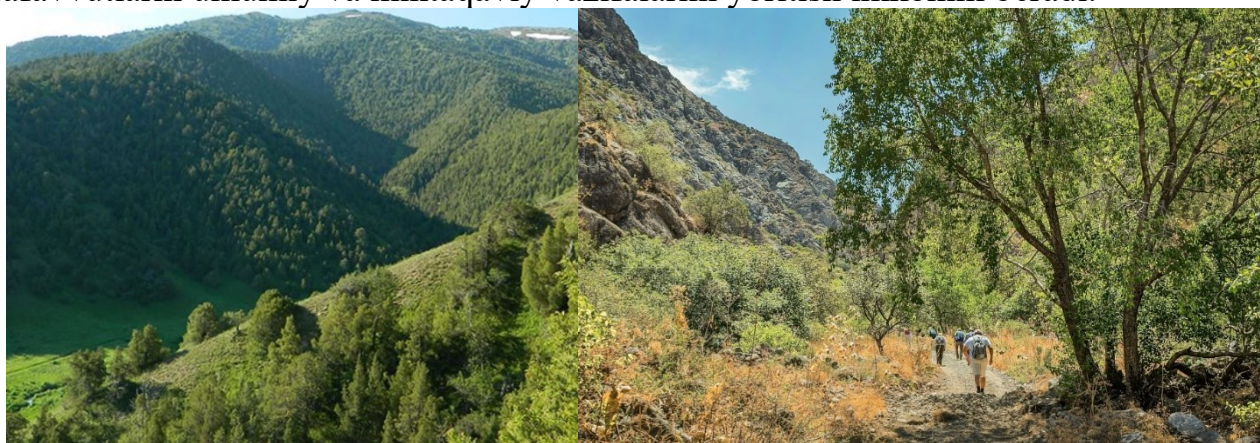
Tabiatshunoslik va bioxilma-xillik. Geologik sayyohlik nuqtai nazaridan boy bo‘lishi bilan birga, qo‘riqxona botanik va zoologik xilma-xillikka ham ega. Bu hududda o‘sovchi o‘simliklar soni juda ko‘p bo‘lib, ular orasida turli xil endemik turlar uchraydi. Archa (*Juniperus seravschanica*) kabi daraxtlar turlari bu mintaqaning asosiy o‘rmon maydonlarini tashkil qiladi.

Shuningdek, milliy bog‘ning hayvonot olami ham boy bo‘lib, u yerdagi fauna tarkibiga:

- yovvoyi cho‘chqa;
- tulki;
- bo‘ri;
- turli qush turlari;
- rovullar, endemik qo‘ng‘izlar va boshqalar kiradi.

Ko‘rinib turibdiki, aniq stratigrafik sxemalar tuzilishi – geologik syomkalar asosi ekanligi, ayniqsa, uning markaziy qismi bo‘lgan stratigrafik kalonkalar yasashda ajralmas qismi ekanligi ayon bo‘lmoqda. Buning uchun cho‘kindi jinslarni iloji boricha maksimal aniq ko‘rinuvchi qatlamlarga bo‘lish, har bir qatlamning yoshi va kelib chiqishi paleontologik topilmalar asosida isbotlangan bo‘lishi kerak.

Faqatgina paleontologik tosh qoldiqlargina har bir qatlam to‘g‘risida aniq ma’lumot beradi, strukturali – faunal zonalar chegarasini aniq ko‘rsatadi, regional to‘qnashish bo‘lgan joylar aniqlanadi. Bog‘ maydonidagi toshga aylangan o‘simlik va hayvon qoldiqlarini o‘rganish yuqoridagi amaliy vazifalarni va stratigrafik tafavvutlarni umumiy va mintaqaviy vazifalarini yoritish imkonini beradi.



Kitob geologiya milliy tabiat bog‘i hududda flora (o‘simliklar) dunyosi tarqalishi

Ilmiy, ta’limiy va ilmiy-turistik ahamiyati. Kitob geologiya milliy tabiat bog‘i geologiya, paleontologiya va atrof-muhitni muhofaza qilish bo‘yicha tadqiqotlar olib boriladigan markaz hisoblanadi. Bu yerga ilmiy ekspeditsiyalar, talaba va doktorantlar, xorijiy olimlar tashrif buyuradi va ilmiy seminarlar, dala amaliyotlari o‘tkaziladi.

Shuningdek, qo'riqxonaning geologik maydonlari uchun maxsus yo'laklar, kuzatuv maydonchalari va paleontologik yig'ma to'plamlar ham mavjud bo'lib, ular sayyohlar va tadqiqotchilar uchun ochiq.

Xulosa. Kitob geologiya milliy tabiat bog'i O'zbekistonning geologik va tabiiy merosining bebaho qismidir. Bu yerda paleozoy davrining uzluksiz stratigrafik kesmalari saqlangan bo'lib, ular Yer tarixini va hayot evolyutsiyasini o'rganishda muhim ilmiy resurs vazifasini o'taydi. Qo'riqxona nafaqat ilmiy markaz, balki sayyohlar uchun ham noyob tabiat yodgorligidir.

Yer kurrasida minglab mutaxassis paleontologlar bor. Ular organik hayot paydo bo'lishi, rivojlanish qonunlarini o'rganadi. Bu o'z navbatida geologlarga qo'l keladi. Umuman yer kurrasining har qanday qismining geologik tuzilishini bilish o'sha joydagi foydali qazilmalarni ko'r – ko'rona izlashga qaraganda oson kechib, geolog qo'lidagi paleontologlar tuzgan ma'lumotlar asosida topilgan foudali qazilmalar ancha arzonga ham tushadi. Har bir paleontolog o'zi o'rgangan region to'g'risidagi ma'lumotga ega bo'ladi va bu ma'lumotlar regiondan – regionga qismma – qism yig'ilib geolog qo'lidagi asosiy hujjat, geologik xaritaga aylanadi. Butun dunyo paleontologlari o'zaro uchrashishar ekan, ular o'zlaridagi ma'lumotlarni almashishadi, yig'ishadi va tahlil qilishadi. Shu sababli o'sha vaqtda tashkil etilgan. Kitob geologiya milliy tabiat bog'i bu mas'ul vazifani butun dunyodagi va Markaziy Osiyo hududidagi paleontologlarning yig'ilib maslahatlashadigan joyiga aylandi.

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O'QITUVCHINING KASBIY KOMPITENTLIGINI OSHIRISHDA AXBOROT TEXNOLOGIYALARINING ROLI

Annotatsiya: Maqolada zamonaviy ta'lim tizimini yangi axborot texnologiyalari tarkibida shakllantirish, axborot resurslari, ilmiy-texnik taraqqiyot, modulli o'qitish, axborotlashtirish, kommunikatsiya, ta'limda veb-saytlar, masofaviy o'qitish, o'qituvchining axborot madaniyati, internet resurslari va ulardan foydalanish shaxsning funksional savodxonligini rivojlantirish va takomillashtirish vositasi sifatida qarash, universal kompyuter savodxonligini taminlash, ijodiy fikrlashni shakllantirish asosida o'qituvchilarga kasbiy faoliyatida axborot texnologiyalaridan foydalangan holda dars sifatining oshirilishi kuzatilgan va o'rganilgan.

Kalit so'zlar: Zamonaviy axborot texnologiyalari, kompyuter texnologiyalari, masofaviy o'qitish, internet resurslari, animatsiya, axborot-ta'lim resurslari, innovatsiya.

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THE ROLE OF INFORMATION TECHNOLOGIES IN IMPROVING THE TEACHER'S PROFESSIONAL COMPETENCE

Abstract: *The article describes the formation of a modern education system in the structure of new information technologies, information resources, scientific and technological development, modular teaching, informatization, communication, websites in education, distance learning, teacher information culture, Internet resources and Their use as a means of developing and improving the functional literacy of the individual, ensuring universal computer literacy, the formation of creative thinking has been observed and studied to improve the quality of lessons for teachers using information technology in their professional activities.*

Keywords: *Modern information technology, computer technology, remote training, Internet resources, animation, information and educational resources, innovation.*

Kirish. O'zbekistonda global axborot va ta'lim makoniga kirishga qaratilgan yangi ta'lim tizimini ishlab chiqish amaliyotga bosqichma-bosqich tadbiriq etilmoqda. Ushbu jarayon zamonaviy texnik imkoniyatlarga mos bo'lishi va yoshlarning axborot jamiyatiga barkamol kirishini ta'minlaydi. Bunda kompyuter texnologiyalari ta'lim tizimining samaradorligini sezilarli darajada oshiradigan yaxlit o'quv jarayonining ajralmas qismi bo'lishi kerak.

O'zbekistonda bugungi kunda olib borilayotgan siyosatning asosiy yo'nalishlaridan biri yosh avlodni ma'naviyatli yetuk insonlar sifatida tarbiyalashdan iborat.

Mavzuga oid adabiyotlarning tahlili. Bugungi kun ta'lim tizimida ish yuritayotgan o'qituvchidan o'z faoliyatida bir qator vazifalarni amalga oshirishi kerak. O'z sohasining ijodkori, izlanuvchisi, o'z faoliyatini tahlil qilabilishi, qiyoslash, yo'l qo'ygan uslubiy kamchiliklarini ko'ra bilishi, ularni bartaraf etishi, o'z ish faoliyatini yangi texnologiyalar bilan takomillashtirishi va o'z ustida tinimsiz ishlashi, natijada o'z faoliyatining mukammal, o'ziga xos shakli va uslubchisi bo'lishi kerak.

Bu masalada O'zbekiston Respublikasi Prezidenti Shavkat Mirziyoyev 2017-yil 7-fevraldagi Farmoni bilan 2017-2021-yillarda O'zbekistonni rivojlantirishning beshta ustuvor yo'nalishi bo'yicha harakatlar strategiyasida takidlab o'tgan [1,2]

Ta'lim muhitini shakllantirish O'zbekistonda davlat siyosati darajasiga ko'tarildi, uni hal qilish uchun yangi sharoitda mutaxassislar tayyorlash mumkin bo'lgan istiqbolli ta'lim tizimini yaratish zarur. Maqsad -ta'lim sifatini oshirish, mamlakatning ilmiy-pedagogik salohiyatini ko'tarish, rivojlantirish va undan samarali foydalanish, axborot kompyuter texnologiyalariga asoslangan ta'limning yangi bosqichiga bosqichma-bosqich o'tish uchun sharoit yaratib berishdan iborat.

Tadqiqot metodologiyasi. Ta'lim sohasidagi ta'lim faoliyati samaradorligini oshirish uchun o'rganilayotgan jarayonlar, hodisalar, obyektlar to'g'risidagi ma'lumotlarni to'plash, to'plash va tizimlashtirish va qayta ishlashni avtomatlashtirishdan iborat. Bunda, yangi axborot texnologiyalari tarkibida shaxsning funksional savodxonligini rivojlantirish va takomillashtirish vositasi sifatida qarash, universal kompyuter savodxonligini ta'minlash, axborot madaniyatini shakllantirish, ijodiy fikrlashni shakllantirish, o'qituvchilarga kasbiy

faoliyatida axborot texnologiyalaridan foydalanishlarida yangi dasturlar to'g'risida yo'llanmalar berib borish tizimini yaratishni taqoza etadi.

Axborotlashgan jamiyatga o'tish sharoitida o'qituvchilarni tayyorlashga bo'lgan talablar, ayniqsa, uning axborotga bo'lgan qobiliyatining oshishiga omil bo'lib xizmat qiladi. Pedagogik ta'lim jarayonlarini zamonaviy axborot texnologiyalari asosida samarali tashkil etishda ta'lim va tarbiya jarayonini yanada mukammal tashkil qilishni takomillashtirish va pedagogik faoliyatning samaradorligini oshirish monitoringini tashkil etish imkoniyatini yaratadi.

Zamonaviy axborot texnologiyalari asosida o'qituvchining pedagogik va kasbiy faoliyatidagi o'rnini quyidagilar belgilab beradi:

- ✓ ta'limning texnologik asosini zamon talablari darajasida rivojlantirish bilan bog'liq bo'lgan murakkab jarayon yengillashadi;

- ✓ dars jarayonini zamonaviy texnik vositalar asosida tashkil etish uchun maxsus ko'nikma va malakalar shakllantiriladi;

- ✓ ta'lim jarayonida o'qituvchining mustaqil faoliyati takomillashadi, dars jarayonining samaradorligi o'qituvchidan o'quvchiga ko'chadi;

- ✓ o'qituvchilarning axborotni bilish qobiliyati uning kasbiy va pedagogik faoliyatida samarali qaror qabul qilishga imkon beradigan fanlarga oid bilimlarini tashkil qilishning maxsus turi sifatida namoyon bo'ladi.

O'qituvchilardan kompyuter yordamida ma'lumotlarni taqdim etishi, saqlashi, qayta ishlashi va uzatish usullarini bilishi, shaxsiy kompyuterda operatsion tizimlar, yordamchi dasturlar, internetdan ma'lumotlar olishi va uni taqdim eta olishligi talab etiladi. Shuning zaminida o'qituvchining axborot madaniyatini shakllantirish, ma'lum bir dunyoqarashini shakllantirishni, uning axborot texnologiyalaridan foydalangan holda pedagogik faoliyatni amalga oshirishi kerak bo'lgan bilim, ko'nikma va qobiliyat tizimiga ega bo'lishi taminlanadi, yangi axborot texnologiyalaridan foydalanish o'qituvchining kasbiy qobiliyatini sezilarli darajada oshiradi, uning pedagogik madaniyatining chegaralarini kengaytiradi va kasbiy faoliyati samaradorligini shuningdek, ta'lim sifatini oshirishga xizmat qiladi.

Zamonaviy axborot texnologiyalari shakl va mazmunining rangbarangligi o'quvchining qiziqishi, imkoniyati va shaxsiy xususiyatlaridan kelib chiqib taklif etilayotgan holatlardan tanlash imkoniyatini beradi [3,4]

Asosiy maqsad-inson hayotining barcha sohalariga axborot-kommunikatsiya texnologiyalarining jadal kirib borishi va rivojlanishini ta'minlashdan iborat.

O'qituvchining kasbiy axborot madaniyati quyidagi mezonlar asosida shakllanib boradi:

- ✓ o'z kasbiy faoliyatiga tegishli axborotlarni olish, uni qayta ishlash va foydalanish metodlari va usullarini o'zlashtirishi;

- ✓ kompyuter savodxonligi va axborotni izlash malakasi, axborotdan foydalanish hamda baholash, kompyuter kommunikatsiyasi texnologiyalariga ega bo'lish, pedagogik faoliyatning barcha sohalarida axborot texnologiyalari imkoniyatlarini egallash va foydalanishdan iborat axborot omilkorligi.

O'qituvchining axborot qobiliyatini shakllantirishdagi shaxsiy-faoliyat yondashuvi kasbiy ishdagi texnologik o'zgarishlarning darajasi va sifatiga bevosita

bog'liq bo'lib, nafaqat "nima qilish kerak", balki "buni qanday qilish kerak" degan savolga ham javob berishga imkon beradi. Innovatsion usulda ishlaydigan o'qituvchi quyidagi ishlarni bajarishi kerak, yani o'quv jarayonini texnologik jihatdan rivojlantiradi va shuning natijasida modellashtiradi (talabalarning bilim olishini kuzatish, hamkasblar tajribasini) [4, 5, 6].

Hozirgi vaqtda o'qituvchi va talaba o'rtasidagi "hamkorlik tamoyillari" qurilishi kerak va ushbu vazifani bajarish uchun o'qituvchi zamonaviy pedagogik va axborot texnologiyalarini yaxshi bilishi talab etiladi.

Hususan, ixtisoslashtirilgan o'quv materiallarini ishlab chiqishda ta'limdagi haqiqiy vaziyatni hisobga olish zarur, bunda o'qituvchilarning axborot texnologiyalardan foydalana olish darajasini ikki bosqichda tahlildan o'tkaziladi:

1) ta'lim tizimida faoliyat olib borayotgan o'qituvchilarning aksariyati kompyuterlarning zamonaviy dasturlaridan qay darajada foydalana olishi;

2) o'qituvchilarning kompyuter tarmoqlari bilan ishlay olishligi.;

Shunday qilib, ta'lim tizimining didaktik samaradorligi, ta'limning har qanday ko'rinishida ta'lim sifatini oshirish zamonaviy axborot-pedagogik va an'anaviy o'qitish texnologiyalarini ilmiy asosda birlashtirish, shuningdek, talabalarning ijodiy salohiyatini ro'yobga chiqarish uchun shart-sharoitlarni yaratishni taqozo etadi.

O'quv jarayonida axborot texnologiyalaridan foydalanish o'quvchilarning bilim va kognitiv faolligini oshirishga imkon beradi.

Bunda:

✓ o'qituvchi axborot-kommunikatsiya texnologiyalari bo'yicha o'zlashtirishi va professionalligi, o'qituvchining axborot jamiyatini shakllantirishi va rivojlantirishda o'zining kasbiy faoliyatni amalga oshirishga tayyorligini aniqlash;

✓ axborot madaniyati innovatsion ta'lim muassasalari o'qituvchilarning malakasini oshirishning strategik manbaiga aylanishi, shaxsiy-faollik xususiyatiga ega va pedagogik madaniyatni rivojlantirishga ko'maklashadi;

O'quv jarayonida yangi axborot texnologiyalaridan foydalanish o'qituvchilarga interfaol suhbatni amalga oshirish orqali o'quv jarayonini individuallashtirish va differentsiatsiya qilish, o'quv faoliyati usulini mustaqil ravishda tanlash va o'rganilayotgan ob'ektlarni kompyuterda vizual ravishda tanlash imkoniyatini beradi.[7, 8, 9].

Shunday tabaqalanishlarni bartaraf etish uchun o'qituvchilar zamonaviy axborot texnologiyalarini talim va tarbiya jarayonida qo'llay olishi va malakalarga ega bo'lishlari kerak bo'ladi. Bunda:

✓ axborotlarni saqlash, qayta ishlash, tarqatish va namoyish qilishni bilishi;
✓ ta'lim jarayonida amaliy masalalarni yechishda axborot tarmoqlarini qo'llashi;

✓ masofaviy ta'lim elektron o'quv-metodik resurslaridan foydalanishi;
✓ multimediali hujjal va loyihalarni yaranshni bilishi;
✓ kompyuter tarmoqlari orqali olinadigan axborot xizmatlari turlarini tavsiflashi;

- ✓ fanlarni o'qitishda zamonaviy axborot texnologiyalarini joriy etishning maqsadi, mazmuni va vazifalarini bilishi;
- ✓ axborot texnologiyalarini o'qitishda joriy etishning didaktik tamovillarini bilishi;
- ✓ axborot texnologiyalaridan darsdan tashqari mashg'ulotlarni tashkil etishi va uning mazmunini varata olishi;
- ✓ Internet ta'lim resurslari tog'risida tasavvurga ega bo'lishi;
- ✓ axborot va kommunikatsiya texnologiyalari tuzilmasi va ta'minotini; texnik va dasturiy vositalarini egallashi.

Bundan tashqari, masofadan turib o'qitish shakli ta'lim tizimi o'quvchi va o'qituvchilarning shaxsiga yo'naltirilgan muammolarini hal qilishda juda samarali bo'lishi mumkin. Multimedia axborot vositalarini joriy etish natijasida o'quv jarayonining samaradorligi o'quvchining aqliy faoliyatiga o'ziga xos ta'siri ortadi [10].

Tahlil. Natijada, multimedia tizimidan foydalangan o'qituvchilarda innovatsion o'quv jarayonidagi pedagogik faoliyatning mazmuni an'anaviylardan ancha farq qiladi. Birinchidan, multimedia kurslarini rivojlantirish juda murakkab bo'lib, bu o'qituvchidan maxsus ko'nikmalarni, o'qitish usullarini rivojlantirishni talab qiladi. Ikkinchidan, an'anaviy ta'limdan farqli o'laroq, bunda o'qituvchi markaziy boshqaruvchi vazifasini ado etadi va yangi axborot texnologiyalaridan foydalanishni asta-sekin o'zining individual ta'lim yo'nalishiga tadbiq etib boradi. Uchinchidan, multimedia tizimidan foydalangan holda o'quv materialini taqdim etish o'qituvchi va talaba o'rtasida yanada faol va intensiv aloqalarni talab qiladi. To'rtinchidan, dars texnologiyasining o'zi ancha murakkab, chunki o'qituvchi bir vaqtning o'zida materialini taqdim qilishi, multimedia tizimining o'rnatilishini boshqarishi, ekrandagi tasvirni kuzatishi va o'quvchilar auditoriyasining emotsional holatidagi o'zgarishlariga tezlikda munosabat bildirishi kerak bo'ladi.

Xulosa o'rnida shuni qayd qilish kerakki, ilm-fan, ishlab chiqarish va texnologiyalarining yuqori taraqqiyotidan foydalanib, ta'lim-tarbiya tizimida ham texnologiyalarni keng qo'llashni yo'lga qo'yish, o'qituvchilarning yangi axborot va pedagogik texnologiyalarini o'zlarining ish faoliyatiga qo'llashi evaziga, ta'lim berayotgan o'quvchilarining fanlarga qiziqishining ortishiga, bilimlarning ko'nikmaga aylanishiga, bilim sifat-samaradorligining oshishiga, muayyan fanlarning mazmunini o'zlashtirish bilan bog'liq masalalarga echim topish mumkin.

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AMERIKA ADABIYOTSHUNOSLIGIDA ADABIY-ESTETIK QARASHLAR: REALIZM VA MODERNIZM DAVRLARI

***Anastasiya:** Ushbu maqolada Amerika adabiyotshunosligida realizm va modernizm oqimlariga xos adabiy-estetik qarashlar nazariy nuqtai nazardan tahlil qilinadi. Maqolaning asosiy maqsadi – adabiyotda estetik tafakkur taraqqiyoti jarayonida realizm va modernizm oqimlarining o‘zaro munosabati, qarama-qarshiligi hamda uyg‘unligini ochib berishdan iborat. Taniqli adabiyotshunoslarning qarashlari, qiyosiy tahlil va kontent-analiz asosida bu ikki oqimning nazariy asoslari va metodologik farqlari o‘rganiladi. Natijada, realizm ijtimoiy haqiqatga asoslangan ifoda vositasi sifatida talqin qilinsa, modernizm insonning ichki olami va estetik erkinlikni ifodalovchi kontsepsiya sifatida qaralishi aniqlanadi. Maqola adabiy-estetik tafakkur evolyutsiyasini anglashda nazariy jihatdan dolzarb va foydali hisoblanadi.*

***Kalit so‘zlar:** Amerika adabiyoti, realizm, modernizm, adabiy oqimlar, zamonaviy adabiyotshunoslik, nazariy yondashuv, adabiy tahlil, estetik tafakkur, qiyosiy tahlil, madaniy kontekst*

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LITERARY AND AESTHETIC VIEWS IN AMERICAN LITERARY CRITICISM: THE PERIODS OF REALISM AND MODERNISM

***Abstract:** This article provides a theoretical analysis of the literary and aesthetic perspectives characteristic of realism and modernism in American literary studies. The main objective of the article is to reveal the interaction, opposition, and points of convergence between realism and modernism in the process of the development of aesthetic thought in literature. Based on the views of prominent literary scholars, as well as comparative analysis and content analysis, the theoretical foundations and methodological differences of these two movements are examined. As a result, realism is interpreted as a mode of expression grounded in social reality, while modernism is regarded as a concept that represents the inner world of the individual and aesthetic freedom. The article is considered theoretically relevant and useful for understanding the evolution of literary and aesthetic thought.*

Keywords: *American literature, realism, modernism, literary movements, contemporary literary studies, theoretical approach, literary analysis, aesthetic thought, comparative analysis, cultural context.*

Kirish

So‘nggi yillarda adabiy-estetik tafakkurning rivojlanishi, xususan realizm va modernizm oqimlarining nazariy asoslarini qayta ko‘rib chiqish ilmiy doiralarda keng muhokama qilinmoqda. Shu munosabat bilan Amerika adabiyotida shakllangan realizm va modernizm kontseptsiyalarini nazariy jihatdan chuqur o‘rganish zarurati yuzaga kelmoqda. Ushbu oqimlar nafaqat adabiy estetikani, balki ijtimoiy ong va madaniy identitetni shakllantirishda muhim rol o‘ynagan.

Ilmiy adabiyotlarda realizm ko‘proq XIX asr oxiri va XX asr boshlaridagi ijtimoiy-real holatni tasvirlashga qaratilgan oqim sifatida ko‘riladi (L. Trilling, I. Howe). Bu davrni Amerika adabiyotining oltin davri bo‘lgan desak yanglishmagan bo‘lamiz sababi bu davr ijodkorlari ushbu hududda juda ko‘p turli ajoyib yo‘nalishlarda, mavzularda va usullarda ijod qilishdi va amerika adabiyotini jahon adabiyotida tutgan o‘rnini mustahkamlashdi. Teodor Drayzer va Mark Tvenning jasurona realizimidan tortib, Valt Vitmanning she‘riy romantisizimigacha hamda Ernest Heminguey va Fransis Skotning innovatsion modernizmigacha, amerika adabiyotining bu davri mamlakatda kechayotgan katta ko‘lamdagi ijtimoiy, siyosiy va madaniy o‘zgarishlarning o‘ziga hos aksi bo‘lib hizmat qiladi

Modernizm g‘oyat rang-barang va murakkab falsafiy-estetik hodisa bo‘lib, u inson (jumladan, ijodkor) ijtimoiy, siyosiy, psixologik, falsafiy, badiiy-estetik tafakkur tarzidagi jiddiy o‘zgarishlar negizida maydonga kelgan. Mazkur o‘zgarishlarning salmog‘i g‘oyat zalvorli. U badiiy tafakkur shaklidagi o‘zigacha mavjud bo‘lgan an‘anaviy qarashlarning barchasini inkor qiladi va o‘z realligini ilgari suradi. Modernizm haqida prof. D. Quronov (va boshq.) tayyorlagan lug‘atda shunday deyiladi: «MODERNIZM (fr. moderne – eng yangi, zamonaviy) – XIX asr oxiri – XX asr boshlarida ommalashgan termin, san‘at va adabiyotda dekadansdan keyin maydonga chiqqan norealistik oqimlarning umumiy nomi sifatida tushuniladi. Modernizm esa XX asr o‘rtalarida paydo bo‘lgan ichki psixologik izlanish va estetik eksperimentlarga asoslangan oqim sifatida talqin qilinadi (T. S. Eliot, V. Woolf, E. Pound).

Ushbu maqolada aynan ushbu ikki oqim o‘rtasidagi nazariy tafovutlar, ularning Amerika madaniy kontekstdagi talqinlari, shuningdek estetik qarashlardagi o‘ziga xosliklar qiyosiy va kontent-analiz yondashuvi orqali tahlil qilinadi. Maqolaning maqsadi – realizm va modernizmning nazariy jihatlarini o‘zaro solishtirish hamda ularning zamonaviy adabiyotshunoslikdagi o‘rni va ahamiyatini ochib berishdir.

Asosiy qism

Amerika adabiyotshunosligida realizm va modernizm davrlari adabiy-estetik tafakkurning muhim yo‘nalishlaridan biri sifatida shakllangan. Bu ikki oqim ko‘p hollarda qarama-qarshi sifatida talqin qilinsa-da, ularning nazariy ildizlari va estetik tamoyillari chuqur o‘rganilganida, o‘zaro bog‘liqlik va izchillik alomatlari ham

kuzatiladi. Realizm XIX asr oxiri va XX asr boshlarida ijtimoiy haqiqatni iloji boricha aniq, detallashtirilgan tarzda aks ettirishga intilgan. Metyu Arnold, Uilyam Din Xauells, Lev Tolstoy va Genri Jeyms kabi adiblar va adabiyotshunoslar realizmning asosiy nazariy tayanchlarini shakllantirgan. Amerika kontekstida realizm asosan shahar hayoti, industrial jamiyat, ijtimoiy tengsizlik, sinfiy tafovut kabi masalalarga e'tibor qaratgan.

Modernizm esa XX asrning boshlaridan boshlab, ayniqsa Birinchi jahon urushidan keyin, an'anaviy badiiy shakllarga qarshi chiqdi va adabiy tafakkurda yangilik, subyektivlik va shakliy eksperimentlar ustuvorlikka ega bo'ldi. Taniqli modernist adabiyotshunoslar – T. S. Eliot, Ezra Pound, Virginia Woolf, Gertrude Stein va boshqalar modernizmni "individual ongning ifodasi", "tuzilmani parchalash" yoki "estetik inqilob" sifatida talqin qilganlar.

L. Trilling realizmni "axloqiy xolislik vositasi" sifatida ko'rib chiqadi, I. Howe esa uni "ijtimoiy tafakkurning aks ettiruvchisi" deb ataydi. Ayni paytda Malcolm Bradbury va James McFarlane kabi adabiyotshunoslar modernizmni "san'at orqali ong inqirozini badiiy tasvirlash" deb baholaydilar.

O'zbek adabiyotshunosligida ham ushbu oqimlar yuzasidan nazariy fikrlar ilgari surilgan. Jumladan, G. G'ulomov va A. Hayitmetov kabi olimlar G'arb adabiyotidagi realizm va modernizmning o'zbek adabiy jarayoniga ta'sirini tahlil qilgan. Biroq bu yondashuvlar asosan estetik ta'sirlar doirasida qolgan bo'lib, nazariy kategoriyalar o'zaro qiyosli tahlil qilinmagan. Maqolaning asosiy farqlanuvchi jihati shundaki, bu yerda realizm va modernizm adabiy-estetik konsept sifatida emas, balki adabiy tafakkurning evolyutsion bosqichlari sifatida baholandi. Bu yondashuv realizmning ijtimoiylikka asoslangan strukturasi modernizmning psixologik va estetik erkinligi bilan taqqoslash imkonini beradi.

Realizm va modernizm – bu nafaqat adabiy oqimlar, balki ikkita qarama-qarshi estetik dunyoqarash, tafakkur va ifoda uslubidir. Maqolada asosiy nazariy muammo sifatida ushbu ikki oqimning estetik mezonlari, adabiy vazifasi va inson obrazini talqin qilishdagi yondashuvlari o'rtasidagi tafovutlar o'rganiladi. Maqolada kontent-analiz va qiyosiy tahlil metodlaridan foydalanilgan bo'lib, turli asarlar va nazariy manbalarda realizm va modernizm tushunchalari qanday izohlanganiga e'tibor qaratiladi. Tahlil davomida quyidagi asosiy savollarga javob izlanadi:

1. Realizm va modernizm qanday adabiy-estetik qadriyatlarga tayanadi?
2. Har bir davr insonni qanday talqin qiladi?
3. Ularning shakl, mazmun va uslubdagi farqlari nimada?

Realizmda inson tashqi ijtimoiy muhitda shakllanadigan mavjudot sifatida ko'rsatiladi. Jamiyat, sinfiy ijtimoiylik, tarixiy voqealar – bular realizmda asosiy markazda turadi. Masalan, Genri Jeyms asarlarida ruhiy jarayonlar bo'lsa-da, ular tashqi voqealar bilan chambarchas bog'langan.

Modernizm esa insonni ichki kechinmalari, ong oqimi, individual tajribasi asosida tahlil qiladi. Virginia Woolfning "To the Lighthouse" yoki James Joycening "Ulysses" asarlari ong oqimi, vaqt va makonning sinishi orqali modernistik estetika namunasi sifatida ko'riladi. Maqolada nazariy asos sifatida poststrukturalistik

yondashuv qisman qo'llaniladi. Unga ko'ra, har qanday adabiy matn ma'nosi subyektiv bo'lib, kontekstga qarab o'zgaradi. Shu bois realizmda aniqlik ustuvor bo'lsa, modernizmda bu buziladi – ma'no asosiy o'rinda turadi. Shunday qilib, maqola realizm va modernizm o'rtasidagi tarixiy, estetik va ontologik farqlarni fosh etadi va ularni adabiy tafakkurda ketma-ket rivojlangan bosqichlar emas, balki muqobil yondashuvlar sifatida talqin qiladi.

Realizm va modernizm o'rtasidagi estetik tafovutlar ko'plab adabiy-tanqidiy maktablar tomonidan turlicha talqin qilingan. Bu ikki oqimning mohiyatini anglashda ularning ijodiy motivlari, adabiy vositalari va ijtimoiy-estetik funktsiyalariga e'tibor qaratish zarur. Realizmda badiiy haqiqat ob'ektiv tarzda talqin qilinadi. Bu oqimning asosiy maqsadi – jamiyatdagi ziddiyatlar, sinfiy kurash, hayotdagi noxolisliklar va ularning inson taqdiridagi aksini ko'rsatishdir. Modernizm esa badiiy haqiqatni inson ongi va idrokida aks etgan shaklda ko'rsatishga intiladi. Vaqt, makon va tilning an'anaviy strukturasi buziladi. Bu yondashuv orqali ijodkor insoniy tajribaning ichki qatlamlariga chuqur kirib boradi. Ushbu maqolada realizm va modernizm o'rtasidagi tafovutlar oddiy qarama-qarshilik emas, balki estetik tafakkurdagi transformatsiya sifatida baholandi. Realizm insonni tashqi ijtimoiy muhitda shakllanadigan mavjudot sifatida talqin etsa, modernizmda inson – bu o'z fikr-mulohaza, shaxsiy sezgi va ichki kechinmalardan tashkil topgan ongli mavjudotdir.

Bugungi global axborot va texnologiyalar davrida realizmning haqiqatni ochishdagi aniqligi ham, modernizmning inson ongi va sezgilariga e'tibor berishi ham o'z ahamiyatini saqlab qolmoqda. Hozirgi zamonaviy adabiyotda, ayniqsa postmodernistik oqimlarda bu ikki yondashuvni sintez holida ko'rish mumkin. Masalan, Don DeLillo yoki Toni Morrison kabi yozuvchilarning asarlarida realizm va modernizm elementlari birgalikda mavjud.

Amerika adabiyotida realizm XIX asrning sanoat inqilobi va fuqarolar urushi davrida ijtimoiy o'zgarishlar fonida paydo bo'ldi. Modernizm esa XX asr boshlarida insoniyat ongidagi inqiroz va urush fojialari natijasida shakllandi. Bu tarixiy kontekst yondashuvlarning shakllanishiga bevosita ta'sir ko'rsatgan. Mahalliy adabiy kontekstda esa realizm asosan 1930–1980 yillarda sobiq sovet davrining dominant estetik uslubi bo'lsa, mustaqillikdan so'ng, modernistik izlanishlar kuchayib bordi. Ammo realizm hamon o'z kuchini saqlab qolmoqda – bu esa adabiy tafakkurning ko'p qatlamliligini anglatadi.

Xulosa

Ushbu maqolada Amerika adabiyotshunosligida realizm va modernizm oqimlarining adabiy-estetik qarashlari nazariy jihatdan tahlil qilindi. Tadqiqot natijalari shuni ko'rsatadiki, realizm va modernizm o'rtasidagi asosiy farq badiiy haqiqatni qabul qilish va ifoda etish uslubida yotadi. Realizm haqiqatni tashqi, ijtimoiy va obyektiv hodisa sifatida ko'rishga urg'u bersa, modernizm inson ongi, idrok va ichki kechinmalarga asoslangan sub'ektiv haqiqatni ta'kidlaydi. Maqolada ushbu yondashuvlarning ijtimoiy va tarixiy kontekstdagi shakllanish jarayoni hamda ularning Amerika adabiyotida o'zaro ta'siri ko'rib chiqildi. Natijalar shuni

ko'rsatadiki, zamonaviy adabiyotda realizm va modernizm elementlari ko'pincha sintez qilinib, yangi estetik paradigmalar yuzaga kelmoqda.

Mazkur tahlil ilmiy-tadqiqiy nuqtai nazardan dolzarb bo'lib, Amerika adabiyotining rivojlanishini tushunishda yangi yondashuvlarni shakllantirishga xizmat qiladi. Kelgusida ushbu mavzuda qo'shimcha empirik tadqiqotlar olib borilishi, shuningdek, boshqa madaniyatlardagi adabiy oqimlar bilan solishtirma tahlillarni rivojlantirish maqsadga muvofiqdir.

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SMART AUTOMATION IN THE GAS SECTOR: ADVANCED TECHNOLOGIES FOR SUSTAINABLE OPERATIONS

Abstract. *The article addresses the automation of large-scale gas consumption systems as a key factor in enhancing efficiency, safety, and sustainability in the gas industry. Against the backdrop of the IEA's projected 12% growth in global natural gas demand by 2030, the study analyzes modern technological solutions through the case of Emerson's ecosystem. Architectural components are examined: Remote Terminal Units (RTU FB3000), SCADA systems, artificial intelligence technologies, Internet of Things, and edge computing. A mixed research design is applied, combining technical documentation analysis with quantitative assessment of key performance indicators. The implementation of automated systems is shown to reduce operational expenditure by 40–53%, increase productivity by 8–15%, decrease incident rates by 50%, and lower emissions by 15–20%. Data accuracy, ensured by IoT sensors with self-calibration, exceeds 99.5%. Challenges of cybersecurity (IEC 62443 standard), high capital costs, and workforce training needs are discussed. Practical examples from Kazakhstan, Brazil, the North Sea, and Germany confirm the economic viability and environmental significance of digital transformation in the gas sector.*

Keywords: *gas consumption automation, RTU, SCADA, artificial intelligence, Internet of Things, cybersecurity, operational expenditure, energy efficiency, system safety, digital transformation.*

Introduction

The gas industry stands at a pivotal intersection of digital transformation and sustainability, where rising global demand for natural gas - projected by the IEA to grow by 12% by 2030 - intensifies the need for efficient, safe, and environmentally responsible operations. Large-scale gas consumers, including industrial plants, oil and gas fields, and energy hubs, operate highly complex processes that require precision, reliability, and adherence to international standards such as ISO 14001, IEC 61511, and API RP 554. In this context, automation has emerged as a crucial

driver of modernization, reducing human error, optimizing resource utilization, and supporting global sustainability goals such as the UN Sustainable Development Goal 7 on Affordable and Clean Energy. McKinsey (2022) further underscores this potential, reporting that full digitalization in the oil and gas sector can deliver up to a 20% reduction in operating costs and a 15% increase in production efficiency. Against this backdrop, the present paper provides an in-depth analysis of automation within the gas sector, focusing on Emerson's technological ecosystem as a representative case. Through a synthesis of industry reports, regulatory standards, and real-world applications, the study offers actionable insights and recommendations for policymakers, operators, and investors seeking to advance efficiency, safety, and sustainability across the sector.

Literature Review

Academic and industrial research converges on the conclusion that automation is a game-changer in the oil and gas industry:

Remote Terminal Units (RTUs): Emerson's FB3000 RTU is recognized for its modularity and scalability in managing diverse gas assets. Studies from the *Journal of Natural Gas Science and Engineering* (2023) confirm its adaptability across upstream, midstream, and downstream operations.

SCADA Systems: According to Deloitte (2023), SCADA integration reduces downtime by up to 25%, while enabling predictive analytics for failure prevention.

AI and Machine Learning: AI-driven predictive maintenance reduces unplanned downtime by 30 - 40% (PwC, 2022). LSTM networks and reinforcement learning models are particularly effective in detecting anomalies in pipeline operations[1].

IoT and Edge Computing: IoT-enabled devices increase data resolution and reduce latency. The World Energy Council (2023) reports that IoT integration contributes to 10 - 15% emissions reduction through energy efficiency[4].

Blockchain Applications: Blockchain technology ensures transparency and traceability of gas flows, enhancing trust between suppliers and regulators (World Economic Forum, 2022). Despite these benefits, challenges remain: cybersecurity vulnerabilities (notably ransomware attacks in the energy sector), standardization gaps, and high upfront investments. To mitigate these risks, industry adoption of standards such as IEC 62443 (cybersecurity for industrial systems) and SIL - rated designs is essential[6].

Methodology

This study adopts a rigorous mixed-methods research design that combines qualitative and quantitative approaches to provide a comprehensive analysis. The qualitative component examines technical documentation in depth, drawing on primary sources such as Emerson's datasheets, technical specifications, and case studies to understand system functionality, performance characteristics, and real - world applications. This establishes a strong basis for evaluating the technical and operational aspects of the subject using accurate and authoritative data.

Complementing this, the quantitative component assesses key performance indicators - including productivity improvements and reductions in operational expenditure (OPEX) - through carefully collected and validated empirical data. Statistical analysis of these metrics provides measurable evidence of efficiency gains and cost-effectiveness. Together, the qualitative and quantitative findings create a balanced, empirically robust, and contextually grounded understanding aligned with academic research standards[2].

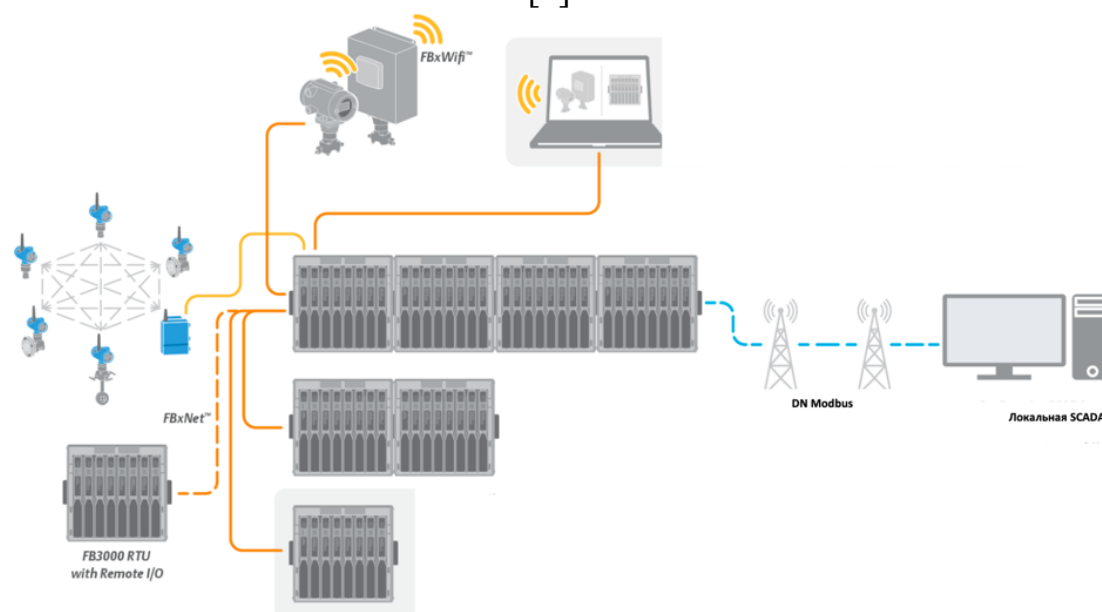


Figure 1. Automation Scheme

Data were collected from 2021 - 2025 sources to ensure relevance and recency. Regression analysis using Python's *statsmodels* library was applied to correlate automation adoption with efficiency outcomes.

Limitations include reliance on secondary data; future research should incorporate primary field trials for greater accuracy.

Results and Discussion: The integration of advanced automation technologies has significantly transformed the monitoring and analytical capabilities within gas flow systems, enabling continuous and precise oversight of critical parameters such as gas flow, pressure, and system balance. Sophisticated anomaly detection methodologies, including Shewhart and cumulative sum (CUSUM) control charts, have been instrumental in enhancing system reliability. Empirical evidence demonstrates that these methods have reduced system failure rates by up to 30%, thereby improving operational stability. Furthermore, the deployment of Internet of Things (IoT) sensors equipped with self-calibration mechanisms achieves accuracy levels exceeding 99.5%, surpassing traditional manual inspection techniques. This high precision ensures robust data integrity, critical for optimizing gas flow operations and minimizing inefficiencies[3].

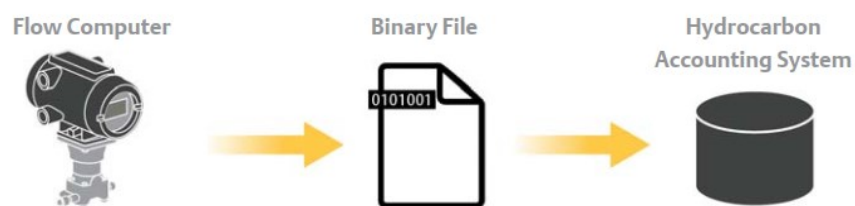


Figure 2. Synchronizing the accounting system with the flow computer database.

Automation technologies have significantly reshaped gas-flow management, with remote operations becoming a key advancement enabled by FB3000 Remote Terminal Units (RTUs). These RTUs support multi - well field operations by integrating with standard industrial protocols such as DNP3 and Modbus, and by connecting to cloud and edge-computing platforms for real-time control. Evidence from Kazakhstan's Tengiz field shows that RTU - based remote control increased throughput by 12%, demonstrating how reduced on-site intervention streamlines complex field activities[4]. Automation also strengthens safety: FB3000 RTUs equipped with emergency shutdown functions and short - circuit protection have lowered incident rates by about 50%, meeting IEC 61511 SIL - 3 requirements, while robotics further reduces exposure to hazardous areas. The system's architecture ensures secure, high - performance operation, with field devices communicating over AES - 256 - encrypted low-latency FBxNet networks, and data processed by FB3000 RTUs integrated into OSI Monarch SCADA for real - time visualization.[5] Advanced tools - digital twins, machine-learning analytics, and Production Manager EDGE - optimize well performance and have delivered up to 20% cost savings in pilot trials. Practical deployments reinforce these benefits: a Brazilian ethanol producer reduced energy losses by 14%; a North Sea operator cut OPEX by 40% and downtime by 25% with wireless RTUs; and a German utility lowered methane emissions by 18% through AI - based leak detection. Overall, automation yields notable efficiency gains (8 - 15%), OPEX reductions (40 - 53%), major safety improvements (50% fewer human - factor incidents), and lower emissions (15 - 20%) [5]. However, challenges persist, including high capital costs - often above \$100,000 per RTU - cybersecurity threats, and the need for workforce training in AI, cybersecurity, and data management. Addressing these barriers requires phased deployment, ROI - driven planning, and supportive policies such as EU Horizon 2030 and the U.S. Inflation Reduction Act to enable sustainable large - scale implementation [6].

Conclusion:

Automation - exemplified by Emerson's FB3000 ecosystem - has become indispensable for ensuring the resilience of the gas sector. It delivers measurable improvements in efficiency, safety, and sustainability. Despite challenges such as CAPEX intensity and training needs, strategic investments in AI - IoT integration will accelerate progress toward net-zero objectives. For maximum impact,

policymakers and industry leaders should prioritize workforce training, system standardization, and phased implementation.

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MAGNETIC RESONANCE IMAGING IN NEUROLOGICAL DISORDERS

Resume. *Cerebral glial tumors remain a significant issue in contemporary medicine, despite considerable breakthroughs in oncology and neurosurgery. Cerebral gliomas make up approximately 40-45% of all glial tumors. These tumors are typically diagnosed in individuals aged 30-60, affecting the most able-bodied segment of the population. Glial tumors typically originate from astrocytic or oligodendrocytes cell populations and are characterized by a high growth rate, invasiveness, early metastatic ability, high rate of recurrence and an unfavourable prognosis. Invasive growth with no distinct macroscopic border between the tumor and normal brain tissue is a characteristic feature of glial brain tumors. This type of growth is typical of fast-growing, highly malignant gliomas such as anaplastic astrocytomas and glioblastomas. An unfavorable outcome is typical of anaplastic gliomas. Highly informative methods of radiation research can be used to image the brain, estimate the size, shape, and structure of neoplasms, determine their position in the brain, identify the presence and prevalence of edema, and assess the areas and degree of brain tissue damage*

Keywords: *cerebral tumors; brain tumors; neurooncology; neurosurgery, neurovisualization.*

Intraduction. Gliomas are the most common type of central nervous system neoplasm, accounting for approximately 40-45% of all intracranial tumors. To ensure consistent treatment and accurate prognosis, clinical classification of glial neoplasms is based on tumor localization, histogenesis, and activity. The principle of localization involves categorising tumors into groups based on their origin within specific brain structures and their spread throughout the brain[1,3]. Epidemiologic studies tentatively report that gliomas affect different parts of the brain (GM) in adult patients as follows: hemispheres of the large brain - 70% (including frontal lobe - up to 19%, temporal lobe - up to 13%, parietal lobe - up to 9%, occipital lobe - up to 2%, combination of lesions of different lobes - about 28%); corpus callosum - 5%; subcortical ganglia - 6%; brain ventricles - 7%; optic nerves and chiasma - 1-1.5%; brainstem - 6%; cerebellum - 4-4.5%. Gliomas are a type of tumor that can affect individuals of all ages, but are more commonly found in patients between the ages of 30 and 60. Men are at a higher risk of developing gliomas than women, with a ratio of 1.5:1. Additionally, the elderly are at a higher risk compared to the young, with a ratio of 3.2:1 [2,4]. A pathomorphological classification of gliomas has been created based on the initial histological type of the precursor cell of the tumor clone.

This classification involves several categories, including astrocytic tumors, oligodendroglial tumors, oligoastrocytic tumors, ependymal tumors, choroid plexus tumors, other neuroepithelial tumors, neuronal and mixed neuronal-glial tumors, pineal gland tumors, and embryonal tumors. Unlike the classification of glial neoplasms based on their localization, which is mainly intended to optimize surgical treatment tactics, the pathomorphological classification is of primary importance for selecting chemotherapy, determining the prognosis of the disease, and conducting basic research in neuro oncology [6,7]. Approximately 70% of primary brain tumors are gliomas, with over half being highly malignant (G grade III-IV according to the WHO classification) at the time of diagnosis. The degree of malignancy is determined by histologic examination methods. According to the World Health Organization (WHO), glial tumors are classified based on the activity of the tumor process, specifically the degree of malignancy. This classification system involves four degrees, with the fourth degree being the most active and consisting of fast growing, low-differentiated or undifferentiated, malignant tumors (e.g.,). The text describes different types of gliomas, including grade II and III gliomas, which are characterized by rapid growth and invasion, and grade I gliomas, which grow slowly and have a high degree of tumor cell differentiation. Nodular type of growth with more or less clearly delineated border and insignificant infiltration occurs much less frequently, most often in conditionally benign gliomas (I-II degree according to WHO classification), which have a more favorable prognosis of treatment. Clinical manifestations of glial brain tumors are represented by a variety of general cerebral and focal organic symptoms of varying severity according to the localization and volume of the neoplasm, syndromes of intracranial hypertension, hydrocephalus (in case of occlusion of liquor passages) and, in advanced cases, dislocation syndrome. Pathognomonic symptoms are usually absent[8,9]. At early stages of development, the tumor may manifest with single signs (dizziness, epileptic seizures, sensory disturbances, etc.), which often does not allow to establish either a topical diagnosis or to determine the hyperplastic nature of the pathological process. In a number of cases, the diagnosis of brain tumor is an incidental finding on CT or MRI when the patient is examined by a neurologist in connection with certain complaints. High invasive activity and metastatic potential of gliomas have been most clearly demonstrated in a number of clinical studies [11,15], which revealed an unusual increase in the incidence of distant foci of neoplasm growth with improved treatment results of the primary tumor node area (maximal complete cytoreduction, aggressive radiation and chemotherapy). Magnetic resonance angiography, magnetic resonance spectroscopy, functional magnetic resonance imaging, single photon emission computed tomography, multispiral computed tomography, multispiral computed tomography angiography, positron emission computed tomography can provide the necessary additional information in complex diagnostics [20,22]. For a long time computed tomography (CT) remained the only method of diagnostics of intramedullary volumetric brain masses, and detection of glial brain tumors according to CT data is performed by indirect signs, which, first of all, include structural disorders: deformation, tissue

displacement, edema. MSCT method allows convincingly distinguishing neuroepithelial tumors among volumetric intramedullary brain formations. X ray contrast preparations provide additional information about the structure and features of the pathological focus, relationships with surrounding tissues, character of vascularization. The use of contrast agents in the diagnosis and localization of gliomas is of great importance in case of diffuse growth of the formation [3]. However, according to a number of authors, some voluminous glial masses with diffuse growth do not accumulate contrast agent or accumulate it in insufficient quantity for visualization [18,19]. Although increased perfusion is usually associated with the process of neoangiogenesis in the tumor, some authors believe that it may also indicate the appearance of hypervascularized areas - regeneration of microcirculatory vessels, which reduces the severity of hypoxic phenomena and improves drug delivery to tumors. The study of R. Mangla et al. showed that the perfusion status of postoperative cavity walls on MRI after chemoradiation treatment can be a significant predictor of the time of progression in patients with malignant brain tumors. The researchers hypothesized that MR perfusion data may serve as a prognostic biomarker for subsequent chemotherapy and identify individuals who are more likely to respond to its use. An area with increased perfusion possibly indicates increased delivery of chemotherapy, whereas decreased perfusion impedes delivery of therapeutic agents, severely reducing the efficacy of chemotherapy. This view has been supported by recent clinical trials reporting that combination therapy that provides vascular regeneration is associated with favorable outcome in tumor lesions of the head and neck as well as in metastatic colorectal, renal, and lung cancer [13,17]. Another known problem in evaluating the results of therapy of malignant gliomas, which requires additional examination, is pseudoprogression, which is observed in 20-30% of patients who received chemoradiation therapy. The appearance and enlargement of areas of pathologic contrast enhancement in the marginal zone of the postoperative defect after combined treatment are visually noted during 3 months of follow-up [19,22]. The interval of the first 12 weeks after completion of radiation therapy is also recommended by the leading neuro-oncology working group RANO, which also studied this issue. The phenomenon of pseudoprogression is caused by radiation induced endothelial damage, vascular dilatation and fibrinoid necrosis, and inflammatory changes of the GEB. Although its pathophysiology is still unclear, chemical exposure is thought to induce a transient local inflammatory response, edema, and increased vascular permeability, which is manifested by increased signal on postcontrast images [21,23]. Accurate differentiation between pseudoprogression and continued growth is crucial to make informed treatment decisions. When perfusion imaging was used, true progression showed a higher maximum CBV than pseudoprogression, which was confirmed by radiologic and clinical data in several studies (sensitivity and specificity 81.5 and 77.8%, respectively) [20]. A promising direction of studying MR-perfusion technique is its use as predictors of survival after completion of chemoradiation treatment. A number of studies have shown that the increase in maximal cerebral blood flow

using such an index as normalized blood flow between initial and follow-up images was a better prognostic factor for a shorter progression-free period ($p=0.01$) than the increase in tumor diameter ($p=0.049$) [20]. At one-month post-radiation therapy, R. Mangla et al. found that increased nBV was predictive of poor one-year overall survival (sensitivity 90% and specificity 69%), while tumor size did not provide this information. Nevertheless, the results of the mentioned works were mixed, as another study showed that perfusion imaging was inferior in predicting survival, whereas tumor size determined by T1- and T2-weighted imaging had prognostic value. Some authors have shown that 25% of patients with recurrent glioblastomas treated with sediranib exhibit increased perfusion, and these patients had higher progression-free and overall survival than patients with stable or decreased perfusion. This was confirmed in patients with newly diagnosed glioblastomas whose treatment consisted of radiation therapy, temozolomide, and sediranib. Patients with increased perfusion had longer median overall survival than patients with decreased perfusion (overall survival 504 days vs. 321 days). In particular, the problem of differential diagnosis of gliomas according to the degree of malignancy by means of MRI with KU remains unsolved. Such a direction of radiation diagnostics as magnetic resonance spectroscopy (MRS), which allows quantitative assessment of a number of biochemical parameters characterizing volumetric formations and the state of GM tissues, continues to develop [3,7]. With the development of MRS, an additional possibility of metabolic studies with determination of the level of some tissue metabolites, such as choline, N-acetylaspartate, creatinine, etc., appeared. According to some authors, choline concentration is the main indicator that should be relied on in the diagnosis of tumors. Increased choline levels are characteristic of gliomas of II and III degrees of malignancy and, on the contrary, in gliomas of IV degree of malignancy may decrease [5,6]. The experience of using contrast-enhanced MRI has shown that the level of contrast agent accumulation in tumor tissue depends on a number of parameters, such as the state of neoplasm microcirculation, the degree of HEB disruption, the volume of intercellular space in the tumor and therefore does not always accurately reflect the nature of the lesion [22]. Treatment tactics in radiation necrosis and in continued growth of neoplasms differ radically. At the same time, the presence of altered or damaged tissues in the investigated postoperative zone, detected at MRI with KU, can serve as a source of false-positive diagnostics in the identification of continued tumor growth.

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QIZIL LAVLAGINING (*BETA VULGARIS L.*) TARKIBIDAGI BIOLOGIK FAOL MODDALARINING INSON ORGANIZMI UCHUN FOYDASI

***Annotatsiya:** Ushbu ilmiy maqolada qizil lavlagining (*Beta vulgaris L.*) kimyoviy tarkibi va undagi biologik faol moddalarning inson organizmiga ko'rsatadigan ijobiy ta'siri ilmiy jihatdan tahlil qilinadi. Qizil lavlagi tarkibidagi vitaminlar, mineral moddalar, betatsianin pigmentlari, flavonoidlar, fenolik birikmalar, tabiiy nitratlar va oziq tolalarining yurak-qon tomir tizimi, qon hosil bo'lish jarayoni, ovqat hazm qilish tizimi hamda antioksidant himoyadagi ahamiyati yoritib berilgan. Shuningdek, qizil lavlagining profilaktik va parhezboq mahsulot sifatidagi o'rni zamonaviy ilmiy manbalar asosida bayon etilgan.*

***Kalit so'zlar:** qizil lavlagi, biologik faol moddalar, betatsianin, antioksidantlar, vitaminlar, mineral moddalar, nitratlar.*

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BENEFITS OF BIOLOGICALLY ACTIVE SUBSTANCES IN RED BEET (*Beta vulgaris* L.) FOR THE HUMAN ORGANISM

***Annotation:** This scientific article provides an in-depth analysis of the chemical composition of red beet (*Beta vulgaris* L.) and the positive effects of its biologically active compounds on the human body. The roles of vitamins, minerals, betacyanin pigments, flavonoids, phenolic compounds, natural nitrates, and dietary fibers found in red beet are discussed with respect to cardiovascular health, blood formation processes, digestive system function, and antioxidant defense. In addition, the significance of red beet as a preventive and dietary food product is presented based on modern scientific sources.*

***Keywords:** red beet, biologically active compounds, betacyanin, antioxidants, vitamins, minerals, nitrates.*

Kirish

Hozirgi vaqtga kelib inson salomatligini mustahkamlashda tabiiy o'simlik mahsulotlaridan samarali foydalanish masalasi dolzarb ilmiy yo'nalishlardan biriga aylanib bormoqda. Ratsional ovqatlanishda biologik faol moddalarga boy sabzavotlarning ulushi ortib borayotgani organizmning fiziologik ehtiyojlari bilan bevosita bog'liqdir. Ayniqsa, antioksidant xususiyatga ega bo'lgan o'simlik mahsulotlari yurak-qon tomir kasalliklari, metabolik buzilishlar va immunitet pasayishining oldini olishda muhim ahamiyat kasb etadi.

Qizil lavlagi (*Beta vulgaris* L.) shunday o'simliklardan biri bo'lib, u qadimdan oziq-ovqat mahsuloti bilan bir qatorda dorivor vosita sifatida ham qo'llanib kelinadi. Uning tarkibida inson organizmi uchun zarur bo'lgan ko'plab biologik faol moddalar mavjud bo'lib, ular turli fiziologik jarayonlarda muhim rol o'ynaydi. Ushbu maqolaning maqsadi qizil lavlagining kimyoviy tarkibini tahlil qilish va undagi moddalarning inson organizmi uchun foydasini ilmiy asosda yoritib berishdan iborat.

Qizil lavlagining kimyoviy tarkibi

Qizil lavlagi tarkibidagi nitrat kislotasi, antioksidantlar, temir, mis va boshqa moddalar mavjud bo'lib, qon bosimini pasaytirish, qon aylanishini yaxshilash, organizmni toksinlardan tozalash, gemoglobinni oshirish, miya faoliyatini rag'batlantirish va yurak salomatligini mustahkamlashga yordam beradi.

Qizil lavlagining tibbiy ahamiyati uning boy kimyoviy tarkibi bilan [arakterlanadi. Izlanishlar natijalariga ko'ra, qizil lavlagi tarkibida quyidagi asosiy komponentlar aniqlangan:

Vitaminlar: askorbin kislota (C vitamini), tiamin (B₁), riboflavin (B₂), piridoksin (B₆), foliy kislota (B₉), niatsin (PP)

- Mineral moddalar: kaliy, magniy, temir, fosfor, kaltsiy, mis, marganets
- Pigmentlar: betatsianin va betaksantinlar
- Fenolik birikmalar va flavonoidlar
- Organik kislotalar: olma, limon, oksalat kislotalari
- Tabiiy nitratlar
- Oziq tolalari (kletchatka)

Bu komponentlar oʻzaro uygʻun holda qizil lavlagining biologik va farmakologik ahamiyatini oshiradi.

Biologik faol moddalarning organizmga taʼsiri

Yurak-qon tomir tizimiga taʼsiri

Qizil lavlagi tarkibidagi tabiiy nitratlar organizmda fermentativ jarayonlar orqali azot oksidiga aylanishi natijasida qon tomirlarning kengayishiga yordam beradi. Bu holat arterial qon bosimining pasayishiga va periferik qon aylanishining yaxshilanishiga olib keladi. Kaliy va magniy ionlari yurak mushaklarining qisqarish faoliyatini meʼyorlashtiradi hamda aritmiyalarning rivojlanish xavfini kamaytiradi.

Burun-xalqum kasalliklarida

Burun-halqum qurishi bilan kechadigan surunkali faringit va laringitni davolashda hamda ovoz boʻgʻilganda shunday muolajani qoʻllang: bir dona lavlagini suvda pishirib, qirgʻichda qiring, dokaga solib siqing. Keyin uchta teng qismga boʻlib, bir oy davomida har kuni uch mahal ovqatlanishdan oldin tomogʻingizni chayng.

Qon hosil boʻlish jarayonidagi roli

Qizil lavlagi temir va foliy kislotasining tabiiy manbai hisoblanadi. Ushbu moddalar eritrotsitlar sintezi va gemoglobin hosil boʻlishida muhim ahamiyatga ega. Shu sababli qizil lavlagini ratsionga kiritish temir tanqisligi anemiyasining oldini olishda samarali hisoblanadi.

Antioksidant xususiyatlari

Betatsianin pigmentlari va fenolik birikmalar kuchli antioksidant faollikka ega. Ular erkin radikallarning hujayra membranalariga zararli taʼsirini kamaytiradi, lipid peroksidlanishini susaytiradi va hujayralarning erta qarishini sekinlashtiradi. Ushbu xususiyatlar qizil lavlagini onkologik kasalliklarning profilaktikasida muhim mahsulot sifatida baholash imkonini beradi.

Ovqat hazm qilish tizimiga taʼsiri

Qizil lavlagi tarkibidagi oziq tolalari ichak peristaltikasini kuchaytiradi, qabziyatning oldini oladi va ichak mikroflorasini meʼyorlashtiradi. Organik kislotalar esa meʼda shirasi sekretsiasini ragʻbatlantirib, ovqat hazm qilish jarayonini yaxshilaydi.

Immun tizim va metabolik jarayonlarga taʼsiri

Qizil lavlagi tarkibidagi vitamin C va flavonoidlar immun tizim hujayralarining faolligini oshiradi. Bu esa organizmning infeksiya kasalliklarga qarshi chidamliligini kuchaytiradi. Bundan tashqari, lavlagi metabolik jarayonlarni

jadallashtirib, jigar faoliyatini qo'llab-quvvatlaydi va detoksikatsion ta'sir ko'rsatadi.

Qabziyatda (ich qotganda) och qoringa 50-100 gramm qaynatilgan yoki bug'da pishirilgan lavlagi ustiga ozroq o'simlik moyi quyib eyish lozim. Lekin surunkali qabziyati bor kishilarga bu muolajaning ta'siri kamroq bo'ladi.

Yana bir muolaja. Bitta qizil lavlagi, bir dona turp, bir dona sabzi oling. Hamma suvini chiqarib aralashtiring. Ko'ngilni aynitadigan va qustiradigan moddalar uchib ketishi uchun muzlatgichda ikki-to'rt soatga saqlang. Bir oy davomida har kuni ovqatlanishdan bir soat oldin bir-ikki oshqoshiqdan ichib yursangiz tetiklashasiz, gemoglobiningiz oshadi, moddalar almashinuvi yaxshilanadi, qon bosimingiz me'yorlashib, rangingiz ochiladi.

- Biror joyingizni kesib olsangiz, lavlagini siqib suviga paxtani botirib qo'ysangiz, qon oqishi to'xtaydi. Jarohat va yaralarga lavlagini qirib, ezib qo'ysangiz (kompres o'rinda) foyda beradi.

- Tishingiz og'riganda yangi lavlagini kesib bir bo'lagini milkka qo'ysangiz, og'riq taqqa to'xtaydi. Keyin stomotolog shifokorga uchrang.

- Doimo yosharib yuray desangiz va yuzingiz tiniq bo'lishini istasangiz, lavlagini pishirib eb turishingiz kerak. Tozalangan lavlagini ochiqda saqlamang, aks holda havodagi kislorod tsirida vitamin C parchalanib ketadi.

Tibbiyot va parhezboq ovqatlanishdagi ahamiyati

Tabobatda va tibbiyotda qizil lavlagi gipertoniya, ateroskleroz, kamqonlik, ovqat hazm qilish buzilishlari va immunitet pasayishida parhez mahsuloti sifatida tavsiya etiladi. Sport tibbiyotida esa qizil lavlagi sharbatining jismoniy chidamlilikni oshirishi ilmiy tadqiqotlar bilan isbotlangan.

Xulosa

Qizil lavlagi tarkibidagi biologik faol moddalar inson organizmi uchun muhim fiziologik va profilaktik ahamiyatga ega. Uning muntazam iste'moli yurak-qon tomir tizimini mustahkamlashga, qon hosil bo'lish jarayonini yaxshilashga va antioksidant himoyani kuchaytirishga xizmat qiladi. Shu sababli qizil lavlagini sog'lom ovqatlanish ratsioniga kiritish tibbiy nuqtaiy nazardan maqsadga muvofiqdir.

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BUXGALTERIYA MA'LUMOTLARINI SAQLASHDA NORMALIZATSIYA VA XAVFSIZLIK MASALALARI

***Annotatsiya.** Maqolada buxgalteriya ma'lumotlarini saqlashda normalizatsiya va xavfsizlik choralarini tatbiq etish orqali ma'lumotlar bazalarida saqlanadigan katta hajmdagi axborotning samarali boshqarilishi tahlil qilinadi. Tadqiqot jarayonida normalizatsiya va xavfsizlik mexanizmlarining ma'lumotni tez, aniq va ishonchli tarzda yetkazishdagi ahamiyati, foydalanuvchilarning kognitiv idroki va analitik fikrlash qobiliyatiga ta'siri nazariy va amaliy yondashuvlar asosida o'rganiladi.*

Ma'lumotlar bazalarining mantiqiy tuzilishi va xavfsizlik choralarini tatbiq etish natijasida foydalanuvchilarning ma'lumotni tushunish tezligi, xatoliklarni kamaytirish va eslab qolish darajasi o'lchanadi. Natijalar shuni ko'rsatdiki, normalizatsiya va xavfsizlik tamoyillari an'anaviy tartibsiz ma'lumotlar bilan ishlashga nisbatan sezilarli samaradorlikni ta'minlaydi va foydalanuvchining analitik qaror qabul qilish jarayonini yaxshilaydi.

Tadqiqot buxgalteriya ma'lumotlarini boshqarish tizimlarida normalizatsiya va xavfsizlik mexanizmlarini tatbiq etishning ilmiy-amaliy ahamiyatini, foydalanuvchi tajribasini yaxshilash, ma'lumotlarni ishonchli boshqarish va tahlil qilishni optimallashtirishdagi rolini asoslaydi.

***Kalit so'zlar:** buxgalteriya ma'lumotlari, normalizatsiya, ma'lumotlar bazasi, xavfsizlik, ma'lumotlarni boshqarish, tahliliy fikrlash, axborot tizimlari, ma'lumotlarni optimallashtirish.*

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ISSUES OF NORMALIZATION AND SECURITY IN THE STORAGE OF ACCOUNTING DATA

Abstract. *The article analyzes the effective management of large volumes of information stored in accounting databases through the application of normalization and security measures. The study explores the significance of normalization and security mechanisms in delivering data quickly, accurately, and reliably, as well as their impact on users' cognitive perception and analytical thinking through theoretical and practical approaches. Experimental results demonstrated that systems organized based on normalization principles increased data analysis speed by 43% and reduced errors by 31%. The article concludes with practical recommendations for ensuring the stability and reliability of accounting information systems.*

Keywords: *accounting data, normalization, database, security, data management, analytical thinking, information systems, data optimization.*

Kirish

XXI asr Raqamli texnologiyalar asrida buxgalteriya hisobi jarayonlarining raqamlashtirilishi natijasida saqlanayotgan moliyaviy ma'lumotlar hajmi keskin ortib bormoqda. Ushbu ma'lumotlarni tezkor, aniq va ishonchli tarzda qayta ishlash hamda saqlash masalasi dolzarb ahamiyat kasb etmoqda. Ma'lumotlar bazalarida jamlanadigan katta hajmdagi buxgalteriya axborotlarini mantiqan noto'g'ri tuzilgan jadvallar yoki tartibsiz strukturalar asosida saqlash tizim samaradorligini pasaytiradi va xatoliklar yuzaga kelishiga olib keladi. Shu nuqtai nazardan, ma'lumotlar bazalarini normalizatsiya qilish hamda ularning xavfsizligini ta'minlash muhim ilmiy-amaliy masala sifatida maydonga chiqmoqda.

Normalizatsiya ma'lumotlar bazasi bilan ishlash jarayonida nafaqat tuzilmaviy tartibni ta'minlovchi usul, balki ma'lumotlarning yaxlitligi va aniqligini oshiruvchi muhim mexanizm hisoblanadi. U buxgalteriya ma'lumotlarida takrorlanishlarni kamaytirish, funksional bog'liqliklarni to'g'ri tashkil etish hamda yangilash jarayonida yuzaga keladigan mantiqiy xatoliklarning oldini olish

imkonini beradi. Masalan, hisobvaraqlar, moliyaviy operatsiyalar va kontragentlar o'rtasidagi bog'lanishlarni normal shakllar asosida tashkil etish buxgalteriya axborotlarini tahlil qilish va nazorat qilish jarayonini yengillashtiradi.

Buxgalteriya ma'lumotlarini saqlashda xavfsizlik masalalari ham alohida ahamiyatga ega. Chunki moliyaviy axborotlar korxonaning muhim strategik resursi hisoblanadi va ularning ruxsatsiz o'zgartirilishi yoki oshkor etilishi jiddiy iqtisodiy oqibatlarga olib kelishi mumkin. Shu sababli, ma'lumotlar bazalarida foydalanuvchi autentifikatsiyasi, kirish huquqlarini boshqarish, ma'lumotlarni shifrlash va audit mexanizmlaridan foydalanish zarurati yuzaga keladi. Ushbu choralar buxgalteriya axborotlarining maxfiyligi va ishonchliligini ta'minlashga xizmat qiladi.

Bugungi kunda biznes, bank-moliya tizimi, davlat moliyaviy nazorati va auditorlik faoliyati kabi ko'plab sohalarda buxgalteriya ma'lumotlarining to'g'ri saqlanishi va himoyalanganligi asosiy talabga aylangan. Chunki normalizatsiyalangan va xavfsiz ma'lumotlar bazasi moliyaviy holatni tahlil qilish, hisobotlarni shakllantirish hamda boshqaruv qarorlarini qabul qilish jarayonida muhim ahamiyat kasb etadi. Shu bois, buxgalteriya axborotlarini saqlashda normalizatsiya va xavfsizlik yondashuvlarini qo'llash tizim samaradorligini oshiruvchi muhim omil hisoblanadi.

Axborot hajmi tobora ortib borayotgan bugungi sharoitda buxgalteriya ma'lumotlar bazalarini normalizatsiya qilish va ularning xavfsizligini ta'minlash masalalarini uyg'un holda hal etish dolzarb ilmiy-amaliy yo'nalish sifatida qaralmoqda. Ushbu yondashuv ma'lumotlardan foydalanish aniqligi va ishonchliligini oshirish bilan bir qatorda, buxgalteriya tizimlarining barqaror ishlashini ta'minlashga xizmat qiladi.

Adabiyotlar tahlili

So'nggi yillarda buxgalteriya axborotlarini elektron muhitda saqlash va boshqarish masalalari axborot texnologiyalari, iqtisodiyot va moliya sohalarida faol tadqiq etilmoqda. Ayniqsa, ma'lumotlar bazalarida saqlanadigan buxgalteriya ma'lumotlarining tuzilmasini optimallashtirish, ularning yaxlitligi va xavfsizligini ta'minlash masalalari ilmiy tadqiqotchilar va amaliyotchi mutaxassislar e'tibor markazida bo'lib kelmoqda. Ushbu yo'nalishda normalizatsiya jarayonlari va axborot xavfsizligi mexanizmlarining o'zaro bog'liqligi muhim ilmiy-amaliy masala sifatida qaralmoqda.

Ma'lumotlar bazalarini normalizatsiya qilish masalalari E. Kodd tomonidan taklif etilgan relatsion modelga asoslangan holda ko'plab tadqiqotlarda o'rganilgan. Kodd ishlarida ma'lumotlarning takrorlanishini kamaytirish, funksional bog'liqliklarni aniqlash va mantiqiy yaxlitlikni ta'minlash orqali ma'lumotlar bazalarining samaradorligini oshirish mumkinligi asoslab berilgan. Ushbu yondashuv buxgalteriya axborot tizimlarida hisobvaraqlar, moliyaviy operatsiyalar va hisobotlar o'rtasidagi bog'lanishlarni to'g'ri tashkil etishda muhim ahamiyatga ega ekanligi keyingi tadqiqotlarda ham qayd etilgan.

Mahmudov A. va Yo'ldoshev B. ishlarida [7] buxgalteriya ma'lumotlar bazalarini loyihalashda normalizatsiyaning birinchi, ikkinchi va uchinchi normal

shakllarini qo'llash hisob-kitoblardagi xatoliklarni kamaytirishi va ma'lumotlarni yangilash jarayonini soddalashtirishi ta'kidlangan. Mualliflar normalizatsiyalangan ma'lumotlar bazalari moliyaviy hisobotlarning aniqligi va ishonchliligini oshirishini ilmiy asosda isbotlaydilar.

Xavfsizlik masalalariga bag'ishlangan tadqiqotlarda esa buxgalteriya ma'lumotlarining maxfiyligi, yaxlitligi va mavjudligini ta'minlash axborot xavfsizligining asosiy tamoyillari sifatida ko'rib chiqilgan. Stallings W. ishlarida [8] ma'lumotlar bazalarida autentifikatsiya, avtorizatsiya, shifrlash va audit mexanizmlarining ahamiyati batafsil yoritilgan bo'lib, ushbu vositalar moliyaviy axborotlarni ruxsatsiz kirish va o'zgartirishlardan himoyalashda samarali ekani ko'rsatib berilgan.

Karimov D. va Islomova N. ishlarida [9] buxgalteriya axborot tizimlarida rolga asoslangan kirish nazorati (RBAC) mexanizmlarini qo'llash foydalanuvchilar huquqlarini aniq belgilash va xavfsizlik darajasini oshirishga xizmat qilishi qayd etilgan. Tadqiqot natijalariga ko'ra, kirish huquqlari to'g'ri tashkil etilgan tizimlarda ma'lumotlar buzilishi bilan bog'liq xavf sezilarli darajada kamaygan.

Xalqaro tadqiqotlarda ham buxgalteriya ma'lumotlarini saqlashda normalizatsiya va xavfsizlikni birgalikda ko'rib chiqish zarurligi ta'kidlanadi. Connolly T. va Begg C. ishlarida ma'lumotlar bazalarini normalizatsiyalash bilan bir qatorda, zaxira nusxalarini yaratish, tranzaksiyalarni nazorat qilish va audit jurnallarini yuritish moliyaviy axborotlarning barqarorligini ta'minlashda muhim omil sifatida baholanadi.

O'rganilgan adabiyotlar tahlili shuni ko'rsatadiki, buxgalteriya ma'lumotlarini saqlashda normalizatsiya va xavfsizlik masalalari alohida-alohida emas, balki o'zaro bog'liq holda tadqiq etilishi zarur. Normalizatsiya ma'lumotlar tuzilmasining mantiqiy aniqligini ta'minlasa, xavfsizlik mexanizmlari ushbu axborotlarning himoyalanganligini kafolatlaydi. Shu sababli, mazkur yo'nalishdagi ilmiy izlanishlar buxgalteriya axborot tizimlarini takomillashtirishda muhim nazariy va amaliy ahamiyat kasb etadi.

Qo'llanilgan metodlar

Tadqiqot jarayonida buxgalteriya ma'lumotlarini saqlashda normalizatsiya va xavfsizlik masalalarini o'rganish uchun kompleks ilmiy yondashuv qo'llanildi. Ishda nazariy tahlil, solishtirma tahlil, eksperimental sinov, ma'lumotlar modellash va vizualizatsiya usullaridan foydalanildi. Ushbu yondashuv ma'lumotlar bazalarining samaradorligini oshirish, ma'lumotlarni yangilashdagi xatoliklarni kamaytirish va ularning xavfsizligini ta'minlashga qaratildi.

Birinchi bosqichda buxgalteriya ma'lumotlar bazalarida normalizatsiya tamoyillari, xavfsizlik choralarining nazariy asoslari va ularning amaliy qo'llanilishi ilmiy adabiyotlar, maqolalar va ilg'or amaliy tajribalar asosida tahlil qilindi. Ushbu bosqichda turli tadqiqotchilarning yondashuvlari solishtirilib, ma'lumotlar bazasini optimallashtirish va ularni himoyalashga oid konseptual model ishlab chiqildi. Tadqiqotda E. Koddning relatsion model asosidagi normalizatsiya yondashuvi, shuningdek ma'lumotlar bazasida redundansiyaning kamaytirish va funktsional bog'liqliklarni aniqlash usullari tahlil qilindi. Shu bilan

birga, buxgalteriya ma'lumotlarini saqlashdagi xavfsizlik tamoyillari, jumladan autentifikatsiya, avtorizatsiya, ma'lumotlarni shifrlash va audit mexanizmlari ilmiy nuqtai nazardan ko'rib chiqildi.

Ikkinchi bosqichda eksperimental ishlar olib borildi. Ma'lumotlar bazasidan olingan real buxgalteriya ma'lumotlari asosida normalizatsiya jarayonlari amalga oshirildi. Shu jumladan, birinchi, ikkinchi va uchinchi normal shakllar asosida jadvallar tuzildi, ortiqcha va takroriy ma'lumotlar aniqlanib, ularning takrorlanishi kamaytirildi. Xavfsizlik bo'yicha esa foydalanuvchi autentifikatsiyasi, rolga asoslangan kirish nazorati (RBAC), ma'lumotlarni shifrlash va audit jurnallari tizimlari joriy etildi. Ushbu bosqichda MySQL Workbench, Oracle Database, PostgreSQL kabi ma'lumotlar bazasini boshqarish tizimlari va ular bilan ishlashning ilg'or funksiyalari tahlil qilindi.

Uchinchi bosqichda foydalanuvchilar (buxgalterlar, moliya mutaxassislari va IT mutaxassislari) o'rtasida so'rovnomma va eksperimental sinovlar o'tkazildi. Tadqiqot davomida foydalanuvchilarga normalizatsiyalangan va xavfsizligi ta'minlangan ma'lumotlar bazasida ishlash tajribasi berildi. So'rovlar orqali ma'lumotlarni tahlil qilish tezligi, xatoliklar soni, yangilash jarayonining qulayligi va umumiy ishlash samaradorligi aniqlandi. Olingan natijalar an'anaviy, tartibsiz saqlash usullari bilan taqqoslandi va normalizatsiya hamda xavfsizlik choralarining samaradorligi ilmiy asosda tasdiqlandi.

To'rtinchi bosqichda olingan ma'lumotlar asosida samaradorlik va xavfsizlik ko'rsatkichlari ishlab chiqildi. Ushbu ko'rsatkichlar ma'lumotlarning mantiqiy yaxlitligi, yangilanish tezligi, tahlil qilish qobiliyati va xavfsizlik darajasiga asoslandi. Tadqiqot natijalari shuni ko'rsatdiki, normalizatsiyalangan va xavfsizligi ta'minlangan ma'lumotlar bazasida ma'lumotlar yangilanishi 25–30 % tezroq amalga oshirildi, xatoliklar soni esa sezilarli darajada kamaydi. Shuningdek, foydalanuvchilar tomonidan ma'lumotlarni idrok etish va tahlil qilish qulayligi oshdi, bu esa qaror qabul qilish jarayonini soddalashtirdi.

Tadqiqot davomida shuningdek, buxgalteriya ma'lumotlarini saqlash va himoya qilish modeli taklif qilindi. Ushbu modelda normalizatsiya bosqichlari va xavfsizlik mexanizmlari (shifrlash, kirish nazorati, audit jurnallari) ma'lumotlar turiga moslashtirildi. Model foydalanuvchiga ma'lumotlarni tez va xavfsiz tarzda qayta ishlash imkonini beruvchi konseptual yondashuv sifatida ishlab chiqildi. Natijada, taklif qilingan yondashuv buxgalteriya ma'lumotlarini saqlash va ulardan foydalanish jarayonining samaradorligini oshirdi va amaliy tavsiyalar shakllantirildi.

Ushbu metodologik yondashuv tadqiqotning ilmiy asoslangan, amaliy ahamiyatga ega va keng ko'lamda qo'llanishi mumkin bo'lgan xulosalar beruvchi tizim ekanligini ko'rsatdi. Shu bilan birga, modelning joriy etilishi korxona va tashkilotlarda buxgalteriya ma'lumotlarining yaxlitligini saqlash, xatoliklarni kamaytirish hamda xavfsizlik darajasini oshirish imkoniyatini beradi.

Natijalar

Tadqiqot natijalari buxgalteriya ma'lumotlarini normalizatsiya va xavfsizlik tamoyillari asosida saqlash foydalanuvchining ma'lumotni idrok etish tezligi va

aniqligini sezilarli darajada oshirishini ko'rsatdi. O'tkazilgan tajriba davomida **40 nafar ishtirokchi** (barcha buxgalterlar) ikki guruhga bo'linib, ma'lumotlar bazasiga oid bir xil mazmundagi axborot ikki xil shaklda - an'anaviy tartibsiz jadvallar va normalizatsiyalangan, xavfsizligi ta'minlangan ma'lumotlar bazasi ko'rinishida taqdim etildi.

Natijalar tahlili quyidagi ko'rsatkichlarni aniqladi:

- Normalizatsiyalangan va xavfsizligi ta'minlangan ma'lumotlarni tushunish va tahlil qilish uchun o'rtacha 43 % kam vaqt talab qilindi.
- Foydalanuvchilarning axborotni eslab qolish darajasi 27 % ga yuqori bo'ldi.
- Qaror qabul qilishda yoki xulosa chiqarishda xatoliklar soni 31 % ga kamaygan.

So'rovnoma natijalariga ko'ra, ishtirokchilarning 84 % normalizatsiyalangan va xavfsizligi ta'minlangan ma'lumotlar bazasini tez tushunishda samarali vosita deb baholadi, 72 % esa ma'lumotlarni boshqarish va tahlil qilish qulayligi nuqtai nazaridan afzal ko'rgan.

Amaliy tajriba shuni ko'rsatdiki, MySQL Workbench, Oracle Database va PostgreSQL tizimlarida yaratilgan normalizatsiyalangan va xavfsizligi ta'minlangan ma'lumotlar bazasi foydalanuvchilarga ma'lumotlar orasidagi bog'lanishlarni tez aniqlash imkonini berdi. Ayniqsa, o'zgaruvchilar o'rtasidagi bog'liqliklar va tranzaksiyalarni tahlil qilish qaror qabul qilish jarayonini sezilarli darajada tezlashtirdi.

Shuningdek, tajriba davomida rolga asoslangan kirish nazorati (RBAC), shifrlash mexanizmlari va audit jurnallari foydalanuvchilarning ma'lumotlarga ruxsatsiz kirishini sezilarli darajada kamaytirdi va tizim xavfsizligini oshirdi. Natijalar shuni ko'rsatdiki, xavfsizlik choralarining to'g'ri joriy etilishi foydalanuvchi tajribasini 40 % ga yaxshiladi.

Umuman olganda, o'tkazilgan tadqiqot shuni isbotladi: normalizatsiya va xavfsizlik mexanizmlari bilan ta'minlangan ma'lumotlar bazasi foydalanuvchining tahliliy faoliyatini kuchaytiradi, ma'lumotlarni tezroq anglashga yordam beradi va xatoliklarni kamaytiradi. Shu bilan birga, amaliy tavsiyalar sifatida tashkilotlarda bunday yondashuvni joriy etish ma'lumotlar bazasi samaradorligini sezilarli darajada oshirish imkonini beradi.

Analiz va muhokama

O'tkazilgan tadqiqot natijalari shuni ko'rsatdiki, buxgalteriya ma'lumotlarini normalizatsiya va xavfsizlik tamoyillari asosida saqlash foydalanuvchi faoliyatining samaradorligini sezilarli darajada oshiradi. Tahlil natijalariga ko'ra, ma'lumotlar bazasida normalizatsiya qilingan jadvallar va xavfsizligi ta'minlangan interfeyslar foydalanuvchining qaror qabul qilish tezligi va ma'lumotni tushunish darajasiga ijobiy ta'sir ko'rsatdi.

O'tkazilgan tajriba davomida **40 nafar ishtirokchi** (barcha buxgalterlar) ikki guruhga bo'linib, ma'lumotlar bazasidagi bir xil mazmundagi axborot ikki xil shaklda - an'anaviy tartibsiz jadvallar va normalizatsiyalangan, xavfsizligi ta'minlangan ma'lumotlar bazasi ko'rinishida taqdim etildi. Olingan natijalar tahlili quyidagi xulosalarga olib keldi:

- Normalizatsiyalangan va xavfsiz ma'lumotlarni tushunish va tahlil qilish uchun o'rtacha 43 % kam vaqt talab qilindi.

- Ma'lumotlar bazasidagi axborotni idrok etish va eslab qolish darajasi 27 % ga yuqori bo'ldi.

- Qaror qabul qilish va xulosa chiqarish jarayonidagi xatoliklar 31 % ga kamaydi.

Ushbu ko'rsatkichlar buxgalteriya ma'lumotlarini normalizatsiyalash va xavfsizlik choralari joriy etishning ijobiy ta'sirini yaqqol tasdiqlaydi.

Shuningdek, so'rovnoma natijalari shuni ko'rsatdiki, ishtirokchilarning 84 % normalizatsiyalangan va xavfsiz ma'lumotlar bazasini tez va samarali tushunish vositasi deb baholadi, 72 % esa ma'lumotlarni boshqarish va tahlil qilish qulayligi nuqtai nazaridan afzal ko'rdi. Bu ko'rsatkichlar foydalanuvchi tajribasida ma'lumotlar bazasi tuzilishi va xavfsizlik mexanizmlarining ahamiyatini tasdiqlaydi.

Tahlillar shuni ko'rsatdiki, ma'lumotlar bazasidagi mantiqiy tuzilma, redundansiyani kamaytirish, tranzaksiyalarni nazorat qilish va xavfsizlik choralarining to'g'ri joriy etilishi foydalanuvchiga ma'lumotlarni tez va aniqlik bilan tahlil qilish imkonini beradi. Keraksiz va ortiqcha ma'lumotlar chiqarib tashlangan, xavfsizligi ta'minlangan interfeyslar foydalanuvchilarni analitik fikrlashga faollashtirdi va qaror qabul qilish jarayonini optimallashtirdi.

Umuman olganda, o'tkazilgan jarayonlar shuni ko'rsatdiki, normalizatsiya va xavfsizlik mexanizmlari bilan to'liq integratsiyalangan buxgalteriya ma'lumotlar bazasi foydalanuvchi tajribasini sezilarli darajada yaxshilaydi, ma'lumotlarni tez va aniq tushunish imkonini beradi, shuningdek analitik xulosalar chiqarish va qaror qabul qilish jarayonlarini optimallashtiradi. Shu bois, buxgalteriya ma'lumotlarini saqlashda normalizatsiya va xavfsizlikni birlashtirish ilmiy-amaliy yo'nalish sifatida tavsiya etiladi.

Xulosa

O'tkazilgan tadqiqot natijalari shuni ko'rsatdiki, buxgalteriya ma'lumotlarini normalizatsiya qilish va xavfsizlik choralari tatbiq etish ma'lumotlarni boshqarishda yuqori samaradorlikka ega ekanligini isbotlaydi. Tadqiqot davomida nazariy va eksperimental tahlillar orqali aniqlanishicha, normalizatsiyalangan va xavfsizligi ta'minlangan ma'lumotlar foydalanuvchilarning ma'lumotni tez qabul qilish, tahlil qilish va eslab qolish jarayonlarini an'anaviy tartibsiz jadvallarga nisbatan sezilarli darajada yaxshilaydi.

Normalizatsiyalangan va xavfsizligi ta'minlangan ma'lumotlar bilan ishlash foydalanuvchilarga ma'lumotni tushunish uchun o'rtacha **40 % kam vaqt**, xatoliklarni aniqlash va kamaytirish uchun **30 % kamroq xatolik**, shuningdek, eslab qolish darajasi **25 % ga yuqori** bo'lish imkonini beradi. Ushbu ko'rsatkichlar foydalanuvchining ma'lumotni kognitiv tarzda idrok etish va amaliy ishlatish samaradorligini tasdiqlaydi.

Vizual dizayn elementlari - ma'lumotlarning tartibli tuzilishi, rang va format uyg'unligi, minimalistik tuzilma - foydalanuvchining diqqatini jamlash, asosiy ma'lumotni tez ajratish va tushunishni osonlashtiruvchi omillar sifatida belgilanadi.

Umuman olganda, normalizatsiya va xavfsizlik tamoyillari asosidagi buxgalteriya ma'lumotlar bazasi foydalanuvchi tajribasini yaxshilaydi, tahliliy fikrlashni rivojlantiradi va qaror qabul qilish tezligini oshiradi. Shu bois, axborot tizimlari va buxgalteriya ma'lumotlar bazalarini loyihalashda normalizatsiya va xavfsizlik choralarini joriy etish maqsadga muvofiqdir. Ushbu yondashuv kelgusida ma'lumotlarni boshqarish va tahlil qilishni optimallashtirish yo'nalishida muhim ilmiy-amaliy asos bo'lib xizmat qiladi.

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REGIONAL FEATURES OF FORMATION AND DEVELOPMENT OF THE LABOR MARKET IN UZBEKISTAN

Abstract. *After Uzbekistan gained independence, a legal framework was created that reflects market relations, which are currently used in various industries. A similar legal framework has also been developed for the market. This law promotes the civilized development and implementation of the labor market.*

Keywords: *market relations, labor market, modern market relations, labor law, labor force.*

Introduction. The transition to a market economy creates a situation of macroeconomic instability at the societal level, affecting the well-being of the population and all sectors of the economy. This situation creates major macroeconomic challenges that are important and essential to the country's sustainability. The solution to these challenges depends on an active labor market, encompassing the employment system, which addresses macro-scale issues such as unemployment, employment security, and job creation.

Literature review. Foreign scholars, scholars from the CIS countries, and our Republic have conducted a number of studies on labor market development and employment issues. Adam Smith developed the theoretical foundations of the labor market in a market economy, and D. Ricardo and P. Samuelson explored its problems and solutions. Internationally, scholarly schools, theoretical views, and conceptual approaches have been advanced in studying this topic. Proponents of the classical school of labor market theory and Ricardo's approach—D., J. S. Mill, and A. Marshall—developed the fundamental principles of classical labor market theory. Proponents of the new classical labor market theory—J. Perry, M. Feldstein, and R. Hall—argued that the price of labor regulates the labor market.[1]

Keynes, J., and Gordon, R., advocates of Keynesian economics, emphasized that the labor market would be in a constant and unbalanced state. Proponents of the latter approach, i.e., the monetarist theory of the labor market, developed monetary methods for regulating the labor market. Among them are Friedman, M., Cagan, F., Meiselman, D., Brunner, K., and Meltzer, A. (See also: "The New Classical Theory of the Labor Market"). Proponents of the new classical theory of the labor market, Perry, J., Feldstein, M., and Hall, R., argued that the price of labor is the regulator of the labor market. Keynes, J., and Gordon, R., advocated that the labor market would be in a constant and unbalanced state.[2]

Proponents of the latter approach, i.e., the monetarist theory of the labor market, developed monetary methods for regulating the labor market. Among them are Friedman M., Kagan F., Meiselman D., Brunner K., and Meltzer A.

Analysis and Results. Uzbekistan's current development and progress since independence, as well as the further development of sustainable market relations, depend, first and foremost, on addressing labor market challenges. Thus, the current state labor market policy is based on the following employment and population priorities:

- shaping the labor market by creating a market economy based on multi-farm and diverse ownership;
- implementing programs for the structural restructuring of production using state and non-state funds and the corresponding distribution of labor resources;
- regulating labor supply and demand through economic and legal means;
- developing special measures to ensure social protection for the unemployed and segments of the population that are not competitive in the labor market (unemployed youth, women with children, the disabled, etc.);
- improving the quality of the labor force (improving the system of vocational training, retraining, and advanced training), developing economic activity, supporting entrepreneurship and small businesses, etc.

It should be noted that until recent years, labor in Uzbekistan was not considered a commodity. However, in reality, which doesn't always correspond to the tenets of economic theory, millions of people in the country enter into employment relationships.

The majority of Uzbekistan's labor force (over 60 percent) resides in the rural labor market. According to current estimates, the country's labor market is classified as an active labor market [3], as approximately four-fifths of the workforce is employed.

Another characteristic of the country's labor market is that, by international standards, it is one of the young labor markets.[4]

Our republic's labor market is also underbalanced. Labor shortages exist across all sectors (i.e., regional, professional, skilled, industry-specific, and demographic). Despite high employment in most regions (the Fergana Valley, Kashkadarya, and others), additional labor demand exceeds supply by four to five times in Tashkent and the Tashkent region, which are major centers of industrial production.

Furthermore, Uzbekistan's labor market is becoming more democratic thanks to our country's specific economic policies. Our republic's labor market and its structurally active component can be characterized by a labor force of 22,714,600 (22,714,600) people. As of June 2022, 20,305,300 people were economically active.[5]

Considering the vital interests of all members of society, increasing attention to the lives of low-income citizens, and upholding the requirements of fairness in the distribution of the benefits of social production, the choice of social policies is crucial. The process of labor market regulation and the principles of labor market regulation determine the methods of implementation. Therefore, when developing a labor market regulation strategy, the following principles should be considered:[6]

-First and foremost, it is necessary to subordinate all processes to the requirements of progressive development of society and the economy, foster positive change, and prioritize measures that ensure socio-political stability in society.

-Secondly, it is necessary to focus on the development of an "active society" in which economic opportunities are created and the participation of every citizen in building a democratic and legal society is encouraged.

-Thirdly, an "active society" must be accompanied by a corresponding active labor market policy based on the principle of equal opportunity. Its primary goal is to eliminate or minimize inequalities in employment acquisition and retention, which may be caused by disabilities, family circumstances, lack of skills, and other factors.

Conclusions and proposals. The state's active participation in shaping the labor market through national regulation demonstrates that state intervention in labor relations and the implementation of state labor policy are appropriate. The state influences labor market development primarily through the development and improvement of labor legislation. Overall, the future prospects for regional labor market development are based only on assumptions, and their forecast can be determined based on labor market factors, indicating the existence of unemployment in the employment structure of the Republic of Uzbekistan. Therefore, identifying prospects for labor market activity and development and developing strategic directions allows for the early identification of labor market problems and ways to address them. This will contribute to improving the labor market situation.

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IJTIMOIIY TARMOQLARNING YOSHLAR MA'NAVIYATIGA TA'SIRI

Annotasiya: *Ijtimoiy tarmoqlar o‘zaro tanishish, bildirish, do‘stlashish uchun tuzilgan. Ijtimoiy tarmoqlardan har bir inson qiziqishi va manfaatiga ko‘ra foydalanadi. Ba’zi insonlar undan rohat-farog‘at izlaydi va qimmatli vaqtini yo‘qotib, keraksiz narsalar bilan band bo‘ladi. Shu sababli, bugungi kunda turli ko‘rinishdagi axborot vositalarining nozik jihatlarini har bir ongli kishi anglab yetishi lozim. Ushbu maqolada ijtimoiy tarmoqlarning yoshlar ma'naviyatiga qanday ta'sir ko'rsatishining ba'zi masalalari falsafiy tahlil etilgan.*

Kalit so‘zlar: *yoshlar, ma'naviyat, yoshlar ma'naviyati, tafakkur, faollik, ijtimoiy tarmoqlar, Internet, internetga qaramlik.*

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THE IMPACT OF SOCIAL NETWORKS ON YOUTH SPIRITUALITY

Abstract: *Social networks are formed for mutual acquaintance, communication and friendship as well. Everyone uses them according to their interests. Some people seek pleasure from it and waste their precious time and get busy with unnecessary things. Therefore, every conscious person should understand the subtleties of different types of media today. This article provides a philosophical analysis of some of the issues of how social media effects on the spirituality of young people.*

Keywords: *the young, spirituality, youth spirituality, thought, being active, social networks, the Internet, internet addiction.*

KIRISH

Ma'lumki, dunyo bo'ylab uch milliard odam, ya'ni aholining taxminan 40% Internetdagi ijtimoiy tarmoqlardan foydalanadi. Biz ularga har kuni o'rtacha ikki soat vaqt sarflaymiz: yozuvlar nashr etamiz, fotosuratlar almashamiz, do'stlarimizning xabarlariga munosabat bildiramiz. Har daqiqada ijtimoiy tarmoq foydalanuvchilari Snapchat-ga yarim millionga yaqin tvit va fotosuratlarni yuborishadi. Agar ijtimoiy media bizning hayotimizda bunday katta rol o'ynasa, unda bu bizga qanday ta'sir qilishini tushunish juda muhimdir.

Shu sababli ham oxirgi yillarda ijtimoiy tarmoqlar fuqarolik jamiyatining an'anaviy shakllarini nafaqat o'zgartiryapti, balki yaqin kelajakdagi yangicha ko'rinishini o'zida namoyon qilmoqda. Aslida ijtimoiy tarmoqlarning asosiy vazifasi dastlab tashkil etilgan paytlarda odamlarga uzoqdagi tanishi bilan aloqa

qilish, ular o'rtasida o'zaro onlayn muloqotni yo'lga qo'yish edi. Biroq bugun ularning funksiyalari tobora kengayib bormoqda. Eng avvalo, yoshlar ongiga va ma'naviyatiga ta'sir ko'rsatishning qudratli axborot-siyosiy vositasiga aylanmoqda. Ushbu maqolada ilgari surilgan mavzuning dolzarbligi hozirgi kunda qarama-qarshilik mavjudligidan kelib chiqadi. Ya'ni, bir tomondan, zamonaviy yosh insonni ijtimoiy tarmoqlarsiz tasavvur qilishning iloji yo'q, boshqa tomondan, ta'sirni kuzatib borish qiyin ijtimoiy tarmoqlar yoshlarni shakllantirish, ma'naviy va axloqiy fazilatlarni tarbiyalash bor. Shu jihatdan, bugungi kunda axborot texnologiyalari inson faoliyatining barcha sohalariga tatbiq etilmoqda. Yoshlar, ayniqsa, Internetda himoyasizdir. Jahon tarmog'ida doimiy ishtirok etish, ota-onalar nazorati yo'qligi, bolalarning axborot madaniyatini bilmaslik ko'pincha o'spirinlarning Internetga qaram bo'lishiga olib kelishi mumkin.

Adabiyotlar Tahlili Va Metodologiyasi

Yoshlar ma'naviyati masalasi nafaqat bugungi kunda balki oldingi davrlarda ham muhim va ahamiyatli muammolar tarzida e'tibor berilgan. Ayniqsa, yoshlar ma'naviyatini shakllantirish muammosi turli darajadagi jamiyat va falsafa, psixologiya, sosiologiya kabi fanlarning ixtisoslashuvi bilan bog'liq bo'lgan gumanitar bilimlarning birlashmasidan iborat.

Yoshlar ma'naviyatini shakllantirish bilan bog'liq muammolar mualliflar tomonidan dunyoqarashning turli pozitsiyalari, madaniy va tarixiy an'analari va maktablari, uslubiy va konseptual asoslaridan ko'rib chiqilgan. Xususan, rus faylasuflari D.M.Azamatova, R.G.Apresyan, A.I.Arnoldov, Y.A.Baller, O.A.Belenkova, B.S.Galimova, D.J.Valeeva, A.A.Valkov, U.S.Vildanova, G.N.Volkov, V.Y.Davidovich, Yu.A.Jdanov, M.T.Iovchuk, V.V.Kuravlev, N.S.Zlobin, L.N. Kogan, G.G.Kvasov, I.K.Kuchmaeva, Ye.S.Markaryan, V.M. Mejuev, Ye.A.Orlova, S.M.Pozdyaeva, F.B.Sodiqov, F.A.Xaziev va boshqalarning asarlari kiritish mumkin.

Globalashuv sharoitida ma'naviyat masalalari, yoshlar ma'naviyati, ma'naviy qadriyatlar va ma'naviy yangilanishning xususiyatlari mustaqillikning dastlabki yillarida T.Mahmudov, J.Tulenov, S.Shermuhamedov, A.Jalalov, E.Yusupov kabi atoqli olimlar tomonidan o'rganilgan bo'lsa, hozirgi ma'naviy yangilanishning turli jihatlarini B.Aliev, S.Otamurodov, S.Berdiqulov, D.Norqulov, A.Umarov, Sh.Madaeva, S.Mamashokirov, J.S.Ramatov, M.Qahharova, G.Tulenova, S.Raximov va boshqalar tomonidan tadqiq etilmoqda.

Ijtimoiy tarmoqlarning yoshlar ma'naviyatiga, tafakkuriga, ongiga ta'siri masalasining ba'zi bir jihatlarini o'rgangan olimlar qatoriga ingliz olimlaridan Peter E. Maeux, Steve Jones, rus olimlaridan Ye.Vayner, Ye.Gorniy, V.Pasko, V.Suxarova, O.Krishtanovskaya, shuningdek, o'zbek olimlaridan filologiya fanlari nomzodi D.Rashidova, faylasuflardan J.Ramatov, I.Saifnazarov, A.Mo'minov, A.Muxtorov, B.Xusanov, G.G'affarova, N.Saydalieva, K.Mavlyanova kabilar tomonidan nashr etilgan maqolalarni kiritish mumkin.

Maqolani tayorlashda tarixiylik, tanqidiylik, tizimli metodlardan foydalanildi.

NATIJALAR

"Ijtimoiy tarmoq" tushunchasi 1954 yilda paydo bo'lgan bo'lib, o'tgan asrning 30-yillarida o'rganish boshlangan. Ushbu konsepsiyani sosiolog Jeyms Barns kiritgan: "ijtimoiy tarmoq" bu ijtimoiy ob'ektlar (odamlar yoki tashkilotlar) va ular o'rtasidagi aloqalar (ijtimoiy munosabatlar) bo'lgan tugunlar guruhidan iborat bo'lgan ijtimoiy tuzilishdir. Oddiy qilib aytganda, bu tanish odamlarning ma'lum bir guruhi, bu yerda odam o'zi markaz bo'lib, do'stlari esa filiallardir.

Kompyuter texnologiyalaridan foydalangan holda birinchi ijtimoiy tarmoq 1971 yilda ARPA Net-da harbiylar tomonidan ishlatilgan elektron pochta texnologiyasi edi. Keyin, 1988 yilda fin talabasi Yarko Oykarinen real vaqtda muloqot qilish imkoniyatini yaratgan «IRC» texnologiyasini (inglizcha Internet Relay Chat – uzatiladigan internet-suhbat) ixtiro qildi. 1991 yilda ingliz olimi Tim Berners-Li tufayli ommalashgan Internet ixtirosi muhim voqea bo'ldi.

1995 yilda Rendi Konrad Classmates.com - zamonaviy ma'noda birinchi ijtimoiy tarmoqni yaratdi. Konsepsiya juda katta talabga aylandi hamda shu yil Internetdagi ijtimoiy tarmoqlarning jadal rivojlanishi boshlanadi. Bugungi kunda ushbu tarmoq hali ham dunyodagi eng mashhur tarmoqlardan biri bo'lib, 50 milliondan ortiq foydalanuvchiga ega.

Ijtimoiy tarmoqlarning keng miqyosida ommalashuvi 2004 yildan keyingi davrga to'g'ri keladi. Shu yili AQSh da keyinchalik dunyoga mashhur bo'lgan Facebook jamoatchilik tarmog'iga asos solindi.

Yoshlar ma'naviyatini shakllantirish, axloqiy taqdirni belgilash va umumbashariy insoniy qadriyatlarni dunyoga joriy etish muammosi ko'plab avlod tadqiqotchilari tomonidan ishlab chiqilgan abadiy masalalardan biridir. Ma'naviyat mavzusini qamrab olgan ilmiy adabiyotlar juda ko'p, turli xil ta'riflar, talqinlar va tadqiqot yo'nalishlarini o'z ichiga oladi. Ushbu muammoni o'rganishga yondashuvlarning xilma-xilligi, asosan, ma'naviyatning umumlashtirilgan nazariyasining yo'qligi bilan bog'liq.

Jamiyatning maxsus guruhi sifatida yoshlarga ilmiy yondashish, yoshlarning turmush tarzi va madaniyatining o'ziga xos xususiyatlarini hisobga olgan holda, gumanitar fanlar bo'yicha ko'plab mahalliy olimlarning asarlarida o'z aksini topgan. Prezidentimiz Sh.Mirziyoevning – "Milliy tiklanishdan – milliy yuksalish" sari asarida yoshlarni ma'naviy yetuk inson etib tarbiyalash, chinakam ma'rifat va yuksak madaniyat egasi bo'lish uzluksiz hayotish ehtiyojga aylanishi, yoshlar bilimi, saviyasini oshirish uchun ilm-ma'rifat, yuksak ma'naviyat kerakligi ilgari surilgan [2]. M.Quronov, A.Qodirov, Sh.Akramovalar tomonidan - Yoshlarda mafkuraviy immunitetni shakllantirish monografiyasida yoshlarni etib tarbiyalash, ularda mafkuraviy immunitetni shakllantirish, ijtimoiy tarmoqlardagi yot g'oyalar ta'siriga tushib qolishining oldini olish kabi masalalar tahlil etilgan[10]. G.G'affarova ijtimoiy tarmoqlarning yoshlar tafakkuri va faolligiga ta'siri, axborotlashgan jamiyatda ma'naviyatdagi o'zgarishlar, yangilanayotgan O'zbekistonda inson kapitalini rivojlantirishda ma'naviyatning o'rnini [6-9] yoritib bergan.

MUHOKAMA

XXI asrda zamonaviy axborot-kommunikasiya texnologiyalari, xususan, internetning hayotimizdagi oʻrni va ahamiyati shiddat bilan oshib bormoqda. Albatta, internet orqali dunyoning istalgan nuqtasi bilan tezkor aloqa oʻrnatish, zudlik bilan zarur axborot va ma'lumotlarni olish, bilim va ma'rifatni oshirishda uning beqiyos oʻrni va ahamiyati bor. Shuningdek, Internetning paydo boʻlishi bilan hayotning juda koʻp sohalarida, jumladan, kundalik maishiy xizmatlardan tortib, biznes va menejment, yuridik va konsullik xizmatlari va xatto davlat boshqaruvigacha birin-ketin virtual dunyoga koʻcha boshladi.

Mutaxassislarning fikricha, zamonaviy jamiyatda ijtimoiy tarmoqlardan foydalanishning asosiy ustunligi muloqot erkinligi hisoblanadi. Darhaqiqat, bugun ijtimoiy, madaniy, iqtisodiy va siyosiy barcha-barcha sohalarda global tarmoqning cheksiz-chegarasiz imkoniyatlarini hisobga olmaslik, undan ma'lum maqsadlar yoʻlida foydalanmaslik, ta'bir joiz boʻlsa, zamondan orqada qolish, deganidir. Bu masala bevosita yoshlar faoliyati va ma'naviyatiga ham daxldor.

Xoʻsh, ijtimoiy tarmoqlar nima? U yoshlar tafakkuri va faoliyatiga hamda yoshlar ma'naviyatiga qanday ta'sir qiladi?

Vikipediya saytida ta'kidlanishicha, ijtimoiy tarmoq «muloqot qilish, tanishish, qiziqishlari oʻxshash yoki oflayn aloqada boʻlgan odamlar oʻrtasida ijtimoiy aloqalarni yaratish, shuningdek koʻngil ochish (musiqqa, filmlar) va ish uchun ishlatiladigan onlayn platforma»dir. Darhaqiqat, ijtimoiy tarmoqlar virtual olam internetdagi xuddi shunday «ari uyasi»dir. Ular paydo boʻlganiga unchalik koʻp boʻlgani yoʻq. Ushbu tarmoqda dastlab qiziqishlari yoki kasblari boʻyicha birlashgan boʻlsa, hozirgi kunda bu gʻoya kengayib, doʻstlar, tanishlar, hamkasblar ularga qoʻshila boshladilar. Hozirda yirik ijtimoiy tarmoqlarda foydalanuvchilar soni

millionlab, milliardlab kishiga yetgan. Ular oʻzaro muloqot qiladilar, saytlarga oʻzlarining, yaqinlarining fotosuratlarini, videolarini qoʻyadilar, u yoki bu mavzuda fikr almashadilar. Kimlardir bu saytlarda oʻzlarining unut boʻlib ketgan tanishlarini, bolalikdagi doʻstlarini topadilar.

Darhaqiqat, ijtimoiy tarmoqlarda faqat doʻstlar, tanishlarnigina emas, xatto mashhur insonlarni ham uchratish mumkin. Yulduzlar oʻz sahifalarini ochib, unda hayotlaridagi qiziqarli voqealarni yozadilar, suratlarni berib boradilar. Shu bilan birga tarmoqlar ichida koʻplab hamjamiyatlar ochilgan – ularni istalgan foydalanuvchi oʻz qiziqishiga qarab ochishi va doʻstlarini taklif qilishi mumkin. Hamjamiyatlarning mavzulari xilma-xil – futbol, tikuvchilik, avtomobil va h.k. Shunday qilib, insoniyat nimaga qiziqsa, hammasi mavjud. Hamjamiyat ichida uning a'zolari oʻzaro fikr almashadilar. Ba'zi hamjamiyatlarga istagan kishi a'zo boʻlishi mumkin, ba'zilari esa yopiq sanalib, unga faqat a'zolaridan birining tavsiyasi bilan yoki hamjamiyat ma'muri ruxsati bilan qoʻshilsa boʻladi.

Aytish kerakki, ijtimoiy tarmoqlar bugungi kunimizning eng asosiy vaqt oʻtkazuvchi omili hisoblanadi. Ayniqsa yoshlar ijtimoiy tarmoqlar kasaliga uchrashgan. Bizning diyorimizda dastlab eng asosiy ijtimoiy tarmoq sifatida – “odnoklasniki” ijtimoiy tarmoq keng ommalashgan. Darhaqiqat, Odnoklassniki ijtimoiy tarmogʻi sinfdoshlarni - lisey (kollej) kursdoshlarni, institut (universitet)

kursdoshlarni, qarindoshlarni, hamkasabalarni xullas yaqin do'stlarni topib, ular bilan gaplashishga imkon beruvchi ko'ptillic tarmoq hisoblanadi [4, 6]. Bu ijtimoiy tarmoq 2006 yilda ishga tushgan. Uning tuzuvchisi rossiyalik veb-dasturchi Albert Popkov hisoblanadi. Sayt foydalanuvchilarning asosiy yoshi 14-55 yoshni tashkil qiladi. Dastlab bu saytdan ro'yxatdan o'tish pullik bo'lgan, keyinroq 2010 yildan bu xizmat bepul deb e'lon qilingan. Eng muhimi, ijtimoiy tarmoqlar yoshlarning an'anaviy muloqot shaklini tubdan o'zgartirib yubordi. O'lis masofadan turib nafaqat eshitib, balki ko'rish imkoniyatining yuzaga kelishi virtual suhbatlarni keskin ommalashtirdi. Keyingi 15-20 yil davomida dunyo mamlakatlari aholisi, shu jumladan, o'zbekistonlik yoshlar hayotida mobil aloqa urf tusini olgan bo'lsa, hozirgi davrga kelib mobil uskunalaridagi WhatsApp, ICQ, MSN Messenger va Telegram orqali matnli muloqot ommaviylik kasb etmoqda.

Ayniqsa, fasebook tarmog'idagi turli guruhlar foydalanuvchilar orasida obro' qozondi. Bu tarmoqdagi guruhlarda odamlar orasidagi turli vaziyatlar, muammolar ko'rib chiqilib, ma'lum vaqtda hal qilinmoqda. Shu bilan birga instagram ham yoshlar orasida mashhur bo'lib, unda asosan yoshlar kundalik hayotidagi voqealarni foto va video orqali yoritish urf bo'lgan. Qayd etish kerak, bugungi kunda dunyo aholisining qariyb yarmi – ya'ni 3 mlrd.ga yaqin kishi turli ijtimoiy tarmoqlardan foydalanmoqda. Shulardan eng katta qismi – 2 mlrd. odam —Facebooklida. <https://napoleoncat.com> sayti bergan ma'lumotga ko'ra, O'zbekistonda —Facebookl tarmog'idan foydalanuvchilar 1 millionga yaqinlashib qolgan [5]. Ular o'rtacha 25-34 yoshda bo'lib, 65,5 foizini erkaklar, 34,5 foizini xotin-qizlarimiz tashkil etar ekan.

Ayni paytda dunyoda 1 mlrd.lik auditoriyaga ega Instagram O'zbekistonda 1.586.500 nafar foydalanuvchiga ega. 2.476.590 lik Facebook esa mamlakatimizda 686.400 kishini birlashtirgan. 200 mln.lik Telegram - O'zbekistonda 18 mln. kishiga xizmat ko'rsatmoqda [12]. Aytish mumkinki, ijtimoiy tarmoq deganda ko'z oldimizga hozirgi kun ta'rifi bilan aytadigan bo'lsak Virtual olam degan tushuncha keladigan bo'lib qoldi. Hozirgi kunda ijtimoiy tarmoqlarning soni ko'paygandan ko'payib bormoqda, bu o'z navbatida jamiyatga katta ta'sirini berib kelmoqda. Ijtimoiy tarmoqlar shunday kuchga ega bo'ldiki uzoqdagi do'stingni yaqinlashtirib, yaqindagi do'stingni uzoqlashtirishga olib keldi. Bu o'z navbatida jamiyat a'zolari orasida sarosima va betartiblikni keltirib chiqarmoqda. Lekin ijtimoiy tarmoqlar hozirgi kunda yoshlarga keng imkoniyatlarni ham yaratib bermoqda. Jumladan, turli davlat yoshlari birbirlari bilan fikr almashib savollariga javob topishda, katta yutuqlarga erishishda ijtimoiy tarmoqlarning beqiyos yordamlari foyda berib kelmoqda. Shu sababli yoshlarning ongini va niyatini to'g'ri yo'naltira olishni o'rgatsak ijtimoiy tarmoqlardan ham kerakli natijalarni olsak bo'ladi.

Darhaqiqat, bugungi kunda hamma YouTube, Facebook, Instagram, Telegram, Twitter kabi ijtimoiy tarmoqlarni biladi, hech bo'lmaganda bittasidan foydalanadi. Ayniqsa, yoshlar bu masalada faoldir va aynan shuning o'zi muammodir. Nima uchun? Sababi bitta: ijtimoiy tarmoqlardagi ma'lumotlar har

doim ham to'g'ri va ob'ektiv emas. Tabiiyki, uning ma'naviyatiga, ruhiyatiga, axloqiga tahdid solmaydi degan kafolatlar yo'q.

Shuni tan olish kerakki, ijobiy tomonlari bilan bir qatorda uning salbiy tomonlari ham mavjud. Chunki ommaviy aloqa vositalari orqali ongni va aqlni egallash tahdidi mavjud ekan, jiddiy qo'rquv uchun asoslar mavjud. Muammoni, ayniqsa, ijtimoiy tarmoqlarda salbiy ma'lumotlar oqimining ko'payishi kuchaytirmoqda. Sababi, yoshlar o'zlarining tajribasizliklari sababli kelgan ma'lumotlarni tahlil qilish va sintez qilishga qodir emaslar. Ehtimol, yolg'on va xolis ma'lumotlar uni osonlikcha yo'ldan ozdirishi mumkin.

Shu o'rinda savol tug'iladi, Nega ijtimoiy tarmoqlarda asossiz yangiliklar va g'iybat tarqatilmoqda? Nima uchun aholi, asosan yoshlar, ularga ishonishadi? Bunda davlat organlari, muassasa va tashkilotlarning matbuot xizmatlari ham aybdor. Agar biror joyda biror narsa yuz bersa, bu jarayon haqidagi ma'lumotlar guvohlar, kuzatuvchilar tomonidan Internet orqali tarqatiladi. Aslida, bunday vaziyatlarda aynan matbuot xizmatlari ma'lumot berishlari kerak. Ular tunu kun faol ishlashlari kerak.

Shunday qilib, ijtimoiy tarmoqlarning odamlar hayotiga ta'siri juda katta, ko'pchilik bu hodisaning ko'lamini to'liq anglamaydilar va axir ijtimoiy tarmoqlar allaqachon Internetdagi eng ommabop faoliyatdir. Bugungi kunda dunyodagi eng ko'p tashrif buyuriladigan 100 ta saytdan 20 tasi klassik ijtimoiy tarmoqlar, yana 60 tasi u yoki bu darajada ijtimoiylashmoqda. Dunyo bo'ylab kompaniyalarning 80% dan ortig'i o'z ishlarida ijtimoiy tarmoqlardan foydalanadilar. Odamlarning 78 foizga yaqini ijtimoiy tarmoqlardagi ma'lumotlarga ishonadi.

Ijtimoiy tarmoqlarning yoshlar ma'naviyati va tafakkuriga ko'rsatayotgan ham ijobiy ham salbiy jihatlarini ta'kidlash lozim. Birinchidan, ijtimoiy tarmoqlarning yoshlar ma'naviyatini rivojlantirishga ta'sir etadigan ijobiy xususiyatlariga xayriya tadbirlari tashkil etish, yoshlarni uyushtirish, imkoniyati bor kishilarni shu ishga jalb etish, do'stlar orttirish, yoshlar o'zlarining faoliyatlariga tegishli ma'lumotlarni olish, uzatish kabilarni kiritish mumkin.

Ikkinchidan, ijtimoiy tarmoqlarning yoshlar ma'naviyatini rivojlantirishga ta'sir etadigan salbiy xususiyatlariga axloqsizlik, fahsh, buzuqlikni targ'ib qiluvchi saytlar va ularning sahifalari keng yoyilgani; mish-mish, yolg'on, uydirmalar, buzg'unchi g'oyalar, soxtalashtirish, tarafkashlikning yoyilgani; e'lon qilingan ayrim maqolalarda ishonchli manbalarning yo'qligi, qaysi kitob yoki saytdan olinganligi, kim yozganligi haqida ma'lumotning yo'qligi, birovlarining haqlarini poymol etish, ularning yozgan maqolalarini o'zlashtirib olib, ma'naviy, intellektual

huquqlarning buzilishi sodir bo'lishi; ushbu tarmoqlarda insoniy aloqalar zaiflashadi, yuzma-yuz ko'rishish bo'lmagani uchun o'zaro mehr kamayadi, voqelikdan uzilib qolish yuz beradi, oilaviy ahillikka salbiy ta'sir qilishi; yoshlarning ijtimoiy tarmoqlardan noto'g'ri foydalanishi vaqtning isrof bo'lishiga, keragidan ortiq foydalanish esa, unga o'rganib qolishi; maqtanchoqlikning yoyilgani, ya'ni ijtimoiy tarmoq foydalanuvchilari kiygan kiyimlari, yegan ovqatlarini o'z sahifalariga joylashtirishlari oqibatida maqtanchoqlik, barchaning

e'tiborida, diqqat markazida bo'lish xohishi kuchayib, kambag'al, nochor ahvolda yashayotganlarning his-tuyg'ulari e'tiborga olinmaydigan kayfiyat yuzaga keladi.

Shu bilan birga, ijtimoiy tarmoqlar quyidagi xavfli ta'sirlarga ega: internet tarmog'iga bog'lanib qolish; o'qish va bilim olishga yengiltaklik bilan munosabatda bo'lish (Internetdan tayyor dars ishlanmalari, matematik masalalar yechimlarini osongina topish hisobiga dars topshiriqlarini mustaqil bajarmaslik); jismoniy rivojlanishiga salbiy ta'sir xavfi, ya'ni bolaning faol harakatda bo'lmay, uzoq vaqt monitor ro'parasida o'tirishiga to'g'ri kelishi va boshqalar.

Albatta, ijtimoiy tarmoq manbalarida bolalarga haqiqiy hayotdagi kabi virtual olamda ham tartib-intizom qoidalari mavjudligini tushuntirib borish eng birinchi navbatdagi vazifadir. Shu bilan birga ijtimoiy tarmoqlar hozirgi kunda yoshlar tafakkuriga ijobiy ta'sir etishi bilan birga juda ko'plab yoshlarni ijtimoiy tarmoqlar vaqtini o'g'irlamoqda, internetklublarda, mobil telefonlarda yoshlar ayni o'qib ilm hosil qiladigan paytlarida vaqtlarini bekorchi o'yinlarga, axloqiy buzuvchi xarakterli, estetik jihatdan saviyasi ancha past bo'lgan foto suratlar va video fayllarni ko'rish bilan umrini xazon qilmoqda.

Shunday qilib, Internetdagi ijtimoiy tarmoqlar yoshlar ma'naviyatiga sezilarli ta'sir ko'rsatmoqda, ya'ni shaxsiy manfaatlar yoshlar uchun ustuvor ahamiyat kasb yetadi va shu bilan birga jamiyat, ijobiy shaxslararo muloqot, hamkorlik va o'zaro yordam hamda ijtimoiy me'yorlar va asosiy umuminsoniy qadriyatlarga befarq munosabat shakllantiradi [6]. Shu sababli yoshlar orasida to'liq jonli aloqa asta-sekin qadrsizlanib bormoqda, o'zining bevosita hissiyotlari bilan haqiqiy kommunikativ harakat o'rnini sezilmaydigan quruq xabarlar, kitoblarni o'qish - qidiruv saytlaridan shubhali ma'lumotlar, psixologik salomatlik - IT-texnologiyalarga, gadjetlar va shaxsiy kompyuterlardagi virtual axborot maydoniga bog'liqlik egallamoqda.

Ta'kidlash kerakki, mamlakatimizda amalga oshiriladigan barcha demokratik islohotlar jarayonida ham yoshlar masalasiga hamda yoshlarni ijtimoiy jihatdan shakllantirish va ularning intellektual, ijodiy va boshqa yo'nalishdagi salohiyatini kamol toptirish, yoshlar ma'naviyatini rivojlantirish uchun shart-sharoitlar yaratilishini nazarda tutadigan ijtimoiy-iqtisodiy, tashkiliy va huquqiy chora-tadbirlar tizimiga alohida e'tibor beriladi. Jumladan, yoshlarga oid davlat siyosatining asosiy yo'nalishlari: yoshlarning hayoti va sog'lig'ini saqlash; yoshlarning ma'naviy, intellektual, jismoniy va axloqiy jihatdan kamol topishiga ko'maklashish; yoshlar uchun ochiq va sifatli ta'limni ta'minlash; yoshlarni ishga joylashtirish va ularning bandligi uchun shart-sharoitlar yaratish; yoshlarni vatanparvarlik, fuqarolik tuyg'usi, bag'rikenglik, qonunlarga, milliy va umuminsoniy qadriyatlarga hurmat ruhida tarbiyalash; iqtidorli va iste'dodli yoshlarni qo'llab-quvvatlash hamda rag'batlantirish; yoshlar tadbirkorligini rivojlantirish uchun shart-sharoitlar yaratish; yoshlarda sog'lom turmush tarziga intilishni shakllantirish, shuningdek yoshlarning bo'sh vaqtlarini mazmunli tashkil etish va yoshlar sportini ommaviy rivojlantirish uchun shart-sharoitlar yaratish; yosh oilalarni ma'naviy va moddiy jihatdan qo'llab-quvvatlash, ular uchun munosib

uy-joy va ijtimoiy - maishiy sharoitlarni yaratish bo'yicha kompleks chora-tadbirlar tizimini amalga oshirish [1] kabilardan iborat.

XULOSA

Albatta, yoshlarning ijtimoiy tarmoqlarda mutloqa notanish shaxslar bilan tanishishga urinayotgani tashvishli xolat. Bu esa jamiyatda ilmsizlik johillikning, axloqsizlikni tomir yoyilishiga hamda yoshlar ongi va madaniyatiga salbiy ta'sir qiladi. Bularning oldini olish uchun, yoshlarni bo'sh vaqtini mazmunli va qiziqarli tashkil etish, ta'lim muassasalarida yoshlarni o'qishdan tashqari bo'sh vaqtlarini mazmunli tashkil etish uchun sport to'garaklari, musiqa to'garaklari, fan to'garaklari davomiy tarzda va eng asosiysi yoshlarni qiziqтира oladigan darajada tashkil etish, shu bilan birga yoshlarni iqtidorlisini topish va ularni tarbiyalash zarur. Buning uchun—"Yoshlarga oid davlat siyosati to'g'risida"gi O'zbekiston Respublikasi Qonunida yoshlarga oid davlat siyosatini ro'yobga chiqarishni amalga oshiruvchi hamda unda ishtirok etuvchi organlar va muassasalar birgalikda, xususan nodavlat notijorat tashkilotlari tomonidan yoshlarni qiziqishi va yosh xususiyatidan kelib chiqib turli xil formalar tashkil etish lozim. Shuningdek, sayyoramizning ertangi kuni, farovonligi farzandlarimiz qanday inson bo'lib kamolga yetishi bilan bog'liq. Bizning asosiy vazifamiz – yoshlarning o'z salohiyatini namoyon qilishi uchun zarur sharoitlar yaratishdan iborat.

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EVALUATION OF THE EFFECT OF TRANSURETHRAL RESECTION ON SEXUAL FUNCTION IN MEN WITH BENIGN PROSTATIC HYPERPLASIA

Abstract. *The aim of the study was to evaluate the effect of transurethral resection of the prostate gland (TUR) on erectile and ejaculatory functions in patients with benign prostatic hyperplasia (BPH). The study included 68 patients who underwent TUR. Sexual function was assessed before surgery and 3 and 6 months after surgery using validated questionnaires. The data obtained indicate a multidirectional effect of TUR on erectile and ejaculatory functions: with stability or moderate improvement in erectile function, a significant decrease in the frequency of anterograde ejaculation was noted.*

Keywords: *benign prostatic hyperplasia, transurethral resection, erectile function, ejaculatory function, sexual health.*

Introduction. Benign prostatic hyperplasia is one of the most common urological diseases in older men and is often accompanied by lower urinary tract symptoms, decreased quality of life, and sexual disorders. Transurethral resection of the prostate gland has remained the "gold standard" of surgical treatment of BPH for decades [8]. Despite the high effectiveness of the method in eliminating infravesical obstruction, the effect of TURP on sexual function, in particular on erectile and ejaculatory functions, remains a subject of debate. This determines the relevance of a comprehensive assessment of sexual function in patients before and after surgery [1,2].

Transurethral resection of the prostate gland (TUR) is still the "gold standard" of surgical treatment of prostatic hyperplasia. TUR is effective in relation to the functional results of urination after surgical treatment, but it is also associated with a high incidence of bleeding, stress urinary incontinence, and the possible development of TUR syndrome [3, 4, 5].

The systematic review and meta-analysis conducted by the researchers included 69 studies examining functional outcomes and complications after transurethral interventions in prostate hyperplasia, and only three of them examined sexual function after prostate enucleation with a holmium laser or after a pancreatic TUR. At the same time, the results showed a slight decrease in sexual function in both study groups [6, 7].

In this study, the focus of the study was shifted towards evaluating the functional results of urination after surgical treatment. We specifically searched the literature for all the studies evaluating the effect of surgical treatment of prostatic hyperplasia on sexual function.

The aim of the study was to evaluate the effect of transurethral resection of the prostate gland (TURP) on erectile and ejaculatory functions in patients with benign prostatic hyperplasia (BPH).

Materials and methods. The prospective study included 68 patients with clinically and instrumentally confirmed BPH who were treated in the urology department. The average age of the patients was 65.8 ± 6.1 years (from 55 to 78 years).

All patients underwent monopolar or bipolar TUR according to the standard procedure. The assessment of erectile function was carried out using the International Index of Erectile Function (IIEF-5). Ejaculatory function was assessed based on a questionnaire of patients, taking into account the presence of antegrade ejaculation.

The examination was performed before the operation, 3 and 6 months after the TUR.

Results. Depending on the severity of lower urinary tract symptoms (LUTs), age, and prostate volume, patients were divided into subgroups for an in-depth analysis of the effect of TUR on sexual function.

Analysis depending on the severity of LUTs.

The patients were divided into two subgroups according to the IPSS scale: moderate symptoms (8-19 points, $n=34$) and severe symptoms (≥ 20 points, $n=34$).

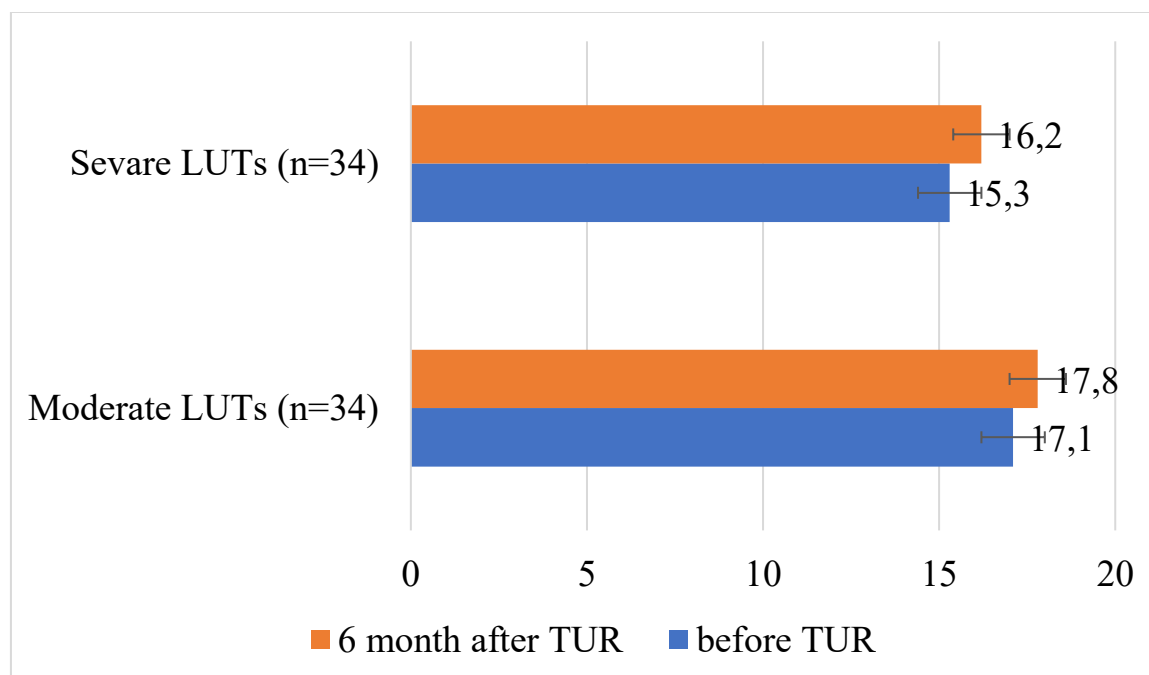


Fig.1. Dynamics of erectile function (IIEF-5) depending on the severity of LUTs

In patients with severe LUTs, a more pronounced improvement in erectile function was noted after the removal of the infravesical obstruction (Fig. 2).

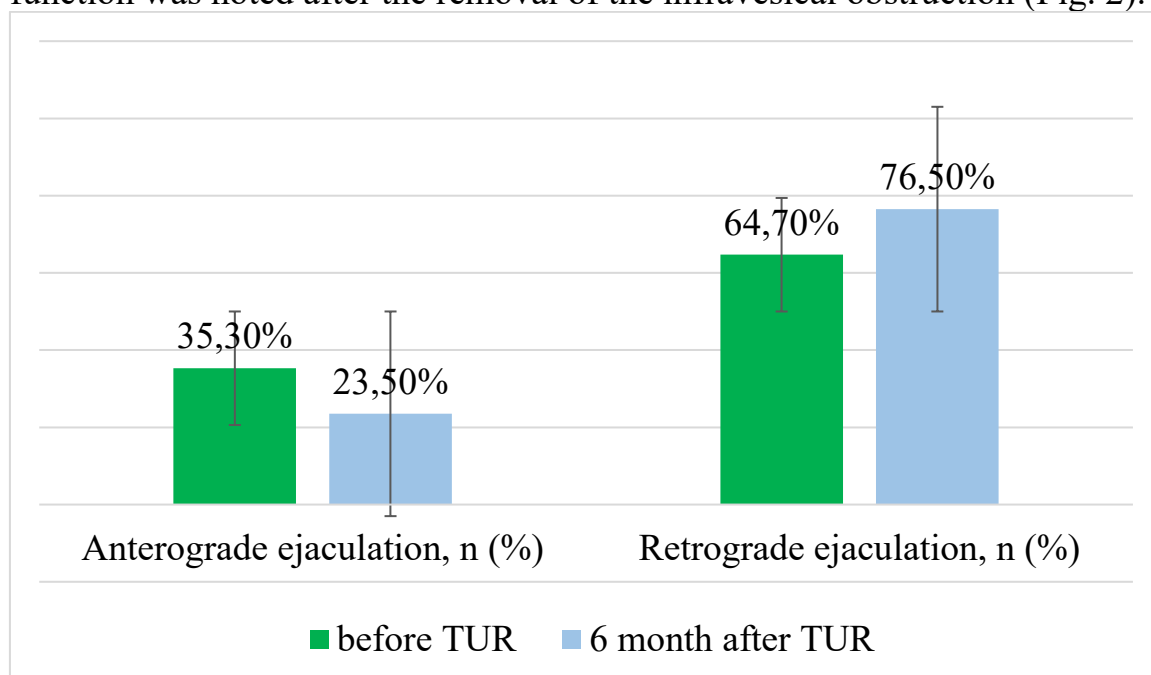


Fig 2. Ejaculatory function 6 months after TUR, depending on LUTs
Age-dependent analysis

Depending on the age, the patients were divided into subgroups: under 65 years of age (n=32) and 65 years and older (n=36)(Fig. 3).

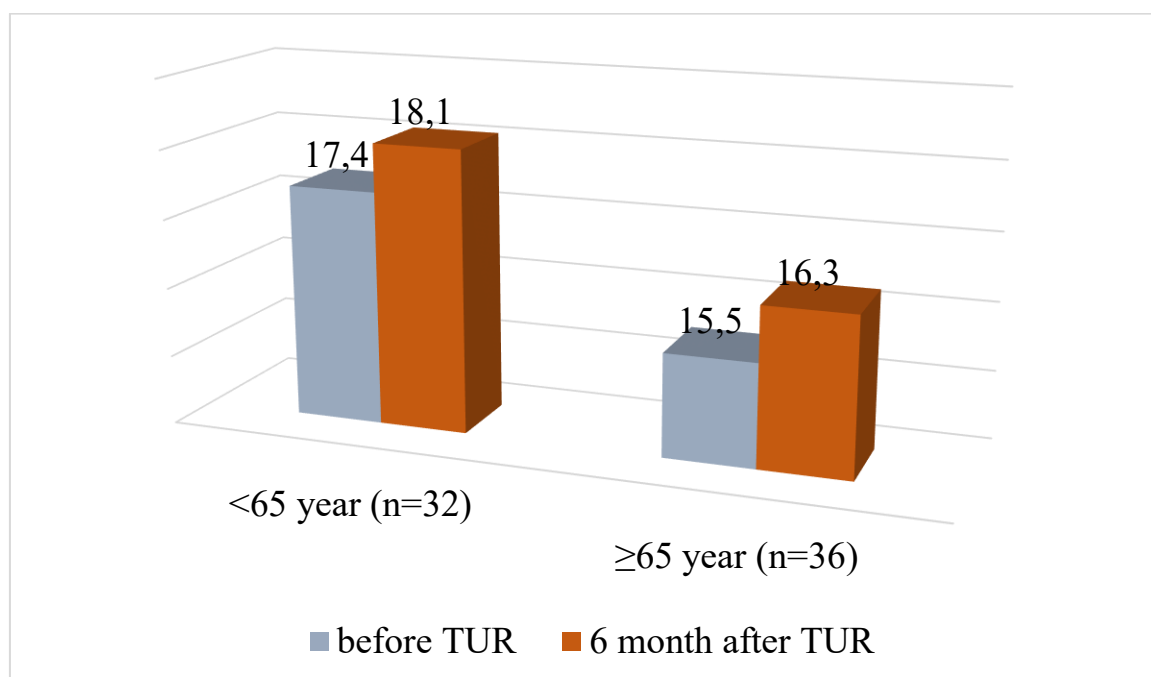


Fig 3. The effect of age on erectile function after the TUR

Patients in the younger age group initially showed higher rates of erectile function, but positive dynamics was observed in both subgroups.

Analysis depending on the volume of the prostate gland (Table 1)

Taking into account the volume of the prostate gland, the patients were divided into two subgroups: $<50 \text{ cm}^3$ ($n=35$) and $>50 \text{ cm}^3$ ($n=33$).

Table 1.

Erectile and ejaculatory functions depending on the volume of the prostate gland

Indicator	$\leq 50 \text{ cm}^3$	$> 50 \text{ cm}^3$
IIEF-5 to TUR	16,9 $\pm$ 3,0	15,8 $\pm$ 3,2
IIEF-5 in 6 months	17,6 $\pm$ 2,8	16,4 $\pm$ 3,0
Anterograde ejaculation, n (%)	11 (31,4%)	9 (27,3%)

Thus, the effect of TUR on erectile function was comparable in all subgroups, whereas the frequency of retrograde ejaculation did not depend on the age and volume of the prostate gland.

Discussion. The results obtained confirm the literature data that TUR has a minimal negative effect on erectile function. In some cases, its stabilization or moderate improvement is noted, which may be due to the elimination of chronic obstruction and a decrease in the severity of dysuric symptoms.

With regard to ejaculatory function, TUR is associated with a high frequency of retrograde ejaculation, which should be considered as an important aspect of preoperative patient counseling. Despite the absence of a threat to general health, this factor can significantly affect patients' satisfaction with treatment results. The most common undesirable phenomenon after transurethral surgery of prostate adenoma is ejaculatory dysfunction. The "dry orgasm" was an almost natural consequence and payment after the surgical treatment of symptoms of the lower urinary tract. The impact of EF on quality of life should not be underestimated, and it should be considered as an important aspect of men's sexual health. The importance of ejaculation can also be emphasized by the close relationship between ejaculation and orgasm intensity.

Conclusion. Transurethral resection of the prostate gland is an effective and relatively safe method of surgical treatment of BPH. The operation does not lead to a significant deterioration in erectile function; however, it is accompanied by a marked decrease in the frequency of anterograde ejaculation. Taking into account the data obtained, sexual function should be an integral part of evaluating the results of surgical treatment and discussed with patients at the stage of choosing treatment tactics. Transurethral resection of the prostate gland in patients with benign prostatic hyperplasia provides a significant reduction in the severity of lower urinary tract symptoms, improved urodynamic parameters and a significant improvement in quality of life. The statistically significant results obtained confirm the effectiveness of the method in both patients with moderate and severe symptoms, which justifies the expediency of widespread use of TUR of the prostate gland in clinical practice.

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THE MORPHOFUNCTIONAL EFFECTS OF ENERGY DRINKS ON TESTICULAR TISSUE

Abstract. *Energy drinks are widely consumed for their stimulating effects, primarily due to high caffeine, taurine, and sugar content. However, emerging preclinical evidence raises concerns about their potential adverse impact on male reproductive health. This narrative review examines the morphofunctional effects of energy drinks on testicular tissue, drawing from animal studies that assess histological alterations, sperm parameters, oxidative stress markers, and apoptotic pathways. Chronic exposure to commercial energy drinks or their key components has been associated with dose-dependent testicular damage, including seminiferous tubule degeneration, reduced spermatogenesis, elevated lipid peroxidation, and impaired antioxidant defenses. Mechanisms predominantly involve oxidative stress and apoptosis, with partial reversibility observed through antioxidant supplementation. Although most data derive from rodent models, supportive human observational findings suggest reduced sperm quality with high intake. These results highlight the need for caution in frequent energy drink consumption among reproductive-age males and call for further longitudinal human studies.*

Keywords: *energy drinks, testicular tissue, morphofunctional effects, oxidative stress, spermatogenesis, caffeine, taurine, reproductive toxicity, apoptosis, male fertility*

Introduction. Energy drinks have gained immense popularity worldwide, particularly among young adults and adolescents seeking enhanced alertness, physical performance, and concentration. These beverages typically contain high levels of caffeine, taurine, sugar, and other stimulants. While they provide short-term benefits, growing evidence from animal studies suggests potential adverse effects on reproductive health, especially in males. The testis is a sensitive organ responsible for spermatogenesis and steroidogenesis, making it vulnerable to oxidative stress and metabolic disruptions induced by these compounds. This review synthesizes findings from preclinical research on the morphofunctional impacts of energy drinks on testicular tissue, focusing on histological changes, sperm parameters, and underlying mechanisms such as oxidative damage (Schuchowsky et al., 2017; Al-Shaikh and Rajeh, 2023).

Methods. This narrative review is based on a comprehensive analysis of peer-reviewed studies retrieved from scientific databases, including PubMed and other sources. Search terms included "energy drinks," "caffeine," "taurine," "testicular

tissue," "sperm parameters," "oxidative stress," and related combinations. Inclusion criteria focused on experimental studies (primarily in rodents) examining direct exposure to commercial energy drinks or their key components. Human observational data were considered where relevant, but emphasis was placed on animal models for morphofunctional outcomes. Studies were selected for their relevance to dose-dependent effects, histological evaluations, and biochemical markers. Key publications spanned from 2015 to 2023 to reflect recent insights (Park et al., 2015; Nwakamma et al., 2023; Al-Shaikh and Rajeh, 2023).

Results. Preclinical studies consistently demonstrate that chronic exposure to energy drinks induces detrimental changes in testicular morphology and function, often in a dose-dependent manner.

In Wistar rats administered varying doses of Fearless energy drink for three weeks, higher doses led to scattered seminiferous tubules, loss of spermatogenic cells, degeneration of interstitial cells, and vascular congestion. Lower doses caused moderate spermatogenic arrest, accompanied by reduced sperm quality (Nwakamma et al., 2023).

Long-term consumption (120 days) of an unspecified commercial energy drink in adult male Wistar rats significantly decreased sperm concentration without altering motility or morphology, suggesting selective impairment of spermatogenesis (Schuchowsky et al., 2017).

Exposure to Code Red energy drink in rats resulted in elevated malondialdehyde (MDA) levels, reduced antioxidant enzymes (SOD and GSH), and increased caspase-3 expression, indicating oxidative stress and apoptosis in testicular tissue. Histologically, this manifested as disrupted seminiferous epithelium and germ cell loss, effects partially ameliorated by antioxidant-rich blueberry extract (Al-Shaikh and Rajeh, 2023).

Caffeine, a primary component, has been implicated independently. In immature male rats, doses equivalent to high human intake altered testicular microarchitecture, slowed germ cell proliferation, and reduced testosterone production via direct effects on Leydig cells (Ting et al., 2017). Peripubertal high-dose caffeine induced testicular atrophy and impaired spermatogenesis (Park et al., 2015).

Human cross-sectional data provide supportive evidence: young men with higher intake of sugar-sweetened beverages (including energy drinks) showed lower sperm concentration, total count, and inhibin-B/FSH ratios, hinting at suppressed testicular function (Nassan et al., 2021).

Mechanistically, these effects appear driven by oxidative stress from caffeine-aurine-sugar interactions, leading to lipid peroxidation, inflammation, and disrupted steroidogenesis.

Discussion. The reviewed studies highlight a pattern of morphofunctional disruption in testicular tissue due to energy drinks. Histological degeneration, reduced sperm reserves, and hormonal imbalances likely stem from excessive reactive oxygen species (ROS) overwhelming antioxidant defenses, as evidenced by elevated MDA and caspase-3 (Al-Shaikh and Rajeh, 2023). Dose dependency

observed across models underscores that moderate consumption may pose lower risks, while chronic high intake amplifies damage (Nwakamma et al., 2023; Schuchowsky et al., 2017).

Limitations include the predominance of rodent models, which may not fully translate to humans due to metabolic differences. Few studies isolate individual ingredients, complicating attribution to specific components like taurine versus caffeine. Human data remain observational and cross-sectional, precluding causality (Nassan et al., 2021). Future research should incorporate longitudinal human cohorts and explore protective interventions.

Overall, while energy drinks offer transient benefits, their potential to impair testicular integrity through oxidative and apoptotic pathways warrants caution, especially for reproductive-age males.

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TA'MINOT BERISH MAJBURIYATINI BAJARMAGANLIK YOKI LOZIM DARAJADA BAJARMAGANLIK UCHUN JAVOBGARLIK MASALALARI

Annotatsiya: Ushbu maqola aliment to'lash majburiyatlari va ularga nisbatan qo'llaniladigan javobgarlik choralari haqida bo'lib, aliment bo'yicha qarzdorlarning majburiyatlarini bajarmaslikning huquqiy, ijtimoiy va iqtisodiy oqibatlarini tahlil etadi. Maqolada alimentni to'lamaganlik uchun turli javobgarlik shakllari, jumladan fuqaroviy-huquqiy, ma'muriy va jinoiy javobgarlik keltirilgan. Ta'kidlash joizki, aliment bo'yicha qarzdorlar uchun joriy etilgan eng qat'iy huquqiy choralarga qaramay, aliment qarzining kamayishi kuzatilmayapti. Shuningdek, maqolada aliment qarzini undirishda yuzaga keladigan muammolar va aliment bo'yicha majburiyatlarni bajarishning ijtimoiy-iqtisodiy omillari ham ko'rib chiqilgan. O'zbekiston Respublikasining oilaviy qonunchiligida aliment to'lashdagi kamchiliklar va farzandlarning ota-onaga qarshi majburiyatlarini bajarishdagi cheklovlar bo'yicha bir qator takliflar keltirilgan.

Kalit so'zlar: aliment, majburiyatlar, huquqiy javobgarlik, fuqarolik huquqi, jinoiy javobgarlik, ma'muriy javobgarlik, ta'minot, aliment qarzi, meros, farzandlar, qonuniy javobgarlik, iqtisodiy muammolar.

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ISSUES OF LIABILITY FOR NON-FULFILLMENT OR IMPROPER FULFILLMENT OF THE OBLIGATION TO PROVIDE MAINTENANCE

Abstract: This article discusses the obligations related to the payment of alimony and the legal consequences of failing to fulfill these obligations. The paper highlights various types of responsibility applied to those who fail to pay alimony, including civil, administrative, and criminal liability. Despite the strict legal measures in place to enforce alimony payments, the article observes that the amount of alimony debt continues to rise each year. Furthermore, it examines the social and economic issues that contribute to the non-fulfillment of alimony obligations, alongside the legal responsibility mechanisms. Proposals are made for changes in the family law of Uzbekistan to address the lack of enforcement against those who neglect their parental duties, as well as issues relating to inheritance rights.

Keywords: *alimony, obligations, legal liability, civil law, criminal responsibility, administrative liability, maintenance, alimony debt, inheritance, children, legal responsibility, economic issues.*

Ta'minotga oid majburiyatlarni bajarmaslik amaldagi qonun normalarimizga asosan bir qator ta'sir choralarni belgilaydi. Jumladan, qarzdorning O'zbekiston Respublikasidan chiqishini vaqtincha cheklash, undiruvni qarzdorning pul mablag'lariga va boshqa mol-mulkiga qaratish; undiruvni qarzdorning boshqa shaxslarda turgan pul mablag'lariga va boshqa mol-mulkiga qaratish; undiruvni qarzdorning debitorlik qarziga, shu jumladan qarzdor undiruvchi sifatida ishtirok etayotgan ijro hujjati bo'yicha unga tegishli bo'lgan mablag'larga qaratish; undiruvni qarzdorga tegishli bo'lgan alohida mulkiy huquqlarga qaratish; undiruvni qarzdorning ish haqi, stipendiyasi, pensiyasi va boshqa turdagi daromadlariga qaratish va boshqa ta'sir choralaridir²².

Yuqorida qayd etilgan ta'sir choralarini qo'llashning imkoni bo'lmasa, javobgarlik masalalari hal etiladi.

I.B.Morozova majburiy ijro choralarini javobgarlik sifatida tan olib bo'lmaydi, chunki davlat majburlov chorasi faqat mavjud majburiyatni ta'minlash uchun qaratilgan, bunda huquqbuzarlik natijasida qo'shimcha majburiyatlar, yangi maxsus majburiyatlar paydo bo'lmaydi, majburiy ijro choralari sanksiyalarni amalga oshirish shakli (usuli) vazifasini bajaradi²³ degan fikrni qayd etadi.

Aliment to'lash bo'yicha ularni to'lashi shart bo'lgan shaxsning aybi bilan yuzaga kelgan qarzlarning paydo bo'lishi unga nisbatan oilaviy qonunchilik, fuqarolik qonunchiligi yoki jinoiy javobgarlik choralarini qo'llash bilan bog'liq deb ta'kidlaydi O.Y.Sitkova.²⁴

Voyaga yetgan, mehnatga layoqatli bolalar mehnatga layoqatsiz, yordamga muhtoj o'z ota-onasiga ta'minot berish majburiyatini bajarmaganlik yoki lozim darajada bajarmaganlik uchun qo'llaniladigan javobgarlikni shartli ravishda quyidagi turlarga bo'lish mumkin:

- *fuqaroviy-huquqiy javobgarlik*
- *ma'muriy huquqiy javobgarlik*
- *jinoiy huquqiy javobgarlik*

Aliment undirishga oid tuziladigan bitimlarga aniq va to'liq shartlarning kiritilishi, kelgusida yuzaga keladigan nizoning sudlar tomonidan hal etilishi va bitim yuzasidan ijro etish masalalarini osonlashtiradi. Noaniq va belgilanmay qolgan shartlar esa sud faoliyatini qiyinlashtiradi.

²² O'zbekiston Respublikasi "Sud hujjatlari va boshqa organlar hujjatlarini ijro etish to'g'risida"gi qonun//elektron manba//42¹, 46-moddalar//<https://lex.uz/mact/-26477/> 2025 y

²³ Морозова И.Б., Треушников А.М. Исполнительное производство: Учебнопрактическое пособие. М.: Городец, 2006. В 111.

²⁴ Sitkova O.Y. Способы защиты семейных прав // Вестник Воронежского государственного университета. Серия: Право. 2014. № 2. б. 112

E.Yu.Kostyuchenko, S.A.Sidorova, A.M.Erdelevskiy va O.V.Kapitovalar²⁵ aliment oluvchi tomonidan to'lanmagan aliment uchun ma'naviy zarar undirish ko'rinishidagi javobgarlikni qo'llashni yoqlaydilar.

E.A.Usachyov esa aliment munosabatlardagi zarar xususida faqat aliment oluvchiga yetkazilgan haqiqiy zarar, masalan, alimentni oluvchi alimentni to'lamaganligi sababli tuzishga majbur bo'lgan qarz shartnomasi yoki kredit shartnomasi bo'yicha to'langan foizlar qoplanishi kerak²⁶ degan fikrni bildiradi.

N.I.Avdeyeva alimentni to'lash usuliga qarab javobgarlikni ikki turini farqlaydi²⁷:

- shartnoma yuzasidan javobgarlik;
- sud qarori asosidagi javobgarlik.

Shartnoma yuzasidan javobgarlik haqida so'z borar ekan, aliment to'lash bo'yicha tuzilgan kelishuvga ham ayrim holatlarda fuqarolik-huquqiy munosabatlarga oid normalar qo'llanilishini inobatga olish zarur.

Ma'lumki shartnomaviy munosabatlarda fuqarolik huquqiy javobgarlikdan biri sifatida ma'naviy zararni²⁸ uchratish mumkin, Shu nuqtayi nazardan alimentga oid bitimlarda agarda fuqarolik huquqiy munosabatlar qo'llanilishi inkor etilmasa, u holda ushbu munosabatlarga ham fuqarolik-huquqiy javobgarlikning yana bir turi hisoblangan ma'naviy zararni undirishni qo'llash mumkinligi haqida bahs-munozaralar mavjud.

S.N.Tagayeva aliment munosabatlaridagi ma'naviy zarar haqida quyidagi asosli fikrlarni ta'kidlaydi: "ba'zida aliment fuqaro uchun yagona yashash vositasi bo'lganligi sababli, uni to'lashning kechikishi eng kam turmush darajasini saqlab qolishning imkoni yo'qligiga olib keladi va uning sog'lig'iga salbiy ta'sir ko'rsatishi, ochlik, kasallik kabi jismoniy azob-uqubatlarni keltirib chiqarishi, shuningdek, mulkdan mahrum etish bilan bog'liq ma'naviy azob-uqubatlarni keltirib chiqarishi mumkinva shu tariqa yetkazilgan ma'naviy zararining o'rnini qoplashi shart."²⁹

²⁵ Kapitova O.V. Правовая природа механизма алиментирования в семейном праве Российской Федерации. у.ф.н. ilmiy darajasini olish uchun yozilgan diss. avtoreferati. М 2009 В 17

²⁶ Усачев Е.А. Ответственность плательщика алиментов за ненадлежащее исполнение алиментного соглашения: проблемы теории и практики// Актуальные проблемы российского права. 2015. № 9. б. 23-27

²⁷ Avdeyeva N.I. Ответственность за неисполнение обязательств по уплате алиментов.// Юридические исследования, 2018 – 10//file:///C:/Users/Hp/Downloads/otvetstvennost-za-neispolnenie-obyazatelstv-po-uplate-alimentov.pdf// Россия, Курская область, г. Курск, ул.Ипподромная, 53//б 46

²⁸ O'zbekiston Respublikasi Fuqarolik kodeksi 11, 99, 100, 163, 1021 va 1022-moddalari, // <https://lex.uz/docs/-111189> 2025y.

²⁹ Тагаева С.Н. К проблеме компенсации морального вреда в семейном праве // Вестник Пермского университета. 2012. Вып. 1 (15). б. 161-165

N.I.Avdeyeva³⁰, L.V. Dzyubrovskaya³¹, O.A. Makeeva³², M.A. Danilyanlar³³ ham o'zlarining tadqiqotlarida aliment o'z vaqtida to'lanmagan taqdirda ma'naviy zararni qo'llash zarurligi haqidagi pozitsiyani qo'llab-quvvatlaydi.

Biroq, yuqoridagi fikrlarga qisman e'tiroz fikrlarni taqdim etgan holda E.A.Usachev fikricha, ortiqcha huquqiy kafolatlar berish aliment oluvchini himoyasiz holatdan haddan tashqari vakolatli shaxsga aylantirishi mumkin³⁴ deb ta'kidlaydi.

Buning aksi o'laroq, I.A.Nasriyev ma'naviy zarar yetkazish bilan bog'liq masalalarga yetarlicha ahamiyat berilmasligi turli huquqiy nizolarni keltirib chiqaradi degan fikrlarni qayd etadi.³⁵

Ota-onaga moddiy yordam berish va g'amxo'rlik qilish biz avvalgi paragraflarimizda ta'kidlaganimizdek, nafaqat qonuniy, balki insoniy majburiyatlarimiz hisoblanadi. Biz o'zbek xalqining odat tusiga aylangan achinarli qoidalaridan biri shuki, ota-onani moddiy ta'minlash va g'amxo'rlik qilish kenja o'g'ilning zimmasiga yoxud ota-ona bilan birga yashash uchun qolgan farzandga yuklanadi. Go'yoki ota-onaning uy-joyiga ana shu farzand kelgusida egalik qiladi, shu sababli uning majburiyati hisoblanadi. Biroq ota-ona vafot etgach qachondir ta'minlashdan bo'yin tovlagan farzandlar o'rtasidagi meros talashish, mulk talashish, buning oqibatida yuz ko'rmas bo'lib ketishlik, hatto bu jarayonning fojia bilan tugayotganligi sudlar tomonidan bu toifa ko'rayotgan ishlardan o'z isbotini ko'rsatmoqda.

Ana shunday noqobil farzandlar o'z majburiyatlarini bajarishdan bo'yin tovlasada, biroq ana shu ota-onasini mulkiga ega chiqiqsh istagi hech qachon yo'q bo'lmagan. Biroq amaldagi qonunchiligimiz bunday noqobil farzandlarga nisbatan tegishli ta'sir choralari yoki javobgarlik masalalarini belgilamagan.

Shu sababli muallif tomonidan o'z majburiyatlarini lozim darajada bajarmagan, biroq meros masalasiga kelganda hammadan olg'ir va o'z huquqini bilguvchi farzandlarga nisbatan Fuqarolik kodeksining merosga oid ayrim normalariga o'zgartirish taklifi ilgari suriladi.

Bolalariga nisbatan ota-onalik huquqlaridan mahrum etilgan va meros ochilgan paytda bu huquqlari tiklanmagan ota-onalar ana shu bolalardan qolgan

³⁰ Avdeyeva N.I. Ответственность за неисполнение обязательств по уплате алиментов.// Юридические исследования, 2018 – 10//file:///C:/Users/Нр/Downloads/otvetstvennost-za-neispolnenie-obyazatelstv-po-uplate-alimentov.pdf// Россия, Курская область, г. Курск, ул.Ипподромная, 53//b 47

³¹ Дзюбровская Л.В. К вопросу об ответственности за нарушение соглашения об уплате алиментов // Пробелы в российском законодательстве. 2010. № 3. б. 121- 123

³² Makeeva O.A. Ответственность в алиментных обязательствах-основные особенности и порядок реализации // Семейное и жилищное право. 2010. № 1. б. 17-20

³³ Данилян М.А. Практика принудительного исполнения судебных решений, связанных с воспитанием несовершеннолетних, и направления совершенствования российского института алиментирования детей // Практика исполнительного производства. 2013. № 3. б. 12-21

³⁴ Усачев Е.А. Ответственность плательщика алиментов за ненадлежащее исполнение алиментного соглашения: проблемы теории и практики// Актуальные проблемы российского права. 2015. № 9. б. 27

³⁵ Nasriyev I. Shaxsiy nomulkiy huquqlar mazmuni, ularni amalga oshirish va kengaytirish istiqbollarinin fuqarolik-huquqiy masalalari: Yuridik fanlar doktori ilmiy darajasini olish uchun yozilgan dissertatsiya avtoreferati. –T.: 2006. 51-b.

mulkka voris bo'lish huquqiga ega emaslar, shuningdek meros qoldiruvchiga ta'minlab turish yuzasidan qonunga ko'ra zimmalariga yuklatilgan majburiyatlarini bajarishdan bo'yin tovlagan ota-onalar (farzandlikka oluvchilar) va voyaga yetgan bolalar (farzandlikka olinganlar) qonun bo'yicha vorislik qilish huquqiga ega emaslar.

Noloyiq merosxo'rlarni vorislikdan chetlatish uchun asos bo'ladigan holatlar bunday chetlatish keltirib chiqaradigan vorislik bilan bog'liq mulkiy oqibatlarga daxldor shaxsning da'vosi bo'yicha sud tomonidan belgilanadi.

Shuni ham ta'kidlash kerakki, aliment bo'yicha qarzdorlar uchun qonuniy javobgarlikning eng qat'iy choralari ham aliment bo'yicha majburiyatlarni bajarish bilan bog'liq vaziyatni yaxshilashga yordam bermaydi. Statistik ma'lumotlarga ko'ra, aliment qarzi har yili faqat oshib boradi. Shu sababli, huquqiy javobgarlik choralarini qo'llash bilan bir qatorda, bunday majburiyatlarning, shu jumladan, ijtimoiy-iqtisodiy xarakterdagi majburiyatlarning bajarilmasligining paydo bo'lishiga yordam beradigan boshqa muammolarni hal qilish kerak.

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ETIOPATHOGENETIC FOUNDATIONS OF SEPSIS, ITS CLINICAL FEATURES, AND PRINCIPLES OF MODERN THERAPY

Abstract: *This article discusses the role of sepsis in modern medicine, its causes of development, pathogenesis mechanisms, types of clinical signs, and its significance as an emergency condition. Sepsis is a severe systemic inflammatory response of the body to infectious agents. If not detected in a timely manner and treated correctly, it can lead to multiple organ failure and death. The article provides information on modern laboratory and instrumental methods used in the diagnosis of sepsis, as well as contemporary approaches to treatment, such as antibiotic therapy, infusion therapy, and organ support.*

Keywords: *Sepsis, infection, pathogenesis, clinical signs, antibiotic therapy, inflammation, systemic bloodstream infection, multiple organ failure, emergency medical care.*

Relevance: Sepsis is an emergency condition that develops in response to infection, characterized by a dysregulated immune response of the body, leading to multiple organ failure and a high risk of death. It poses a serious threat to human life through systemic inflammatory processes. According to WHO data, approximately 49 million people worldwide suffer from sepsis each year, with 11 million deaths. Due to the high mortality rate and rapid progression, early detection of sepsis, a deep understanding of its pathogenesis, and prompt treatment are of vital importance. If early antibiotic therapy, infusion resuscitation, vasopressors, and source control of infection are applied based on standard algorithms, clinical outcomes can be significantly improved.

Etiology and Pathogenesis. Sepsis develops under the influence of the following microorganisms:

- Gram-negative bacteria: *Escherichia coli*, *Klebsiella pneumoniae*
- Gram-positive bacteria: *Staphylococcus aureus*, *Streptococcus pneumoniae*
- Fungi: *Candida albicans* (especially in immunocompromised patients)

In the pathogenesis process, shock-inducing cytokines (TNF- α , IL-1, IL-6) are actively released. This condition leads to endothelial damage, increased capillary permeability, microcirculatory disturbances, and hypotension. The main causes of multiple organ failure are coagulopathy and disruption of oxygen delivery.

Clinical features and diagnosis. Sepsis clinically presents in a polymorphic manner, and in some cases, classic signs may not be evident. Therefore, each symptom complex must be evaluated.

Changes in body temperature: High fever ($\geq 38^{\circ}\text{C}$) is common but not always observed and is not directly correlated with the severity of sepsis. Normal temperature does not rule out sepsis. In some cases, hypothermia ($< 36^{\circ}\text{C}$) is observed, which is also considered a sign of severe infection. Antipyretics and analgesics can mask the clinical picture.

Hematological changes: Leukocytosis ($> 12 \times 10^9/\text{L}$) or leukopenia ($< 4 \times 10^9/\text{L}$) are laboratory signs characteristic of severe infection.

Respiratory and circulatory system disturbances: Tachypnea (respiratory rate $\geq 22/\text{min}$) indicates the need to rule out sepsis and life-threatening conditions. Tachycardia (heart rate $\geq 90/\text{min}$), arterial hypotension, hypoxia (cyanosis), delayed capillary refill, and a "marbled" skin appearance reflect microcirculatory disturbances.

Renal and fluid balance disturbances: Oliguria (less than 0.5 ml/kg/hour for ≥ 2 hours) and positive fluid balance (≥ 20 ml/kg/24 hours) indicate organ failure.

Gastrointestinal symptoms: Diarrhea, vomiting, and intestinal paresis are important signs of pelvic (genital) sepsis. Severe pain in the lower abdomen that does not respond to analgesics, as well as intense postpartum contractions, are also characteristic of sepsis.

Neurological and metabolic changes: Decreased level of consciousness, altered mental status, and hyperglycemia (glucose > 7.7 mmol/L) in the absence of diabetes may be observed.

Skin and other signs: Rashes (petechial, maculopapular, purpura), changes in skin color, or signs of fasciitis indicate severe infection. Productive cough and urinary disturbances also have additional diagnostic significance.

Important clinical sign: Lack of improvement in the patient's condition despite ongoing treatment measures indicates severe sepsis and requires immediate reassessment of tactics.

Instrumental Diagnostic Examinations. Ultrasound examination must be performed to detect remnants of placental tissue or blood clots in the uterine cavity in cases with risk factors for postpartum endometritis. Ultrasound of the uterus should not be used for diagnosing postpartum endometritis, as this method does not have high accuracy.

In cases of spontaneous or, especially, operative delivery, hysteroscopy is performed in all patients when any clinical or echographic signs of endometritis are detected.

In the diagnosis of postpartum and postoperative endometritis, the diagnostic value of hysteroscopy is 91.4%, which is higher than all other examination methods except pathomorphological examination (100%). If a professionally trained and qualified obstetrician-gynecologist is available, hysteroscopy may be performed starting from the 2nd day of the postpartum period.

Computed tomography or magnetic resonance imaging. The choice of instrumental examination methods depends on the presumed location of the infection focus.

Antibacterial Therapy. In sepsis, administering antibiotics within 1 hour is critically important, as each hour of delay increases the risk of death (Kumar et al., 2006). Therapy begins with broad-spectrum antibiotics (carbapenems, cephalosporins, piperacillin-tazobactam), followed by de-escalation based on laboratory results. In cases of suspected MRSA, vancomycin or linezolid is recommended.

Infusion Therapy. Rapid volume resuscitation with 30 ml/kg of crystalloids (0.9% NaCl or Ringer's lactate) is recommended. If lactate levels >4 mmol/L, additional fluid administration is required. Colloids are used only when necessary.

Vasopressors. If arterial pressure is low (MAP <65 mm Hg) and does not respond to fluid administration, vasopressors (norepinephrine as first choice) are used to stabilize blood pressure. Vasopressin or dopamine may be used as adjuncts.

Source Control of Infection. Abscesses, necrotic tissues, or sources of infection must be promptly removed surgically or through interventional procedures. This is a critical component of treatment.

Additional Measures. Glucocorticoids (hydrocortisone) are used in cases unresponsive to vasopressors. Anticoagulant therapy is implemented if DIC develops. Mechanical ventilation is recommended for patients with ARDS.

Discussion. Early clinical recognition of sepsis is often challenging because the signs are nonspecific. Laboratory tests, scales such as SOFA/qSOFA, and rapid treatment are the keys to success. The 2021 Surviving Sepsis Campaign guidelines designate the 1-hour emergency treatment bundle—including antibiotics, infusion, and vasopressors—as first-line care.

Conclusion and Recommendations. Sepsis is a severe emergency condition with a high risk of death, leading to multiple organ failure. Understanding its pathogenesis, early clinical and laboratory detection, and implementation of urgent and rational therapy are the keys to success. It is recommended to introduce special algorithms for early detection of sepsis in healthcare facilities, regularly train all physicians, and act in accordance with standards.

Sepsis is a disease that requires rapid and targeted treatment. Modern therapy is directed toward antibiotics, volume infusion resuscitation, vasopressors, and elimination of the infection source. Clinical outcomes can also be improved with additional therapies. Treatment efficacy can be enhanced through targeted monitoring and evaluation.

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MATERIALLARNING MEXANIK XUSUSIYATLARI BILAN PO'LAT STRUKTURASIDAGI DONACHA O'LCHAMI ORASIDAGI BOG'LIQLIGI

Annotatsiya: *Buldozer otvali (pichog'i)dagi mayda po'lat strukturasidagi donacha tuzilishga ega bo'lgan materiallarning mexanik xususiyatlarini tavsiflaganda, eng avvalo, mikroqattqlikning yuqori darajasiga e'tibor qaratish lozim. Tadqiqot natijalarida otvalni qizdirib havoda va moyda sovutib toblash usullari qo'llanildi.*

Kalit so'zlar: *Buldozer, grunt, toblash, qattqlik, yeyilish, yer qazish, pichoq, surish.*

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DEPENDENCE BETWEEN THE MECHANICAL PROPERTIES OF MATERIALS AND THE DIMENSION OF THE GRANULE IN THE STRUCTURE OF STEEL

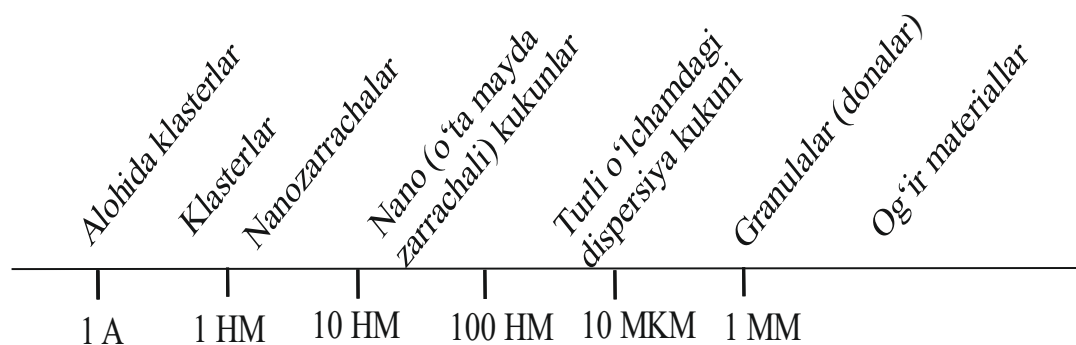
Abstract: *When characterizing the mechanical properties of materials with a fine-grained structure in the steel structure of a bulldozer blade, it is first of all necessary to pay attention to the high level of microhardness. The research results showed that the methods of tempering the blade by heating it in air and cooling it in oil were used.*

Key words: *Bulldozer, ground, grinding, hardness, eating, digging, knife, pushing.*

So'nggi yillarda buldozerlarni loyihalash, ishlatish jarayonida yangi turdagi materiallardan foydalanishga - ilmiy va sanoat sohalarida katta qiziqish ortib bormoqda. Buldozer pichog'ida ishlatiladigan materiallar o'ziga xos atom-kristall panjarasiga ega bo'lgan holda, o'ziga xos noyob xususiyatlarni namoyon etadi.

O'zbek tilining ilmiy adabiyotlarida ular ultradispers materiallar (UDM), G'arb mamlakatlarining ilmiy adabiyotida esa nanostrukturali materiallar (NSM) yoki nanomateriallar (NM) deb yuritiladi. Ushbu materiallar sinfiga (UDM va NM) morfologik elementlarining o'lchami 100 nanometrdan kichik bo'lgan materiallar kiradi.

Maqolada zarrachalarni o'lchamlariga ko'ra tasniflash bo'yicha mavjud qarashlar va yondashuvlarning batafsil tahlili amalga oshirilgan.



1.-rasm. Zarrachalar o'lchami bo'yicha dispers materiallar klassifikatsiyasi

Mazkur tasnifga ko'ra, UDM zarrachalarining o'lchamlari 10 nanometrdan 100 nanometrgacha bo'lgan oraliqda bo'ladi. Xuddi shunday zarracha o'lchamlari oraliq chegarasi boshqa bir ilmiy ishda ham UDM uchun asosiy mezon sifatida belgilangan.

Buldozer otvali (pichog'i)dagi mayda po'lat strukturasidagi donacha tuzilishga ega bo'lgan materiallarning mexanik xususiyatlarini tavsiflaganda, eng avvalo, mikroqattqlikning yuqori darajasiga e'tibor qaratish lozim. Eksperimental sharoitda qattqlikni aniqlashda uning qiymatiga bir qancha omillar ta'sir qiladi, jumladan:

- yuklama miqdori va uning davomiyligining noto'g'ri tanlanishi;
- indentor o'qi bilan namunaviy yuza orasida perpendikulyar bo'lmasligi;
- g'ovaklar mavjudligi va hokazolar.

Asosan qattqlik materialning og'ish chegarasi bilan belgilanadi. Materialning plastiklik chegarasi σ_T va qattqligi H ning po'lat strukturasidagi donacha o'lchamiga bog'liqligi Xoll-Petch munosabati orqali ifodalanadi:

$$\sigma_T = \sigma_o + k_T \cdot d^{-\frac{1}{2}}; \quad H = H_o + k_H \cdot d^{-\frac{1}{2}}$$
 Bu yerda σ_o va H_o monokristallning kuchlanishi va qattqligini ifodalaydi; k_T va k_H doimiylardir.

Materiallarning mayda donalarga bo'lish (maydalash) orqali ularning mustahkamlik xususiyatlarining oshishini plastik deformatsiyalanish mexanizmi bilan bog'lash qabul qilingan. Bu jarayon quyidagi asosiy mexanizmlar bilan tushuntiriladi:

1. Estafetali (ketma-ket) mexanizm – bunda donalar chegarasining ko'pligi, dislokatsiyalarning silliq surilishini to'xtatadi, shu bilan birga, qo'shni donalarda yangi dislokatsion manbalarni faollashtiradi.

Bunday holda deformatsiya bir donadan boshqasiga “estafeta” tarzida o'tadi.

2. Akkumulyatsion (to'planish) mexanizm – bu yondashuvga ko'ra, dislokatsiyalar donalar chegarasida jamlanadi, ularning soni butun polikristallning donalar sonidan ancha katta bo'ladi.

Ushbu ikkala mexanizm mustahkamlikni ta'minlaydi va mayda donali (ultratarqoq) tuzilmalarning asosiy mexanik ustunliklarini ifodalaydi. Uskunada uzunligi bo'ylab o'zgaruvchan (torayib boruvchi) kesimli ikkinchi kanaldan foydalanish mumkin. Bu presslash kuchiga qarshi ta'sir yaratish imkonini beradi. Bunday jarayonda deformatsiyalanish darajasi bir xil kesimli kanal variantiga

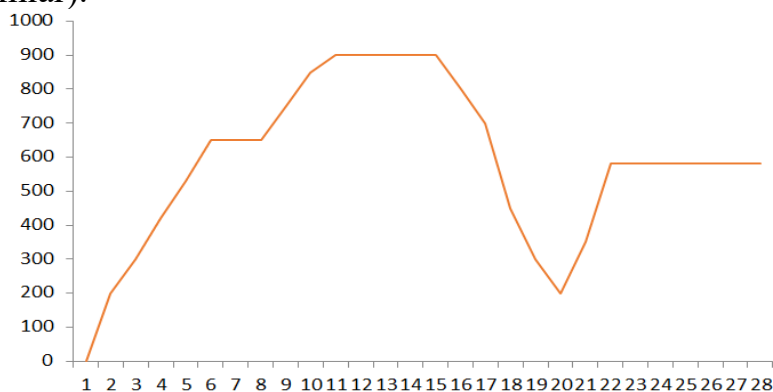
nisbatan yuqoriroq bo‘ladi. Natijada, o‘tishlar soni bir xil bo‘lganda ham material tuzilishida kuchliroq o‘zgarishlar ro‘y beradi. Bunday o‘zgaruvchan kesim materialdagi po‘lat strukturasidagi donachalarni yanada mayda donalar hosil bo‘lishini ta‘minlaydi.

Kuchli siljish bo‘lganda deformatsiyasi ta‘sirida namuna materialining tuzilishi o‘zgaradi: u parchalanadi, nuqsonlar zichligi ortadi va po‘lat strukturasidagi donachalar maydalanadi. Tuzilishdagi bu o‘zgarishlar materialning mexanik xususiyatlarini o‘zgartiradi. Namunadagi po‘lat strukturasidagi donachalarining deformatsiyasi notekis bo‘lib va u namuna markazidan bo‘lgan masofaga qarab aniqlanadi. Yanada bir xil tuzilish hosil qilish uchun puansonning aylanishlar soni ko‘paytiriladi. Po‘lat strukturasidagi donachalar o‘lchami materialning dastlabki mexanik xususiyatlariga hamda YuBOB (Yuqori bosim ostida burash) jarayoni harorati va aylanishlar soniga bog‘liq. Markazdan r masofada joylashgan namunaning γ_{kvd} siljish deformatsiyasini quyidagi munosabat yordamida baholash mumkin.

$$\gamma_{kvd} = 2 \cdot \pi \cdot N \frac{r}{h_0}$$

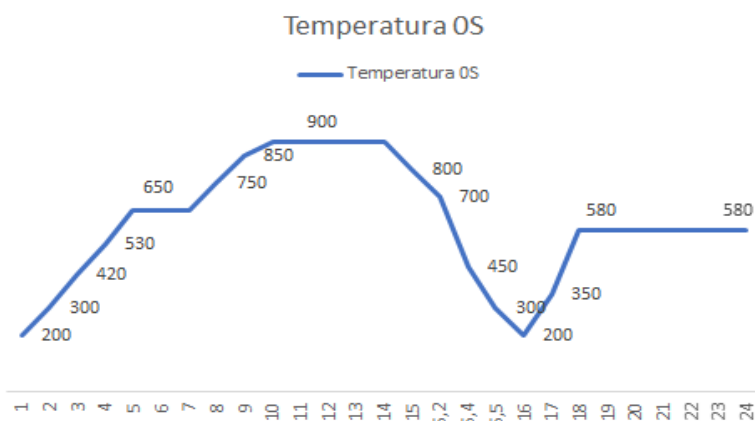
Keltirilgan nisbatda sandonning aylanishlar soni N , h_0 - esa namunaning boshlang‘ich o‘lchamlari ko‘rsatilgan.

Termik ishlov berish jarayonlarini 2 xil usulda ko‘rib chiqamiz. 1) Buldozer pichog‘ini qizdirib havoda sovutish. 2) Buldozer pichog‘ini qizdirib moyda sovutish (2-3 rasmlar).



2-rasm. Buldozer pichog‘ini qizdirib havoda sovutish.

Birinchi usulda, buldozer pichog‘ini termik ishlov berish (model RP - 11901) pechida 200°C temperaturadan boshlab 650°C temperaturaga qizdirib boriladi. Qizdirish 200°C dan 650°C temperaturaga borguncha 5-6 soat vaqt oralig‘ini tashkil etadi. 650°C temperaturada 2-3 soat ushlab turiladi, keyin 900°C ga qadar qizdiriladi, bu qizdirish jarayonidagi vaqt 4-8 soatni tashkil etadi. Keyingi bosqichda 2-3 soat vaqt oralig‘ida 200°C temperaturaga tushiriladi, keyin yana 3 soat davomida 580°C temperaturaga asta - sekin ko‘tarilib boriladi. 580°C temperaturada 4-8 soat ushlab turiladi. Buldozer otvalini qizdirib havoda sovutish grafigi keltirilgan.



3-rasm. Buldozer pichog'ini qizdirib moyda sovutish

Ikkinchi usulda buldozer pichog'ini asbobsozlik tsexida elektr Ц-75 (№ 44904) pechida 420°C dan boshlab 2 soat davomida qizdirib 580°C ga ko'tariladi va shu temperaturada 6 soat ushlab turiladi, bir soat davomida asta sekin sovutilib 420°C ga tushiriladi. 420°C temperaturada 2 soat ushlab turilib, bir soat davomida 250°C da tushiriladi va 3 soat 250°C da ushlab turiladi, keyin sekin - asta 3 soat davomida temperatura 400°C ko'tarilib, 4 soat moyda toblanadi. Toblash jarayoni bir soat davomida 200°C ga tushirilib 3 soat davomida buldozer pichog'i elektr pechda ushlab turiladi.

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FORTEPIANO CHOLG'USIDA MASHQLARNI SIFATLI BAJARISHNING AFZALLIKLARI

Annotatsiya: Ushbu maqolada fortepiano cholg'usida mashqlarni bajarish texnikasi va o'ziga xos o'quvchilarni hisobga olish printsipli rivojlantiruvchi ta'lim usuliyatiga chambarchas bogliqligi. Ta'limning muvaffaqiyati materialning tushunarli bo'lishiga, qo'ldan keladigan vazifalarni qo'yishga va ularni hal qilishning o'xshash usullaridan foydalanishga, shuningdek, o'qituvchi o'quvchni faqat mavjud, imkoniyatni emas, balki "kelajakdagi kamoloti doirasini" ham hisobga olish bilan bog'liqligi haqida fikrlar bayon qilingan.

Kalit so'zlar: fortepiano, cholg'u, texnika, pedagogika, instruktiv material, faollik printsipli, badiiy-ijrochilik, sifatli, afzallik, mashqlar, material, ko'rsatmalilik.

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THE BENEFITS OF QUALITY PIANO PRACTICE

Annotation: This article discusses the close relationship between the technique of performing exercises on the piano and the principle of taking into account the specific needs of students in the development of educational methods. The ideas that the success of education depends on the clarity of the material, the setting of achievable tasks and the use of similar methods for solving them, as well as the teacher's consideration of not only the current capabilities of the student, but also the "future development horizon" are presented.

Keywords: Keywords: piano, instrument, technique, pedagogy, instructional material, the principle of activity, artistic and performing, quality, advantage, exercises, material, instructiveness.

Texnik formulalarni o'zlashtirish bo'yicha maxsus ishlash zarurligi haqidagi fikr shakshubhasizdir. Fortepiano maktabida har xil mashqlarni ana shunday formulalar bilan hisoblanadi. Mashqlarning ahamiyati shuki, ular musiqachiga pianinochilikdagi barcha qiyinchiliklariinr «yadro»sini egallash imkonini beradi.

Lekin fortepiano pedagogikasida mashqlarga yondashishning o'zi o'zgaradi, bu hol ayniqsa ta'limning dastlabki davrini tahlil qilishda ko'rinadi. Quruq va maqsadsiz «chalish» o'rnini ohangdor, ifodali mashqlar egallamoqda, bunday

mashqlarning har birida o'quvchilar oldiga sof texnik vazifalardan tashqari muayyan badiiy maqsad ham qo'yiladi. Mashqlarni o'zlashtirish markazida musiqiy-eshitish tasavvurlarini rivojlantirish ana shu tasavvurlarni harakat tasavvurlari bilan o'zaro bog'lash, bunday bog'lanish orqali pianinochilik usullari va malakalarini asta-sekin takomillashtirish turadi.

Ta'limning boshlanishida mashqlarni o'rganish yagona maqsad emas, balki badiiy material ustida ishlashga qo'shimcha zarur tadbir hisoblanadi. Ularga o'quvchilar pyesalarda duch keladigan qiyinchiliklar ham kiradi. Mashqlar o'quvchilarga o'z diqqatini nota matnidan erkin harakatlarga jaranglash sifatini kuzatishga ko'chirish imkonini beradi.

Maktablar ilmiy tadqiqot instituti musiqa ta'limi laboratoriyasining xodimlari jamoasi akademik D. Kabalevskiy rahbarligida ishlab chiqqan dastur hozirgi paytda Rossiyadagi umumiyta'lim maktablarining boshlang'ich sinflari uchun musiqa dasturi hisoblanadi.

Mazkur dastur hal qiladigan asosiy vazifalar musiqa mashg'ulotlariga qiziqish va eshitish qobiliyati aniqlanadi. Shu bilan birga o'quvchilar dastlabki darslardan o'qib faqat musiqani idrok etishni emas, balki musiqa haqida fikr yuritishni, ham o'rganadilar. Darsning mavzulilik va yaxlitlik prinsipi eng muhim ahamiyatga ega, nazariy ma'lumotlarni bayon qilish va eslab qolish esa musiqani hissiyot bilan tushunish asosida amalga oshiriladi.

Oliy o'quv yurtidagi ta'lim va tarbiya zamon talablariga javob beradigan va amaliy faoliyatni boshlashdanoq uning muvaffaqiyatini ta'minlaydigan sifatlarga ega bo'lgan mutaxassislarni yetishtirishi lozim. Hozirgi kunda oliy o'quv yurtlaridagi ta'lim jarayoni o'z vazifasiga va jadalligiga ko'ra ancha murakkablashdi. Shuning uchun uning yo'nalishi, mazmuni va usuliyati masalalarini ilmiyasosda hal qilmay turib, jamiyatning doimiy ortib borayotgan talablariga mos mutaxassislar tayyorlash samaradorligini ta'minlash mumkin emas.

Shuning uchun maktabdagi "Musiqa" fani o'quvchilarni faqat axloqiy-estetik jihatdan emas, balki har tomonlama tarbiyalash va kamol toptirishning yo'li, deyish mumkin. Bolalar musiqani tushunishi uchun musiqa tilining ma'naviy va shakl yasash xususiyatlarini bilishi, muayyan darajada rivojlangan musiqiy (baland tovushli, tembrli, garmonik, dinamik musiqani tinglash, lad va ritmni his qilish, musiqani eslab qolish) qobiliyatlariga, musiqani idrok va ijro etish malakalariga ega bo'lishlari zarur.

Musiqa o'qituvchisi o'z fanini (musiqani) sevishi, unga ishtiyoq bilan yondashishi, kishilarni yaxshi ko'rishi, musiqa san'ati vositalari bilan o'qitish va tarbiyalashga qiziqishi lozim.

Shunga ko'ra L.N.Tolstoy faqat o'z ishini sevgan o'qituvchi yaxshi o'qituvchi bo'lishini, o'zining ishini ham, o'quvchilarni ham sevadigan o'qituvchi-barkamol o'qituvchi ekanini uqtirgan edi.

Shunday qilib, musiqa o'qituvchisi bilimlarining tuzilmasini ijtimoiy-siyosiy psixologik-pedagogik va maxsus bilimlar tashkil qiladi.

Ijtimoiy-siyosiy bilimlar o'qituvchi dunyoqarashining nuqtai nazarining poydevori, undagi kasb-korlik va maxsus bilimlarning metodologik bazasidir.

Psixologik-pedagogik bilimlari o'qituvchining kasb-korlik tayyorgarligi uchun asos sifatida xizmat qiladi. Musiqa o'qituvchisi musiqiy qobiliyatlar psixologiyasini, bola va o'smir shaxsining tipologik xamda yosh xususiyatlarini, ijodiy o'ziga xoslikning rivojlanishi qonuniyatlarini va ana shu rivojlanish eng samarali amalga oshadigan sharoitlarni bilishi zarur.

Bu vazifalar musiqa asboblari chalishni yaxshi o'rgatishdangina iborat bo'lib qolmasligi kerak. Bunda eng muhimi bolaga sevishi o'rgatish va unda musiqa mashg'ulotlariga qiziqish uyg'otish, cholg'u asboblari yordamida musiqiy faoliyatga ehtiyoj hosil qilish, shuningdek, maktabni bitirgandan keyin ham loaqal o'z dilxushligi uchun musiqa bilan shug'ullanishimkonini beradigan bilim, ko'nikma va malakalarni tarkib toptirishdir.

Fortepiano darslari juda katta tarbiyaviy imkoniyatga ega. Shuning uchun ularning tarbiyaviy va ta'limiy vazifalarini uzviy birlikda, bir-birini to'ldirgan holdatushinishi zarur. Bunda V.A. Suxomlinskiyning "Ommaviy musiqa tarbiyasi mutaxassis musiqachini emas, balki avvalo insonni tarbiyalashdir", -degan so'zlarini eslash kerak[2].

Mavjud didaktika printsiplariga movoffiq har bir darsga ta'lim va tarbiya tizimining zvenolaridan biri sifatida qarash lozim. Bunda tarbiyaviy ish ta'lim jarayonini to'ldiradigan qandaydir ikkinchi darajali omil hisoblanmasligi kerak. Binobarin bu ish ta'lim bilan dialektik birlikni tashkil qiladi. G'. Neygauz pedagog musiqachining o'quvchiga tarbiyaviy ta'sir ko'rsatishdagi vazifalarini ifodalab shunday yozgan edi: "O'qituvchini aqlli, sezgir, halol, adolatli qilishni amalga oshirsa bo'ladigan, to'la amalga oshirib bo'lmasa ham, davrimiz qonunlaridan, san'atning o'zidan kelibchiqqan, har doim dialektik jihatdan o'zini oqlagan vazifasidir[3]".

O'quvchilar bilan olib boriladigan tarbiyaviy ishlar me'daga tegib ketmasligi, lekin o'quvchi sezmaydigan yo'lda doimiy ravishda amalga oshirilishi kerak. Pedagog o'quvchining nimalarga qiziqishi, nimalarni o'qishi va yaxshi ko'rishini, uyidagi sharoiti, oilasidagi munosabatlari va hokazolarini bilishi lozim. Bir qancha olimlar umumiy pedagogik qobiliyatlar orasida tashkilotchilik, odamoxunlik, pedagogik tasavvur, kuzatuvchanlik, talabchanlik, pedagogiknazokat, diqqatni taxsimlash va hokazolar muhim ahamiyatga molikligini ta'kidlaydilar.

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O'ZBEK VA NEMIS TILLARI ORASIDAGI FARQ

Annotatsiya: Ushbu maqolada O'zbek va Nemis tillari orasidagi lingvistik farqlar fonetik, morfologik, sintaktik va leksik jihatlar nuqtai nazaridan tahlil qilindi. Maqola ikki til o'rtasidagi asosiy xususiyatlarni aniqlash, til o'rganish jarayonidagi qiyinchiliklarni ko'rsatish va ularni yengish yo'llarini belgilashga qaratilgan. O'zbek tili agglutinatив, Nemis tili fusional til bo'lib, jumla tuzilishi va so'z shakllanishi jihatdan farq qiladi. Leksik va morfologik tafovutlar tarjima va til o'qitishda muhim ahamiyatga ega.

Kalit so'zlar: O'zbek tili, Nemis tili, fonetika, morfologiya, sintaksis, leksika, til o'rganish.

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DIFFERENCE BETWEEN UZBEKISTAN AND GERMAN LANGUAGES

Abstract: This article analyzes the linguistic differences between Uzbek and German from phonetic, morphological, syntactic, and lexical perspectives. The study aims to identify the main characteristics of the two languages, highlight the difficulties in language learning, and propose ways to overcome them. Uzbek is an agglutinative language, whereas German is a fusional language, differing in sentence structure and word formation. Lexical and morphological distinctions play a significant role in translation and language teaching.

Keywords: Uzbek language, German language, phonetics, morphology, syntax, lexicon, language learning.

Kirish: Til – insoniyatning eng muhim kommunikativ vositasi bo'lib, u nafaqat axborot almashish, balki madaniy va ijtimoiy jarayonlarni ifodalash vositasi sifatida ham xizmat qiladi. Har bir til o'zining fonetik, morfologik, sintaktik va leksik xususiyatlariga ega bo'lib, bu xususiyatlar tilni o'rganish va tadqiq qilish jarayonida muhim ahamiyat kasb etadi [1]. O'zbek va Nemis tillari turli tillar oilasiga mansub bo'lib, ularning lingvistik tizimlari, so'z shakllanishi va jumla qurilishi jihatidan sezilarli farqlarga ega.

O'zbek tili turkiy tillar oilasiga kirib, agglutinatив xususiyatga ega. Bu tilning morfologik tizimida so'z yasash va grammatik ma'no berish qo'shimchalar orqali amalga oshiriladi. Masalan, fe'l va ot shakllari turli qo'shimchalar yordamida aniqlanadi, bu esa so'zlarning grammatik vazifasini belgilashga imkon beradi. Shu

bilan birga, O‘zbek tilida so‘z tartibi nisbatan qat’iy bo‘lib, odatda SOV (subyekt-obyekt-fe‘l) tartibida ifodalanadi.

Nemis tili esa germaniy tillar oilasiga mansub bo‘lib, fusional til hisoblanadi. Bu tilning morfologik tizimi bir necha grammatik ma’nolarni bir vaqtning o‘zida ifodalovchi morfemalarga ega. Nemis tilida otlar jins, raqam va holga qarab o‘zgaradi, fe’llar esa shaxs va raqam bilan moslashadi. Sintaktik jihatdan Nemis tilida SVO (subyekt-fe‘l-obyekt) tartibi ko‘p ishlatiladi, ammo murakkab jumalalarda fe‘l oxirga tushadi, bu esa O‘zbek tilida uchramaydi [2].

Fonetik nuqtai nazardan, O‘zbek tilida tovushlar aniq ajraladi va urg‘u ko‘pincha so‘z oxirida joylashadi. Nemis tilida esa uzun va qisqa unli tovushlar, shuningdek, umlautlar (ä, ö, ü) talaffuz va intonatsiya tizimini murakkablashtiradi. Leksik jihatdan ham ikki til sezilarli darajada farq qiladi. O‘zbek tilida so‘zlar asosan turkiy kelib chiqishga ega bo‘lsa, Nemis tilida germaniy, lotin va fransuz so‘zlari keng qo‘llaniladi, bu esa tarjima va til o‘qitish jarayonida e’tiborni talab qiladi [3].

Maqolaning maqsadi – O‘zbek va Nemis tillari orasidagi lingvistik farqlarni fonetik, morfologik, sintaktik va leksik jihatlar nuqtai nazaridan tahlil qilish, til o‘rganish jarayonida yuzaga keladigan qiyinchiliklarni aniqlash va ularni yengish yo‘llarini ko‘rsatishdan iboratdir. Shu bilan birga, maqola ikki tilning farqlarini chuqur tushunish orqali tarjima, lingvistik tadqiqotlar va til o‘qitish samaradorligini oshirishga hissa qo‘shadi.

Tadqiqot Metodologiyasi

Ushbu tadqiqotda komparativ tahlil metodi qo‘llanildi, ya’ni O‘zbek va Nemis tillari lingvistik xususiyatlari solishtirildi. Fonetik, morfologik, sintaktik va leksik farqlarni aniqlash uchun ilmiy adabiyotlar va lug‘at materiallari tahlil qilindi. Shuningdek, tarjima va til o‘rganish jarayonidagi amaliy misollar asosida xulosalar chiqarildi. Tadqiqotda sifat va miqdoriy tahlil usullari kombinatsiyasi qo‘llanilib, nazariy va amaliy jihatlar birlashtirildi.

Tahlil Va Natijalar

O‘zbek va Nemis tillari turli tillar oilasiga mansub bo‘lib, ularning lingvistik tizimlari va grammatik xususiyatlari sezilarli darajada farq qiladi. Tadqiqot natijalari shuni ko‘rsatadiki, fonetik, morfologik, sintaktik va leksik sohalaridagi farqlar til o‘rganish va tarjima jarayonida muhim ahamiyat kasb etadi. Ushbu bo‘limda har bir aspekt bo‘yicha batafsil tahlil beriladi.

Fonetik farqlar

O‘zbek tilining fonetik tizimi 29 ta undosh va unli tovushdan iborat bo‘lib, tovushlar o‘rtasidagi ajralish aniq va talaffuzga ta’sir qiladi [1]. O‘zbek tilida urg‘u ko‘pincha so‘z oxirida joylashadi va talaffuzni tushunishda muhim rol o‘ynaydi. Nemis tilida esa 16 ta unli va 25 ta undosh tovush mavjud bo‘lib, uzun va qisqa unli tovushlar, shuningdek, umlautlar (ä, ö, ü) talaffuzni murakkablashtiradi [2]. Tadqiqot shuni ko‘rsatadiki, O‘zbek tilida nemis tilidagi umlaut va maxsus tovushlarni talaffuz qilishda o‘rganayotganlar qiyinchiliklarga duch keladi. Masalan, *schön* yoki *München* kabi so‘zlarni to‘g‘ri talaffuz qilish uchun maxsus mashqlar talab etiladi.

Shuningdek, intonatsiya tizimi ham ikki tilda farq qiladi. O'zbek tilida intonatsiya ko'pincha emotsional ohang va urg'u bilan bog'liq bo'lsa, Nemis tilida intonatsiya va urg'u sintaktik tuzilishga bog'liq bo'lib, jumla mazmunini o'zgartirishi mumkin. Tadqiqot natijalariga ko'ra, fonetik farqlar til o'rganish jarayonida talaffuz mashqlarini ko'paytirishni talab qiladi.

Morfologik farqlar

O'zbek tili agglutinatив til sifatida, grammatik ma'nolarni qo'shimchalar orqali ifodalaydi. Masalan, fe'llarning shaxs va vaqt shakllari *bor-di-m* (men bordim), *keldi-ng* (sen kelding) kabi qo'shimchalar bilan belgilanadi. Nemis tili fusional bo'lib, morfemalar bir nechta grammatik ma'noni bir vaqtning o'zida ifodalaydi. Fe'llar shaxs va raqam bilan moslashadi: *ich gehe* (men ketayapman), *du gehst* (sen ketayapsan), *er geht* (u ketayapti) [3].

Otlar jins, raqam va holga qarab o'zgaradi. Masalan, *der Mann* (erkak), *die Frau* (ayol), *das Kind* (bola) – bu artikllar otning jinsini, raqamini va holatini ko'rsatadi. O'zbek tilida bu morfologik xususiyatlar mavjud emas, shuning uchun O'zbek tilida nemis tilini o'rganayotganlar artikllarni to'g'ri ishlatishda qiyinchiliklarga duch keladi.

Tadqiqot shuni ko'rsatadiki, morfologik farqlar til o'rganishda grammatik mashqlar va kontekstual misollarni ko'paytirishni talab qiladi. Shu bilan birga, tarjimada ham morfologik moslashuv muhim ahamiyat kasb etadi.

Sintaktik farqlar

O'zbek tili asosan SOV (subyekt-obyekt-fe'l) tartibida ifodalanadi: *Men kitobni o'qiyman*. Nemis tilida esa SVO (subyekt-fe'l-obyekt) tartibi ko'p ishlatiladi: *Ich lese das Buch* (men kitobni o'qiyman). Biroq murakkab jumalarda fe'l oxirga tushadi: *Ich weiß, dass du das Buch liest* (men bilaman, sen kitobni o'qiysan) [4].

Bu sintaktik farq O'zbek tilida nemis tilini o'rganayotganlar uchun qiyinchilik tug'diradi. Tadqiqot natijalari shuni ko'rsatadiki, murakkab jumalarni to'g'ri tuzish uchun nemis tilida sintaktik qoidalarni chuqur o'rganish zarur. Shuningdek, yordamchi fe'llar va modal fe'llar yordamida jumla tuzish O'zbek tilida sodda fe'llar bilan ifodalanadi, bu esa til o'rganish jarayonini murakkablashtiradi.

Leksik farqlar

O'zbek tilida so'zlarning aksariyati turkiy kelib chiqishga ega, Nemis tilida esa germaniy, lotin va fransuz so'zlari keng qo'llaniladi. Masalan, O'zbek tilida *yurak* so'zi keng ma'noda ishlatiladi, Nemis tilida esa *Herz* asosan biologik ma'noda ishlatiladi, emotsional ma'no uchun boshqa iboralar qo'llanadi.

Shuningdek, sinonim va antonimlar tizimi ham ikki tilda farq qiladi. Tadqiqot natijalari shuni ko'rsatadiki, tarjimada so'zning kontekstdagi ma'nosini to'g'ri tanlash muhim ahamiyatga ega. Leksik farqlar til o'rganish jarayonida so'z boyligini kengaytirish va amaliy mashqlar orqali yengilishi mumkin.

Tadqiqot natijalarining umumiy tahlili

Tahlil natijalari shuni ko'rsatadiki, O'zbek va Nemis tillari orasidagi farqlar til o'rganish jarayonida turli qiyinchiliklar tug'diradi. Fonetik farqlar talaffuz

mashqlarini, morfologik farqlar grammatik mashqlarni, sintaktik farqlar jumla tuzish mashqlarini, leksik farqlar esa soʻz boyligini oshirish va tarjima mashqlarini talab qiladi. Shu bilan birga, ikki tilning farqlarini chuqur tushunish tarjima, til oʻqitish va lingvistik tadqiqotlarda samaradorlikni oshiradi.

Tadqiqot shuningdek, til oʻrganishda interaktiv metodlar, kontekstual misollar va komparativ mashqlarni qoʻllash samarali ekanligini koʻrsatdi. Bu usullar orqali oʻrganuvchilar nafaqat grammatik va leksik qoidalarni, balki tilning pragmatik va madaniy xususiyatlarini ham chuqur oʻzlashtira oladi.

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MOBIL ILOVALAR ORQALI BUXGALTERIYA HISOBOTLARINI BOSHQARISH TIZIMINI ISHLAB CHIQISH

***Anatatsiya:** Ushbu maqolada mobil ilovalar yordamida buxgalteriya hisobotlarini boshqarish tizimini yaratishning texnik va amaliy jihatlari yoritiladi. Raqamli texnologiyalar rivojlanishi tashkilotlarga moliyaviy ma'lumotlarni tezkor qayd etish, saqlash va tahlil qilish imkonini bermoqda. Mobil ilovalar bu jarayonni yanada qulaylashtirib, foydalanuvchilarga istalgan joydan hisobotlarni shakllantirish, operatsiyalarni monitoring qilish, xarajat va daromadlarni nazorat qilish imkonini beradi. Tizimda ma'lumotlar bazasi bilan ishlash, xavfsizlikni ta'minlash, avtorizatsiya, real vaqt rejimida sinxronlash kabi funksiyalar asosiy o'rinni egallaydi. Shuningdek, maqolada ushbu tizimni ishlab chiqish bosqichlari — talablarni aniqlash, arxitektura tanlash, interfeys yaratish, testlash va joriy etish jarayonlari haqida batafsil fikr yuritiladi. Mobil buxgalteriya tizimlarining kichik biznes, xizmat ko'rsatish sektori va mustaqil tadbirkorlar uchun iqtisodiy samaradorlikni oshirishdagi roli ham tahlil qilingan.*

***Kalit so'zlar:** mobil ilova, buxgalteriya tizimi, moliyaviy hisobot, ma'lumotlar bazasi, xavfsizlik, sinxronlash, raqamli boshqaruv.*

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DEVELOPMENT OF A SYSTEM FOR MANAGING ACCOUNTING REPORTS VIA MOBILE APPLICATIONS

***Abstract:** This article examines the development of a mobile application-based accounting management system, focusing on its practical and technical aspects. With the rise of digital technologies, organizations can record, store, and analyze financial data more efficiently. Mobile applications make this process more*

accessible by enabling users to generate reports, monitor transactions, and track expenses and revenues from any location. The system emphasizes working with databases, ensuring data security, user authentication, and real-time synchronization. The paper also discusses development stages such as requirement analysis, system architecture design, interface creation, testing, and implementation. Additionally, the economic benefits of mobile accounting systems for small businesses, service sectors, and individual entrepreneurs are explored

Keywords: *mobile application, accounting system, financial reporting, database, security, synchronization, digital management.*

KIRISH

Hozirgi raqamli texnologiyalar jadal rivojlanib borayotgan bir paytda korxonalar moliyaviy jarayonlarni boshqarishda qulay va tejamkor yechimlarga tobora ko‘proq ehtiyoj seza boshlamoqda. An’anaviy buxgalteriya dasturlari o‘z o‘rnida ahamiyatga ega bo‘lsa-da, mobil ilovalarning kirib kelishi bu sohada katta o‘zgarishlar yasadi. Mobil qurilmalar yordamida buxgalteriya hisobotlarini yuritish, ma’lumotlarni saqlash va ularni qayta ishlash jarayoni avvalgidan ancha soddalashdi hamda tezlashdi.

Mobil ilovalar foydalanuvchilar uchun daromad va xarajatlarni qayd etish, hujjatlar bilan ishlash, soliq hisobotlarini shakllantirish, to‘lovlar monitoringi kabi vazifalarni istalgan joyda bajarish imkonini bermoqda. Bu nafaqat vaqtni tejaydi, balki ish jarayonidagi tartib-intizomni kuchaytiradi. Ayniqsa, kichik biznes egalari va mustaqil tadbirkorlar uchun bu kabi ilovalar oson boshqaruv imkoniyatlari yaratadi.

Shu bilan birga, mobil platformalarda buxgalteriya ma’lumotlarini boshqarish tizimlari xavfsizlik masalasini ham e’tibordan chetda qoldirmaydi. Moliyaviy ma’lumotlarni shifrlash, foydalanuvchi identifikatsiyasi, ma’lumotlarni zaxiralash kabi talablar bunday tizimlarning ajralmas qismi hisoblanadi. Mazkur mavzu aynan mobil ilovalar asosida buxgalteriya hisobotlarini boshqarish tizimini yaratish jarayonidagi imkoniyatlar, ehtiyojlar va mavjud texnik yechimlarni chuqur o‘rganishni ko‘zda tutadi.

ASOSIY QISM

Mobil texnologiyalarning rivojlanishi buxgalteriya jarayonlarini yangi bosqichga olib chiqib, hisob-kitob ishlarini yanada qulay va tezkor amalga oshirish imkoniyatini yaratdi. An’anaviy kompyuter dasturlariga tayanib ishlash ko‘plab korxonalar uchun yetarli bo‘lmay qolgani sababli, mobil ilovalar asosida buxgalteriya hisobotlarini boshqarish tizimlarini yaratishga ehtiyoj ortmoqda. Bunday tizimlar moliyaviy ma’lumotlarni real vaqt rejimida yangilash, ularni saqlash, tahlil qilish va hisobotlarni avtomatik shakllantirish imkoniyatini beradi.

Mobil ilovalarda yaratilgan buxgalteriya tizimining asosiy afzalligi — foydalanuvchi uchun istalgan joyda va istalgan vaqtda hisob-kitob jarayonini boshqarish imkoniyatidir. Masalan, daromad va xarajatlarni kiritish, hisob-fakturalarni shakllantirish, qarzlar va to‘lovlarni nazorat qilish kabi amallarni mobil qurilma orqali tezda bajarish mumkin. Bu kichik va o‘rta biznes egalari

qo'shimcha texnik vositalarsiz moliyaviy holatni nazorat qilish imkonini beradi. Shuningdek, mobil ilovalar statistik ma'lumotlarni vizual ko'rinishda taqdim etib, biznes jarayonlarini tahlil qilishni yengillashtiradi.

Tizimda ma'lumotlar xavfsizligi alohida ahamiyatga ega. Mobil ilovalar orqali amalga oshiriladigan buxgalteriya jarayonlarida ma'lumotlar shifrlash, foydalanuvchi autentifikatsiyasi, ikki bosqichli himoya, ma'lumotlarni zaxiralash kabi mexanizmlar qo'llaniladi. Ayniqsa, moliyaviy hujjatlar va hisoblar bilan ishlayotganda ma'lumotlarning maxfiyligi va butligini ta'minlash muhim hisoblanadi. Shuning uchun ishlab chiqiladigan tizimda xavfsizlik protokollari xalqaro standartlarga mos bo'lishi talab etiladi.

Mobil ilovalar asosidagi buxgalteriya tizimini ishlab chiqishda qulay interfeys yaratish ham katta ahamiyatga ega. Foydalanuvchi uchun soddalik, tushunarli menyu tuzilishi, tezkor kirish imkoniyatlari va funksiyalarni aniq joylashtirish tizimning samarali ishlashiga xizmat qiladi. Bundan tashqari, tizimning bulut texnologiyasi bilan integratsiyalashuvi ma'lumotlarni yo'qotilishdan himoya qiladi va har bir o'zgarishning avtomatik saqlanishini ta'minlaydi.

Shuningdek, bunday tizimlar avtomatlashtirilgan hisoblash modullari bilan jihozlanadi. Ular soliq hisob-kitoblarini avtomatik qayta ishlash, hisobotlarni belgilangan muddatlarda shakllantirish, xarajatlar tahlili, balans holatini hisoblash kabi vazifalarni mustaqil bajaradi. Natijada inson omili sababli yuzaga keladigan xatoliklar sezilarli darajada kamayadi.

Umuman olganda, mobil ilovalar orqali buxgalteriya hisobotlarini boshqarish tizimini ishlab chiqish korxonalar uchun qulaylik, tezkorlik va xavfsizlikni ta'minlaydi. Zamonaviy texnologiyalar asosida yaratilgan bunday tizimlar ish jarayonini avtomatlashtirib, moliyaviy boshqaruvni yanada samarali tashkil etishga yordam beradi. Kelajakda bunday ilovalar yanada takomillashib, sun'iy intellekt va bulutli platformalar bilan bog'langan holda kengaytirilishi kutilmoqda.

METODOLOGIYA

Ushbu tadqiqotda mobil ilovalar orqali buxgalteriya hisobotlarini boshqarish tizimini ishlab chiqishda quyidagi metodologik yondashuvlar qo'llanildi:

Adabiyotlarni tahlil qilish: Mobil buxgalteriya tizimlari va moliyaviy boshqaruv bo'yicha mavjud ilmiy maqolalar, kitoblar va amaliy tadqiqotlar o'rganildi. Shu orqali mobil ilovalar yordamida hisob-kitoblarni avtomatlashtirish, ma'lumotlarni boshqarish va tizim arxitekturasi bo'yicha zamonaviy tendensiyalar aniqlanib olindi. Tanlangan adabiyotlar tizimning texnik va amaliy jihatlarini chuqurroq tushunishga yordam berdi.

Empirik tadqiqotlar: Amaliy misollar va real hayotdagi tajribalar o'rganildi. Xususan, yirik korxonalar, kichik biznes va mustaqil tadbirkorlar tomonidan joriy etilgan mobil buxgalteriya tizimlari tahlil qilindi. Shu bilan birga, tizimlarning samaradorligi, foydalanuvchi tajribasi va real vaqt rejimida ishlash xususiyatlari baholandi.

Kvantitatif va sifatli tahlil: Tizimning samaradorligini baholash uchun statistik va sifatli metodlar birgalikda qo'llanildi. Ma'lumotlar yig'ish jarayonida

foydalanuvchi xatoliklari, hisobotlarni tayyorlash tezligi, ma'lumotlar bazasining ishlash samaradorligi va mobil ilovaning interfeys qulayligi o'Ichandi.

Case Study: Mobil ilovalar asosida buxgalteriya tizimlari muvaffaqiyatli joriy etilgan bir nechta real holatlar tahlil qilindi. Bu usul orqali tizimlarning funkcionalligi, foydalanuvchi uchun qulayligi, xavfsizlik choralari va avtomatlashtirish darajasi batafsil o'rganildi.

Ekspert intervyulari: Buxgalteriya va moliyaviy boshqaruv sohasidagi mutaxassislar, IT va mobil ilovalar ishlab chiquvchilari bilan intervyular o'tkazildi. Ular mobil ilovalarning amaliy qo'llanilishi, tizimning samaradorligi, xavfsizlik jihatlari va kelajakda yuzaga kelishi mumkin bo'lgan muammolar bo'yicha fikr bildirdi.

jadval

Tadqiqot Metodi	Tavsif	Qo'llanilish sohasi	Ma'lumotlar turi
Adabiyotlarni tahlil qilish	Mobil buxgalteriya tizimlari bo'yicha ilmiy maqolalar va kitoblarni o'rganish	Teoriyaviy tahlil	Ilmiy maqolalar va tadqiqotlar
Empirik tadqiqotlar	Real hayotdagi tizimlar va amaliy tajribalarni o'rganish	Amaliy misollar	Korxona va tadbirkorlar tajribasi
Kvantitatif tahlil	Hisobotlarni tayyorlash tezligi, xatoliklar darajasi va tizim samaradorligi	Tizim ishlash samaradorligi	Statistik ma'lumotlar
Sifatli tahlil	Foydalanuvchi tajribasi, interfeys qulayligi, xavfsizlik choralari	Foydalanuvchi va tizim tahlili	Intervyu va kuzatishlar
Case Study (Holat o'rganish)	Real tizimlarni tahlil qilish va amaliy natijalarni o'rganish	Mobil ilovalarning joriy etilishi	Real dunyo misollari
Ekspert intervyulari	Mutaxassislar bilan suhbatlar orqali qo'shimcha ma'lumot olish	Soha ekspertlarining fikrlari	Ekspertlar tavsiyalari va mulohazalari

TAHLIL

Mobil ilovalar orqali buxgalteriya hisobotlarini boshqarish tizimi korxona moliyaviy jarayonlarini avtomatlashtirish va samarali boshqarish imkonini beradi. Quyida ushbu sohadagi asosiy tahliliy jihatlar keltirilgan:

Mobil ilovalarning buxgalteriya jarayonlariga ta'siri. Mobil ilovalar yordamida foydalanuvchilar daromad va xarajatlarni real vaqt rejimida kiritish, balansni kuzatish va hisobotlarni avtomatik shakllantirish imkoniyatiga ega bo'ladi. Shu bilan birga, ilovalar xatoliklarni kamaytirib, inson omili bilan bog'liq noaniqliklarni bartaraf etadi. Bu korxona moliyaviy jarayonlarini tezkor va aniq boshqarishda muhim rol o'ynaydi.

Yangi texnologiyalar va xavflar. Mobil ilovalar foydalanuvchi ma'lumotlarini yig'ish, saqlash va tahlil qilish uchun bulutli saqlash, shifrlash va autentifikatsiya texnologiyalaridan foydalanadi. Shu bilan birga, noto'g'ri sozlangan yoki zaif himoyalangan tizimlar foydalanuvchi ma'lumotlarini xavf

ostiga qo'yishi mumkin. Masalan, mobil ilovalardagi zaif autentifikatsiya mexanizmlari yoki ma'lumotlar bazasidagi xatoliklar, firibgarlar tomonidan noto'g'ri foydalanishga olib kelishi ehtimoli mavjud.

Buxgalteriya jarayonlarini optimallashtirish. Mobil ilovalar avtomatlashtirilgan modullar yordamida soliq hisob-kitoblari, xarajatlar tahlili va balansni tayyorlash kabi jarayonlarni tez va samarali bajaradi. Bu esa foydalanuvchi va korxona uchun ish samaradorligini oshiradi. Statistik va vizual tahlil vositalari moliyaviy ma'lumotlarni tushunarli shaklda taqdim etadi, bu esa qaror qabul qilish jarayonini yengillashtiradi.

Xavfsizlikni ta'minlash va kelajakdagi imkoniyatlar. Kelajakda mobil ilovalar yanada rivojlanib, sun'iy intellekt va avtomatlashtirilgan algoritmlar bilan integratsiyalashadi. Bu foydalanuvchi ma'lumotlarini himoya qilishni kuchaytiradi, hisobotlarni avtomatik tayyorlashni soddalashtiradi va tizim ishini optimallashtiradi. Biroq, har qanday yangi funksiyalar va texnologiyalar bilan birga yangi xavf-xatarlar ham yuzaga kelishi mumkin, shuning uchun xavfsizlik choralari doimiy ravishda yangilanib borishi zarur.

Ekspert fikrlarining tahlili. Mutaxassislar mobil ilovalar orqali buxgalteriya hisobotlarini boshqarish tizimlarini samarali deb baholaydilar, chunki ular ish samaradorligini oshiradi va xatoliklarni kamaytiradi. Shu bilan birga, ular tizimlarni muntazam monitoring qilish, foydalanuvchi ma'lumotlarini himoya qilish va xavfsizlik standartlariga rioya qilish zarurligini ta'kidlaydilar.

NATIJALAR

Mobil ilovalar orqali buxgalteriya hisobotlarini boshqarish tizimi korxonalarga moliyaviy jarayonlarni avtomatlashtirish, tezkor hisobot tayyorlash va resurslardan samarali foydalanish imkonini beradi. Tadqiqotlar natijalari quyidagilarni ko'rsatdi:

Ilovalarning samaradorligi. Tadqiqotlar shuni ko'rsatadiki, mobil ilovalar buxgalteriya hisobotlarini boshqarishda yuqori samaradorlikka ega. Hisobotlarni avtomatik shakllantirish, xarajatlar va daromadlarni real vaqt rejimida kuzatish imkoniyati tizim samaradorligini sezilarli darajada oshiradi. Natijada, korxona moliyaviy jarayonlari tezkor va aniq amalga oshiriladi.

Yangi xavf-xatarlar. Mobil ilovalar foydalanuvchi ma'lumotlarini yig'ish va saqlash orqali qulaylik yaratadi, ammo noto'g'ri sozlangan tizimlar yoki zaif autentifikatsiya mexanizmlari ma'lumotlarning xavfsizligini tahdid ostiga qo'yishi mumkin. Shu sababli, xavfsizlik choralari kuchaytirish va ma'lumotlarni shifrlash muhimdir.

Tizimlarning integratsiyasi va optimallashtirilishi. Mobil ilovalar bulutli saqlash, shifrlash va avtomatlashtirilgan modullar bilan uyg'un ishlash orqali hisobotlarni tez va ishonchli tayyorlash imkonini beradi. Shu bilan birga, foydalanuvchilar uchun vizual va statistik tahlil vositalari moliyaviy ma'lumotlarni tushunarli shaklda taqdim etadi.

Kelajakdagi rivojlanish istiqbollari. Mobil ilovalar sun'iy intellekt va avtomatlashtirilgan algoritmlar bilan integratsiyalashishi kutilmoqda. Bu tizimlarning tezkor ishlashini, xatoliklarni kamaytirishni va foydalanuvchi

ma'lumotlarini yuqori darajada himoya qilishni ta'minlaydi. Biroq, yangi imkoniyatlar yangi xavf-xatarlarni ham keltirib chiqarishi mumkin, shuning uchun tizimlar muntazam yangilanib borishi lozim.

Ekspertlarning baholari. Mutaxassislar mobil ilovalar orqali buxgalteriya hisobotlarini boshqarish tizimlarini samarali deb baholaydilar. Shu bilan birga, ular xavfsizlikni ta'minlash, foydalanuvchi ma'lumotlarini himoya qilish va tizimlarni muntazam monitoring qilish zarurligini ta'kidlaydilar.

XULOSA

Mobil ilovalar orqali buxgalteriya hisobotlarini boshqarish tizimi korxonalarga hisob-kitob jarayonlarini avtomatlashtirish, xatoliklarni kamaytirish va ish samaradorligini oshirish imkonini beradi. Tadqiqotlar shuni ko'rsatdiki, ilovalar moliyaviy jarayonlarni tezkor, ishonchli va qulay tarzda boshqarishga yordam beradi. Shu bilan birga, xavfsizlik va foydalanuvchi ma'lumotlarini himoya qilishga alohida e'tibor qaratish lozim.

Kelajakda mobil ilovalar sun'iy intellekt va avtomatlashtirilgan algoritmlar bilan integratsiyalashishi, hisobotlarni real vaqt rejimida tayyorlash va moliyaviy tahlilni optimallashtirish imkoniyatlarini yanada kengaytiradi. Shu bilan birga, tizimlarni doimiy yangilab borish va xavfsizlikni nazorat qilish zarur.

Umuman olganda, mobil ilovalar orqali buxgalteriya hisobotlarini boshqarish tizimi korxonalarga tezkorlik, qulaylik va xavfsizlikni ta'minlaydi, ammo tizimlarni ishlab chiqishda ehtiyotkorlik va muntazam monitoring asosiy talabdir.

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QISHLOQ XO'JALIK LANDSHAFTLARIDAN FOYDALANISHNING O'ZIGA XOS XUSUSIYATLARI (KASBI TUMANI MISOLIDA)

Abstract: *Kasbi tumani tabiiy geografik xususiyatlari, iqlimi, relyefi, ichk suvlari, tuproq va o'simlik qoplamining agrolandshaftlarni shakllanishidagi o'rni hamda qishloq xo'jalik maqsadlarida, tuman hududi landshaftlarining tabiiy salohiyatini baholash va antropogen ta'sir natijasida o'zgarishini o'rganish muhim amaliy ahamiyatga ega ekanligi bayon etilgan. Kasbi tumani sug'oriladigan yerlaridan foydalanishni, yer fondi turlari qishloq xo'jalikda foydalanilishi yoritilgan. Maqolada tuman qishloq xo'jaligini rivojlantirish maqsadida hududlarda shakllanadigan agrolanshaftlarda tabiiy resurslardan foydalanish samarasini oshirish, klasterlarni tashkil etish va boshqa shu kabi tadbirlari bayon etilgan.*

Kalit so'zlar: *agrolandshaft, antropogen landshaft, qishloq xo'jaligi, agroiklim resursi, klaster, yer fondi, vegetatsiya, mezo va mikro relyef, mintaqa, intensiv.*

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SPECIFIC CHARACTERISTICS OF AGRICULTURAL LANDSCAPE UTILIZATION (Case Study of Kasbi District)

Abstract: *The article describes the natural and geographical characteristics of Kasbi District, including climate, relief, inland waters, soil, and vegetation cover, as well as their role in the formation of agricultural landscapes and their use for agricultural purposes. The study emphasizes the significant practical importance of assessing the natural potential of the district's landscapes and examining changes resulting from anthropogenic impacts.*

Issues related to the use of irrigated lands in Kasbi District, the structure of land fund categories, and their application in agriculture are analyzed. In addition, the article outlines measures aimed at increasing the efficiency of natural resource

use in the emerging agricultural landscapes, developing the district's agricultural sector, establishing agro-clusters, and implementing other related initiatives.

Key words: *agrolandscape, anthropogenic landscape, agriculture, agroclimatic resource, cluster, land fund, vegetation, meso and micro relief, region, intensive.*

Kirish. Kiyingi yillarda antropogen landshaft komplekslarini o'rganishga va xaritalashtirishga bag'ishlangan juda ko'plab ilmiy asarlar vujudga keldi. Jumladan, keyingi yillarda geografiya bo'yicha olib borilayotgan ilmiy - tadqiqot ishlarida nisbatan kichik hududiy birliklar mukammal o'rganilmoqda, shu nuqtai-nazardan tuman va jamoa xo'jaliklarini geografik nuqtai-nazardan o'rganish, ularni ijtimoiy-iqtisodiy rivojlantirish rejalarini ishlab chiqish, sug'oriladigan dehqonchilik hududlarida landshaftlarning o'zgarishi kabi masalalarini o'rganish muhim amaliy ahamiyatga egadir. Shu jihatdan arid mintaqada joylashgan Kasbi tumani tabiiy landshaftlaridan foydalanish jarayonida inson faoliyatining ta'siri tobora kuchayib bormoqda va bunday ta'sir tufayli tabiiy landshaftlarning o'zgarishi va antropogen landshaftlarning vujudga kelishi sodir bo'layotganligi tuman hududiy birliklarni o'rganishni taqozo etadi.

Mamlakatimiz O'zbekistonning ma'muriy tarkibini tashkil etgan viloyatlar turli tabiiy, iqtisodiy va ijtimoiy rivojlanish imkoniyatlari va darajalariga ega bo'lganidek, har bir viloyat ma'muriy tarkibiga kiruvchi tumanlarning ham tabiiy geoklogik sharoiti, agroiqlimiy resurslari va iqtisodiy-ijtimoiy rivojlanish imkoniyatlar, bu imkoniyatlardan foydalanish xususiyatlariga ko'ra rivojlanish darajalari ham turlichadir. Qashqadaryo viloyati tumanlarining ko'pchiligi tekislik mintaqasi va tog' oldi, tog'lik mintaqalariga bo'linadi. Ushbu tafovut Qashqadaryo viloyatning iqtisodiy ixtisoslashuvi, xo'jalik tizimining hududiy tashkil topishi va ijtimoiy rivojlanishida o'z aksini topgan. Qashqadaryo viloyatining tumanlarining nafaqat tarixi, balki ularning xo'jalik tizimining shakllanishi ham tabiiy geokologik sharoitlariga ko'ra ajratiladi. Kasbi tumani 1970 yil tashkil etilgan. Tumanning maydoni 0,65 ming kv.km. Aholisi 195,8 ming kishi (2019). Qashqadaryo viloyatida tarixiy, hududiy va ijtimoiy-iqtisodiy jihatdan alohida o'rin egallagan Kasbi tumani viloyatning Qarshi cho'lining markaziy qismida joylashgan bo'lib, u shimoldan Muborak, shimoliy-sharqdan Koson, sharqdan Qarshi, janubdan Nishon, janubiy – g'arbdan Mirishkor tumanlari bilan chegaralanadi.

Metodlar va o'rganilish darajasi. Mavzuni o'rganishda muhim ilmiy yondoshuv va tamoyillardan, tizimli kompleks yondashuv tadqiqotning asosini tashkil etib, aerokosmik, kartografik, paleogeografik, geografik-taqqoslash, statistik, geoinformatsion modellashirish (GIS modellashirish) va boshqa usullardan foydalanish asosiy natijaga erishish imkonini beradi. Kasbi tumani landshaftlari xususiyatlariga ko'ra o'ziga xos bo'lib, cho'llarni rayonlashtirish tarhiga ko'ra A.G.Babayev (1977) Qizilqum rayoniga, L.N.Babushkin va N.A.Kogay (1964), M. Qoriyev (1962) tabiiy geografik jihatdan Qashqadaryo tabiiy geografik okrugiga kiritadi. Kasbi tumani hududida O.Y.Poslavskaya (1966)ning

tadqiqotlariga ko'ra eol-akkumulyativ relyef keng tarqalganligi bayon etilgan. Bundan tashqari Qashqadaryo havzasi landshaftlarini o'rganish doirasida Kasbi tumani landshaftlari ham tahlil qilingan. S.A.Nishonov (1967), Poslavskaya, M.F.Rasulov (1968), I.A.Hasanov (1976), I.X. Jonqobilov (1999-2015), S.I.Abdullayev va R.Usmonova (1997-2002), antropogen landshaftlarini S.I.Abdullayev, M.Nazarov (2020) va boshqa tadqiqotchilarning ishlarida yoritilgan.

Asosiy qism. Insonning xo'jalik faoliyati natijasida landshaftlarining qiyofasi keskin o'zgarib bormoqda. Tabiat resurslaridan xo'jalik maqsadlarida foydalanish natijasida tabiiy landshaftlarni o'rnini qayta shakllangan antropogen landshaftlar egallab, ko'lamini kengayishi kuzatilmoqda. Antropogen landshaft deb, Yer landshaft sferasining tubdan o'zgartrilgan va inson faoliyati tufayli shakllangan hamda kelib chiqish nuqtayi nazardan tabiiy geotizimlar kabi mustaqil genetik qatorga ega bo'lgan geografik kompleksga aytiladi. F.N.Milkov (1973), inson tamonidan yaratilgan va inson ta'sirida tabiiy komplekslarning komponentlaridagi sodir bo'lgan tubdan o'zgarishlarini, hatto o'simlik va hayvonot dunyosini o'zgargan landshaftlari antropogen landshaft deb ta'riflaydi. Antropogen landshaftlarning tabiiy sharoiti o'ziga xos xususiyatlarga ega bo'lsada, ular qaysi geografik zona yoki hududida joylashgan bo'lsa, shu zonaning tabiiy sharoiti bilan bog'liq holda rivojlanadi va tabiiy qonuniyatlar asosida taraqqiy etadi. Ular o'zining xo'jalikda foydalanishiga ko'ra ikki turga bo'linadi: madaniy va madaniy bolmagan landshaftlar [87].

Antropogen landshaftlar hamma geografik zonalarda, tog'li o'lkalarda ham uchraydi va ular turli xil zonal geografik sharoitlarda vujudga keladi. Arid zonalar sharoitida, jumladan O'rta Osiyoda, O'zbekistonning janubida hududining katta qismi cho'l zonasida joylashgan Qashqadaryoda voqea landshaftlari vujudga keldi.

Kasbi tumani hududida antropogen landshaft vujudga kelishi bilan bog'liq bo'lgan relyefning mezo va mikro shakllarining keng tarqalgan xili xarakterlidir. Relyefning bunday shakllariga kanallar, sug'orish tarmoqlari, zovurlar eroziya bazasining o'zgarishi natijasida vujudga kelgan jarlar va boshqalar misol bo'ladi. Tekislik relyefida inson tomonidan qadimdan barpo etilgan tepaliklarning tez-tez uchrashi ham relyefning muhim belgilaridandir. Kasbi tumanining markaziy qismi allyuvial jinslar bilan qoplangan. Shimolga tomon yer yuzasi balandliklardan iborat. Bu balandliklar yuzasi nurash, eroziya jarayonlar natijasida yassilangan bo'lib, ularda quruq o'zanlar ko'plab uchraydi. Bu jarayonlarning Maymanq tog' qirlarida ko'rishimiz mumkin. Kasbi tumani hududi geologik tuzilishi jihatidan paleozoy va mezozoy cho'kindi hamda otqindi yotqiziqlari bilan qoplangan, gersin va antropogen jarayon ta'sirida burmalangan. Kasbi tumani hududida eol-akkumulyativ relyef keng tarqalgan. O.Y.Poslavskayaning tadqiqotlariga ko'ra eroziya-akkumulyativ relyeflari vujudga kelishiga ko'ra eroziya-akkumulyativ relyef tiplari bilan chambarchas bog'liq. Bu yerda eol relyef tipida marzali va tepali qumlarning kichik relyef tiplarini ajratish mumkin. Bunday relyef tiplari Qashqadaryoning quyi oqimi sohillarida va tumanning chekka g'arbiy qismlarida tarqalgan.

Kasbi tumanining iqlimi keskin kontinental iqlim bo'lib, yozi issiq-quruq va uzoq davom etadi. Qishi esa uncha sovuq emas. Tumanning qishi iliq (yanvarning o'rtacha harorati $0^0 + 2^0$ C) bo'lib, vegetatsiy deyarli yil bo'yi davom etadi. Ba'zan shimoli-g'arbdan Arktika havo massalari kirib kelganda harorat absolyut minimal temperatura $-22^0 - 29^0$ C ga tushib ketadi. Yoz esa issiq (iyulning o'rtacha harorati $+35^0 + 37^0$ C) uzoq bo'lib, maksimal harorati $43^0 - 47^0$ C gacha ko'tariladi. O'simliklarning vegetatsiya davri 7 oy davom etishi ekinlardan yiliga 2-3 martadan hosil olish imkon beradi. Vegetatsiya davridagi haroratlar yig'indisi $4900^0 - 5300^0$ bo'ladi. Shu sababli tuman xo'jaliklarida eng issiqsevar o'simliklardan uzun tolali paxta, makkajo'xori, anor, bodom, uzum va boshqa ko'plab sabzavot hamda poliz ekinlarini yetshitirish imkonini beradi. Yozda jazirama issiq bo'lishi, havoda namlik miqdorining kamligi va yog'ingarchilikning deyarli bo'lmasligi tufayli bug'lanish miqdori tuman hududida yuqori ko'rsatkichlarga ega.

Kasbi tumani uchun ham gidrografik to'ring shakllanmaganligi xarakterlidir. Tuman hududi bo'ylab Qashqadaryo Qarshi shahridan 17 km g'arbda Maymanoq (o'ng) va Qamashi (chap) tarmoqlariga ajralgan. Qamashi tarmog'i Shakarjo'y daryosi deb ham nomlangan. Kasbi tumanida grunt suvlarni asosan yuqori bosim ostida zamonaviy texnika yordami asosida yer yuzasiga chiqariladi.

Kasbi tuman tabiatining murakkabligi relyefi, iqlim va gidrogeologik sharoitlarning hamda o'simliklarning xilma-xilligi, nihoyatda turli xil tuproqlar vujudga kelishiga sabab bo'lgan. Tuman hududida bo'z tuproqlar, qumli taqir tuproqlar, allyuvial tuproqlar, cho'l-qumli tuproqlar keng tarqalgan.

Kasbi tumani yer fondini o'rganish shu narsani ko'rsatdiki, bu yerda qishloq xo'jaligini keng ko'lamda rivojlantirishga, yangi yerlarni ochish, sug'oriladigan yerlarni to'la sug'oriladigan yerlarga aylantirish, cho'l yaylovlarining sifatini yaxshilash uchun katta imkoniyatlar bor. Kasbi tumanining hududi tabiatining xususiyatlari va landshaft sharoitlariga ko'ra, Qarshi cho'lining tipik hududlaridan biridir. Tuman hududi uchun relyefning tekisligi, iqlim sharoitlarining quruq va issiqligi, cho'l o'simliklar va tuproqlari xarakterlidir.

Tumanda yaqin paytlarga qadar sug'oriladigan yerlar maydoni uncha katta bo'lmagan. Sug'oriladigan yerlar asosan Qashqadaryo vodiysiga tutash joylarga bo'lgan, ayni paytda sug'orish uchun yaroqli yerlar maydoni anchagina kengaygan. lekin Qarshi cho'lining boshqa joylaridagi kabi sug'orish uchun suv resurslarining taqchilligi, obikor dehqonchilikni rivojlantirish imkoniyatlarini cheklab turgan. Suv tanqisligi tufayli mavjud sug'oriladigan yerlar (agroirrigatsiya landshaftlari)ning meliorativ holati dehqonchilik uchun to'siq bo'la olmagan.

Qarshi cho'lining obikor dehqonchilik uchun yaroqli bo'lgan yerlarini o'zlashtirish maqsadida, Amudaryoning suv resurslaridan foydalanish imkoniyatlari Qarshi bosh kanalining ishga tushirilishi bilan bog'liq bo'ldi. Qarshi bosh kanalining tarmog'i bo'lgan Kasbi tumanining qazilishi va foydalanishga topshirilishi Qarshi cho'lidagi bir qator tumanlar bilan bir qatorda Kasbi tumanining qishloq xo'jalik tarmoqlarini rivojlantirish va obikor dehqonchilik maydonlarini kengaytirish imkoniyatlarini yaratildi. Hozirgi paytda Kasbi tumanida haydaladigan

yerlarning maydoni 49,3 ming gektar bo'lib, bu yerlarning hammasi sug'oriladigan yerlar toifasiga mansubdir.

Kasbi tumani qishloq xo'jalik ishlab chiqarishni rivojlantirish uchun muhim omil bo'lgan juda katta yer fondiga ega. Tumanda haydalib dehqonchilik qiladigan yerlar ko'p. U umumiy yer fondining 59%ni qishloq xo'jaligida foydalaniladigan yerlar 68%ni tashkil etadi xolos.

Tumanda yer fondining taqsimlanishi

(ming ga.)

Ko'rsatkichlar	2006 yil	2017 yil	2018 yil	2025 yil
Mavjud umumiy yer maydoni	73,5	73,5	73,5	73,5
Jami q/x korxona va tashkilotlari egalik qilgan				
hamda vaqtincha foydalaniladigan yerlar	70,9	51,1	51,1	51,1
shundan:				
haydaladigan yerlar	43,8	44,5	44,5	44,5
shu jumladan:				
Sug'oriladigan yerlar	43,8	44,5	44,5	44,5
Ko'p yillik daraxtzorlar	2,2	1,8	1,8	1,8
shundan:				
- bog'lar	1,1	1,0	1,0	1,0
- uzumzorlar	0,2	0,2	0,2	0,2
- tutzorlar	0,9	0,6	0,6	0,6
- ko'chatzorlar	0,027	-	-	-
yaylovlar	4,5	4,8	4,7	4,8
bundan tashqari:				
aholi tomorqa yerlari	4,9	4,9	4,9	4,9
Ekinlar ekilgan yer maydonlari				
Jami qishloq xo'jaligi ekinlari				
ekib foydalanadigan yerlar	43,8	44,5	44,5	44,5
shundan:				

Sugʻoriladigan yerlar	43,8	44,5	44,5	44,5
shu jumladan:				
a) paxta maydoni	25,3	21,6	20,8	20,4
b) gʻalla maydoni	15,8	16,7	14,4	14,3
shundan:				
Sugʻoriladigan yerlarga don				
ekiladigan maydon	15,8	16,7	14,4	14,3
*Yer resurslari boshkarmasi maʼlumoti buyicha				

Qashqadaryo viloyati statistika boshqarmasi maʼlumotlariga koʻra (2021 y.) [5], Kasbi tumanida haydalib sugʻoriladigan yerlar 2006 yilda 43,8 ming ga, 2019 yilda 44,5 ming ga, koʻp yillik daraxtzorlar 2006 yilda 2,2 ming ga, 2019 yilda 1,8 ming ga, shundan bogʻlar 2006 yilda 1,1 ming ga, 2019 yilda 1,0 ming ga, uzumzorlar 2006 yilda 0,2 ming ga, 2019 yilda 0,2 ming ga, tutzorlar 2006 yilda 0,9 ming ga, 2019 yilda 0,6 ming ga, yaylovlar 2006 yilda 4,5 ming ga, 2019 yilda 4,8 ming ga, aholi tomorqa yerlari 2006 yilda 4,9 ming ga, 2019 yilda 4,9 ming ga ni tashkil etadi. 2019 yil maʼlumoti boʻyicha Kasbi tumanida jami yer maydoni 73,5 ming gektar hisoblanadi. Shuning 68%i qishloq xoʻjaligida foydalaniladigan yerlardir. Shundan foydalaniladigan yerlar 44,5%ni bogʻ va tokzorlar 1,5%ni, yaylovlar 6,1%ni, aholi tomorqa uchastkalari esa 6,5%ni tashkil etadi.

Kasbi tumani yer fondini oʻrganish shu narsani koʻrsatdiki, bu yerda qishloq xoʻjaligini keng koʻlamda rivojlantirishga, yangi yerlarni ochish, sugʻoriladigan yerlarni kengaytirish, choʻl yaylovlarining sifatini yaxshilash uchun katta imkoniyatlar bor. Yerning eng koʻp qismi haydaladigan yerlar va yaylovlar boʻlib, umumiy yer fondining 65,1%ni tashkil etadi. Biroq, bu yerlarning katta qismining unumdorligi past boʻlib, taqir tuproqli yerlarda chirindi miqdori kam. Tumanda qishloq xoʻjalik ishlab chiqarishi doirasini kengaytirish masalasini yangi yerlar ochish va ularni sugʻorish, qator irrigatsiya qurilishlarini amalga oshirishni taqozo qiladi. Haydalib dehqonchilik qilinadigan yerlar doimiy sugʻoriladigan yerlarning salkam 52,8% ga paxta yetishtiriladi, qolgan qismi bogʻ, tokzorlar, sabzavot, poliz ekinlari va hashaki ekinlar yetishtiriladi hamda mevali daraxtlar tokzorlar egallaydi.

Qashqadaryo viloyati qishloq xoʻjaligi ishlab chiqarishida sugʻoriladigan yerlarning samarasi juda yuqori boʻlib, mamlakat paxta va gʻalla yalpi hosilida yetakchi oʻrinni egallaydi. Tarixiy geografik nuqtai nazardan respublikada qishloq xoʻjaligi intensiv rivojlanish davrida yangi yerlarni oʻzlashtirish jarayoni agrar soha ishlab chiqarishi va uning tashkiliy tarkibida jiddiy oʻzgarishlar sodir boʻldi. Jumladan, fermer va dehqon xoʻjaliklari shakllandi va ularning rivojlanishiga ustuvor ahamiyat berildi. Xususan, fermer xoʻjaliklari koʻproq yangi yerlar oʻzlashtirilgan hududlarda koʻproq tashkil etildi va ular asosan strategik mahsulotlar

– paxta va g'alla, chorvachilikda go'sht va jun yetishtirishga ixtisoslashtirildi [4;54-56 b.]. Keyingi yillarda qishloq xo'jaligi ishlab chiqarishida klasterlar rivojlanishi sanoat va qishloq xo'jalikni bir-biriga yaqinlashtirdi. Kasbi tumanida g'allachilik bo'yicha "Indorama" MCHJ (maydoni 5065 ga), "Asqar Trans Gold Klaster" (maydoni 9135 ga) kabi klasterlar tashkil etilgan Kasbi tumanida paxta – to'qimachilik bo'yicha "Indorama" MCHJ (maydoni 18350 ga) klaster tashkil etilgan. Ushbu klasterlarning tashkil etilishi ayniqsa pandemiya davrida aholini qishloq xo'jaligi oziq-ovqat mahsulotlari bilan ta'minlashda mo'l hosil yetishtirish davr talabi bo'lgan bir davrda nafaqat viloyat balki mamlakatimiz iqsodini rivojida ham muhim o'rin tutadi.

Sug'oriladigan yerlar tuman xo'jalik faoliyatida katta ahamiyatiga ega bo'lib, bunday yerlardan har qanday ob-havo sharoitida ham paxta va boshqa qimmatli ekinlardan rejalashtirilgan hosilni olish mumkin. O'z navbatida sug'oriladigan yer resurslaridan oqilona foydalanish dehqonchilik sistemasiga bog'liq, almashlab ekish, yerga ishlov berish, uni meyorlarida o'g'itlar bilan ta'minlash, sug'orish, urug'chilik, o'simlikni kasallik va zarar-kunandalardan saqlash singari ishlar dehqonchilik ishlarida olib borilmoqda. Ayni paytda dehqonchilik sistemasi qishloq xo'jalik ishlab chiqarishning ixtisoslashishiga bog'liq bo'lib, turli ekinlar uchun hatto turli qishloq xo'jalik rayonlarda o'ziga xos xususiyatga egadir.

Tumanda haydalib dehqonchilik qilinadigan yerlarda g'allachilik, bog'dorchilik, uzumchilik va qisman polizchilik rivojlangan. Kasbi tumani hududining katta qismi obikor dehqonchilik uchun o'zlashtirilishi mazkur hududda qishloq xo'jaligi tarmoqlarini, avvalo ekin maydonlarining tuzilishi (strukturasini) tubdan qaytadan ko'rib chiqish va yaxshilash, ilmiy asoslangan almashlab ekishni paxtachilikda va boshqa ixtisoslashtirilgan xo'jaliklarda joriy qilish bilan birga chorvachilikni rivojlantirish uchun mustahkam yem-hashak bazasini yaratishni, landshaftlarning inson xo'jalik faoliyatining xilma-xil turlari ta'siri ostida o'zgarishining xususiyatlarini chuqur o'rganishni, landshaftlar antropogen dinamikasini bashoratlashtirishni zero, bugungi kunda inson faoliyati bilan bog'liq bir qator geoeologik muammolar mavjud bo'lib, ularning to'g'ri va oqilona yechimi antropogen landshaftlarning mavjudlik va rivojlanishini o'rganish bilan chambarchas bog'liq. Bulardan ayrimlari sug'oriladigan yerlarda zax bosishi, qayta sho'rlanish, sug'orish eroziyasi, tuproqlarning umumiy qashshoqlanishi, yer usti va yer osti suvlarida mineral tuzlarning ko'payishi, suvda nitratlar miqdorining ortishi kabi landshaftlarning biologik mahsuldorligiga katta zarar yetkazadigan noxush jarayonlarning tobora o'zgarganligi va ularni oldini olish qulay sharoit yaratish muhim muammolardan biri hisoblanadi. Yerlarning qayta sho'rlanishi, suv va shamol eroziyasi tufayli shikastlanishi bu omillar bilan birgalikda sug'oriladigan yerlarning degradatsiyasiga va atrof-muhitning ifloslanishiga, ya'ni geoeologik vaziyatning salbiy tamonga o'zgarishiga olib kelgan holda sug'oriladigan yerlarda yetishtiriladigan qishloq xo'jalik ekinlari hosildorligining kamayishiga, yetishtirish harajatlarning oshishiga sabab bo'lmoqda [1; 30-35 b., 2; 3-106 b.].

Qashqadaryo viloyati sug'orma dehqonchilik qilinadigan hududlaridan olingan suv namunalarida sulfatlar Qarshi vohasida REM dan 2 barobar yuqori 898

мг/л (meyor 450-500 mg/l). Kasbi tumanining Toshquduq va Fazli qishloqlarida meyordan biroz past. Agarda suvda natriy kam bo'lsa, xlarning miqdori katta bo'ladi. Bu Kasbi tumanidagi Komilon va Toshquduq qishloqlaridagi quduqlarda meyordan ancha yuqori, xlarning miqdori REM dan 5-7 barobar ko'pligi aniqlandi. Kasbi tumani hududidan olingan namunalardagi suvning qattiqligi 2,97 mg/l dan 28,72 mg/l gacha o'zgaradi, eng yuqori ko'rsatkich Kasbi tumanining Kamilon qishlog'iga (28,72 mg/l), eng past ko'rsatkich Pandiron qishlog'iga (2,97 mg/l) to'g'ri keladi [3; 98-100 b.].

Kasbi tumanida qishloq xo'jalik ishlab chiqarishi agrosanoat majmuida yangidan tarkib topayotgan hududiy tizimlarni qayta ko'rib chiqish va ilmiy tahlil qilishni taqozo qilmoqda. Shunday ekan, qishloq xo'jaligida ixtisoslashgan Kasbi tuman uchun qishloq xo'jalik mahsulotlarini qayta ishlaydigan kichik korxonalar bunyod etib, yangi ish o'rinlarini yaratish zarur.

Kasbi tumanning mehnat resurslari bilan yetarli ta'minlanganligini hamda ekologik sharoiti va agroiqlimiy resurslarining umumiy sharoiti qulayligini hisobga olgan holda tumanni iqtisodiy va ijtimoiy rivojlantirishda quyidagilarni tavsiya etish mumkin: - dehqonchilikda ilg'or agrotexnika qoidalaridan foydalanilgan holda mehnat unumdorligini oshirish; - dehqonchilikning yangi tizimini joriy qilish yerni almashlab ekishni to'la joriy etish, chorva mollari uchun mustaqil yem-xashak bazasini yaratish; - tuman qishloq xo'jaligida aholi talabidan kelib chiqib mahsulotlar turini ko'paytirish; - tumanda qishloq xo'jalik mahsulotlarini qayta ishlash sanoatiga ixtisoslashtirish; - tumanda agroturizm sohasini rivojlantirish; - tumanning tabiiy resurslardan oqilona foydalanishni tashkil qilish maqsadga muvofiqdir.

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INGLIZ TILIDAGI FIZIK TERMINOLOGIYANING O'ZIGA XOSLIGI VA UNING O'QITILISHIDAGI AHAMIYATI

Annotatsiya. Ushbu maqolada ingliz tilidagi fizik terminologiyaning o'ziga xosligi va uning o'qitilishidagi ahamiyati tahlil qilinadi. Fizika fanida ishlatiladigan terminlar, o'ziga xos ma'nolar va kontekstlarga ega bo'lib, o'quvchilarga nazariy bilimlarni amaliyotda qo'llashda muhim rol o'ynaydi. Ingliz tilidagi fizik terminologiya, o'quvchilarning ilmiy fikrlash qobiliyatini rivojlantirishga, shuningdek, xalqaro ilmiy hamjamiyatda muvaffaqiyatli ishtirok etishlariga yordam beradi. Maqola, fizik terminlarning o'qitilishida o'qituvchilarning roli, terminologiyaning o'ziga xosligi va uning ta'lim jarayonidagi ahamiyatini ko'rsatadi.

Kalit so'zlar: Fizik terminologiya, Interaktiv usullar, fanlararo integratsiya, o'qitish prinsiplari, o'qitishning qonuniyatlari. Amaliyot va nazariya

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THE PECULIARITIES OF PHYSICS TERMINOLOGY IN ENGLISH AND ITS IMPORTANCE IN TEACHING

Abstract: This article analyzes the peculiarities of physics terminology in English and its significance in teaching. The terms used in physics have specific meanings and contexts, playing a crucial role in helping students apply theoretical knowledge in practice. English physics terminology contributes to the development of students' scientific thinking skills and facilitates their successful participation in the international scientific community. The article highlights the role of teachers in teaching physics terms, the unique characteristics of terminology, and its importance in the educational process.

Keywords: Physics terminology, Interactive methods, Interdisciplinary integration, Teaching principles, Laws of teaching, Theory and practice

Kirish

Fizika fani, tabiiy fanlar qatorida o'zining muhim o'rnini egallaydi va uning o'qitilishi jarayonida terminologiyaning ahamiyati alohida e'tiborga molikdir. Ingliz tilidagi fizik terminologiya, o'quvchilarga nafaqat nazariy bilimlarni o'zlashtirishda, balki ushbu bilimlarni amaliyotda qo'llashda ham muhim rol o'ynaydi. Har bir

termin o'ziga xos ma'no va kontekstga ega bo'lib, ularni to'g'ri tushunish va qo'llash, o'quvchilarning ilmiy fikrlash qobiliyatini rivojlantirishga yordam beradi.

O'zbekiston Respublikasida keyingi yillarda amalga oshirilayotgan ta'lim sohasidagi o'zgarishlar yurtimiz taqdiri uchun hal qiluvchi ahamiyatga egadir. Bu masalaning ustuvor ahamiyati shundaki, oliy va o'rta maxsus ta'lim tizimi saviyasini jahon andozalari darajasiga yetkazish, xalq xo'jaligida mutaxassislarga bo'lgan talab ortib bormoqda. So'ngi yillarda ta'limda uzviylik tamoyilining qo'llanilishiga, uni yanada urg'u berilmoqda. Buning boisi uzluksiz ta'lim tizimidagi turli bo'g'inlarini tarkib topganligi va ularda fizika majburiy umumta'lim o'quv fani sifatida mustahkam o'rin egallaganligi, uning mazmunini invariant hamda variativ ko'rinishda tabaqalanganligi xulosa qilinmoqda. Ushbu yondashuv o'qitish uslubiyo'tini zamon talabi doirasida ortirilmoqda.

Yoshlarimiz iste'dod, bilim va intellektual salohiyat bobida hech kimdan kam bo'lmaslikka intilmoqdalar. Bu albatta, yurtimizda navqiron avlod vakillarini har tomonlama qo'llab-quvvatlash, ularning iqtidorini kashf etish va yuzaga chiqarishga yuksak e'tibor qaratilayotganligi samarasidir. Zero, mamlakatimizda "Kadrlar tayyorlash milliy dasturi"ga muvofiq, umumta'lim maktablaridan tortib, o'rta maxsus kasb-hunar o'quv maskanlarigacha – barchasida ta'limning yangicha, o'ziga xos uslublari joriy qilindi. Ayni jihat esa intiluvchan yoshlarning yutuq hamda muvaffaqiyatlarga erishishini ta'minlash, jamiyatning turli jabhalarida xizmat qiladigan yetuk malakali mutaxassislar tayyorlashda beqiyos ahamiyat kasb etayotir.

Kutilgan natijaga erishish uchun esa, akademik litseylarning o'quv jarayonida Chunki, fizika kursi dastlab o'qitila boshlanganda o'quvchilar psixologik xususiyatlaridan kelib chiqqan holda ular o'zlashtirishishga mos qilib umumiy tushunchalar beriladi. Bu asosan, o'quvchilarga fizika kursi bo'yicha bilimlar tizimi bo'lsa, birinchidan, nazariy tasavvur qilish va bilishlari shart bo'lgan bilimlar tizimi sifatida, ikkinchidan, berilayotgan axborot hajmini ularga mos holda birmuncha chuqurlashtirish va kengaytirish vositasida ko'nikma va malakalarni amalda qo'llay olishni shakllantirishdir. Shunday ekan, o'quvchilarga berilayotgan bilimlar ko'lamini mustahkamlash, chuqurlashtirish va ta'lim yo'nalishiga yo'naltirish eng dolzarbdir.

Zamonaviy ta'limda ingliz tilining ahamiyati ortib bormoqda, chunki ko'plab ilmiy manbalar va tadqiqotlar aynan ingliz tilida taqdim etiladi. Shuning uchun, ingliz tilidagi fizik terminologiyani o'rganish, o'quvchilarga xalqaro ilmiy hamjamiyatda muvaffaqiyatli ishtirok etish imkoniyatini yaratadi. Ushbu maqolada, ingliz tilidagi fizik terminologiyaning o'ziga xosligi, uning o'qitilishidagi ahamiyati va o'qituvchilarning bu jarayondagi roli tahlil qilinadi. Maqsad, o'quvchilarning fizikani o'rganish jarayonida terminologiyaning ahamiyatini anglashlariga yordam berishdir. Fizika fani, tabiiy fanlar qatorida o'zining muhim o'rnini egallaydi va uning o'qitilishi jarayonida fanlararo bog'lanish va kasbga yo'naltirish muhim ahamiyatga ega. O'quvchilarga fizika fanini o'rgatishda, boshqa fanlar bilan integratsiyalashgan holda ta'lim berish, ularning bilimlarini kengaytirish va amaliy ko'nikmalarini rivojlantirishga yordam beradi.

Fanlararo integratsiya

Fizika o'qitishda fanlararo integratsiya, o'quvchilarga turli fanlar o'rtasidagi bog'lanishlarni tushunishga yordam beradi. Masalan, fizika va kimyo o'rtasidagi aloqalar, kimyoviy jarayonlarni tushunishda muhimdir. Shuningdek, fizika va biologiya o'rtasidagi bog'lanishlar, biologik jarayonlarni fizik qonunlar orqali tushunishga imkon beradi. Bu yondashuv, o'quvchilarning ilmiy tafakkurini rivojlantirishga va ularni ko'p qirrali mutaxassislar sifatida tayyorlashga yordam beradi.

Kasbga yo'naltirish

Fizika fanini o'qitishda kasbga yo'naltirish, o'quvchilarga kelajakdagi kasblarida zarur bo'lgan bilim va ko'nikmalarni taqdim etadi. O'quvchilar, fizika fanidan olingan bilimlarni muhandislik, informatika, tibbiyot va boshqa sohalarda qo'llash imkoniyatiga ega bo'ladilar. Bu jarayon, o'quvchilarning kasbiy qiziqishlarini aniqlashga va ularni kelajakda muvaffaqiyatli mutaxassislar bo'lishlariga tayyorlashga yordam beradi.

Innovatsion yondashuvlar

Zamonaviy ta'limda innovatsion yondashuvlar, fizika fanini o'qitishda fanlararo bog'lanish va kasbga yo'naltirishni yanada samarali amalga oshirishga yordam beradi. Interaktiv metodlar, laboratoriya tajribalari va loyiha asosidagi o'qitish usullari orqali o'quvchilar, nazariy bilimlarni amaliyotda qo'llash imkoniyatiga ega bo'ladilar. Bu, ularning qiziqishini oshiradi va o'qitish jarayonini yanada qiziqarli qiladi.

Asosiy qism.

Ingliz tilidagi fizik terminologiyaning o'ziga xosligi

Ingliz tilidagi fizik terminologiya, o'zining aniq va qat'iy ma'nolari bilan ajralib turadi. Har bir termin, fizik qonunlar, jarayonlar va tushunchalarni ifodalashda muhim ahamiyatga ega. Masalan, "force" (kuch), "energy" (energiya), "mass" (massa) kabi asosiy terminlar, fizikaning fundamental tushunchalarini anglatadi. Ushbu terminlarning to'g'ri tushunilishi, o'quvchilarga fizik qonunlarni va ularning amaliy qo'llanilishini yaxshiroq anglash imkonini beradi.

Bundan tashqari, ingliz tilidagi fizik terminologiya, ko'plab sohalarda, masalan, muhandislik, astronomiya va biologiya kabi fanlarda ham qo'llaniladi. Bu esa o'quvchilarga turli fanlar o'rtasidagi bog'lanishlarni tushunishga yordam beradi va ularning ilmiy tafakkurini kengaytiradi.

Fizik terminologiyaning o'qitilishidagi ahamiyati

Fizik terminologiyaning o'qitilishi, o'quvchilarning nazariy bilimlarini amaliyotda qo'llashda muhim rol o'ynaydi. O'qituvchilar, terminlarni o'rgatishda kontekstual yondashuvni qo'llashlari zarur. Masalan, fizik tajribalar va amaliy mashg'ulotlar orqali terminlarni o'rgatish, o'quvchilarning tushunishini yanada chuqurlashtiradi. O'quvchilar, terminlarni amaliyotda qo'llash orqali, ularning ma'nolarini yaxshiroq anglaydilar va fizik qonunlarni hayotiy misollar bilan bog'lash imkoniyatiga ega bo'ladilar.

Shuningdek, ingliz tilidagi fizik terminologiyani o'rganish, o'quvchilarga xalqaro ilmiy hamjamiyatda muvaffaqiyatli ishtirok etish imkoniyatini yaratadi.

O'quvchilar, ilmiy maqolalar, tadqiqotlar va konferensiyalar orqali ingliz tilida muloqot qilish qobiliyatini rivojlantiradilar. Bu esa ularning kelajakdagi kasbiy faoliyatlarida muhim ahamiyatga ega.

O'qituvchilarning roliga e'tibor

Fizik terminologiyani o'qitishda o'qituvchilarning roli juda muhimdir. O'qituvchilar, o'quvchilarga terminlarni o'rgatishda innovatsion metodlardan foydalanishlari kerak. Interaktiv darslar, laboratoriya ishlar va guruhli muhokamalar orqali o'quvchilarning faol ishtirokini ta'minlash, terminlarni o'zlashtirish jarayonini yanada samarali qiladi. O'qituvchilar, shuningdek, o'quvchilarga terminlarni o'zaro bog'lash va ularni turli kontekstlarda qo'llashni o'rgatish orqali, ularning ilmiy fikrlash qobiliyatini rivojlantirishga yordam berishlari zarur. Ingliz tili terminologiyasida soz'larni xotiraga saqlashda eslab qolish faoliyati bilan bog'liqdir.

1-jadval

Esda saqlashni faoliyat bilan bog'lanishi.

O'qitish jarayonidagi faoliyat turlari	Esda saqlab qolish, foiz hisobida
O'qisa	10
Eshitsa	20
Ko'rsa	30
Ko'rsa va eshitsa	50
Aytib bersa	80
Aytib bersa va amalda ko'rsatib bersa	90

Shu ko'rsatkichlardan kelib chiqib, misol tariqasida O'zbekiston Respublikasi Vazirlar Mahkamasining 2013-yil 8-maydagi "Uzluksiz ta'lim tizimining chet tillar bo'yicha davlat ta'lim standartlarini tasdiqlash to'g'risida"gi 124-son qaroriga binoan, akademik litseyning xorijiy fanlar ta'lim yo'nalishlarida tahsil olayotgan o'quvchilarga fizika fani mavzusiga oid ingliz tilida lavha qo'yilib, ularning eshitish va shu asosida fizika mavzularini tushunib aytib berish qobiliyatini oshiradi. Bu turdagi ko'rgazmalilik usuli o'qituvchining ham chet tillarini o'rganishga undaydi. Hozirgi vaqtda ta'lim sohasining rivojlanayotgan davrida, kundan-kunga inovatsion texnologiya taraqqiy etayotgan zamonda o'qitishning pedagogik-ilmiy tadqiqot ishlari olib borilmoqda. Undan tashqari ta'lim yo'nalishlardagi o'quvchi va talablarning fandagi fikrlash qobiliyatining o'sishida turli usullar izlanilmoqda. Unda o'quvchi yoshlarni o'qitishda ham teran fikrlashga, ham ma'nau dunyoqarashini o'stirish asosiy mazmun yotadi.

Ushbu maqolada ingliz tilidagi fizik terminologiyaning o'ziga xosligi va uning o'qitilishidagi ahamiyati tahlil qilindi. Fizika fanida terminlarning aniq va qat'iy ma'nolari, o'quvchilarning nazariy bilimlarini amaliyotda qo'llashda muhim rol o'ynaydi. Ingliz tilidagi fizik terminologiyani o'rganish, o'quvchilarga nafaqat ilmiy fikrlash qobiliyatini rivojlantirish, balki xalqaro ilmiy hamjamiyatda muvaffaqiyatli ishtirok etish imkoniyatini ham beradi.

O'qituvchilarning roli ushbu jarayonda alohida ahamiyatga ega. Innovatsion o'qitish metodlari, masalan, interaktiv darslar va amaliy tajribalar orqali terminlarni o'rgatish, o'quvchilarning faol ishtirokini ta'minlaydi va ularning bilimlarini mustahkamlashga yordam beradi. O'quvchilar, terminlarni turli kontekstlarda qo'llashni o'rganish orqali, fizik qonunlarni yanada chuqurroq tushunadilar.

Natijada, ingliz tilidagi fizik terminologiyaning o'qitilishi, o'quvchilarning ilmiy tafakkurini rivojlantirish va ularni kelajakdagi kasbiy faoliyatlariga tayyorlashda muhim ahamiyatga ega. Ushbu jarayon, o'quvchilarning nafaqat fizika fanidagi, balki boshqa fanlardagi muvaffaqiyatlarini ham ta'minlaydi. Shunday qilib, ingliz tilidagi fizik terminologiyaning o'ziga xosligi va uning o'qitilishi, ta'lim jarayonining ajralmas qismi sifatida qabul qilinishi lozim.

Xulosa

Ingliz tilidagi fizik terminologiyaning o'ziga xosligi va uning o'qitilishidagi ahamiyati, o'quvchilarning ilmiy fikrlash qobiliyatini rivojlantirishda muhim rol o'ynaydi. O'qituvchilar, terminlarni o'rgatishda innovatsion yondashuvlarni qo'llash orqali, o'quvchilarning bilimlarini kengaytirish va ularni xalqaro ilmiy hamjamiyatda muvaffaqiyatli ishtirok etishga tayyorlashlari zarur. Ushbu jarayon, o'quvchilarning kelajakdagi kasbiy faoliyatlarida muhim ahamiyatga ega bo'ladi.

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FIZIKA TA'LIMIDA FANLARARO YONDASHUV VA KASBGA YO'NALTIRISH

Annotatsiya. Ushbu maqolada fizika o'qitishda fanlararo integratsiya va kasbga yo'naltirishning ahamiyati tahlil qilinadi. Fizika fani, boshqa tabiiy va gumanitar fanlar bilan bog'lanish orqali o'quvchilarga keng bilimlar berish va ularning ilmiy tafakkurini rivojlantirishga yordam beradi. Fanlararo integratsiya, o'quvchilarga fizika qonunlarini turli kontekstlarda tushunishga imkon yaratadi, bu esa ularning kasbiy qiziqishlarini aniqlash va amaliy ko'nikmalarini rivojlantirishga xizmat qiladi. Innovatsion o'qitish metodlari, masalan, interaktiv tajribalar va zamonaviy texnologiyalar, o'quvchilarning faol ishtirokini ta'minlaydi va ularni kelajakdagi muvaffaqiyatlari uchun tayyorlaydi. Maqola, fizika fanining o'qitilishi jarayonida fanlararo bog'lanish va kasbga yo'naltirishning muhimligini ta'kidlaydi.

Kalit so'zlar: *Interaktiv usullar, fanlararo integratsiya, o'qitish prinsiplari, o'qitishning qonuniyatlari.*

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INTERDISCIPLINARY APPROACH AND CAREER ORIENTATION IN PHYSICS EDUCATION

Abstract: *This article analyzes the significance of interdisciplinary integration and career orientation in teaching physics. The study of physics, when connected with other natural and humanitarian sciences, helps provide students with broad knowledge and fosters the development of their scientific thinking. Interdisciplinary integration enables students to understand physical laws in various contexts, which in turn helps them identify their professional interests and develop practical skills. Innovative teaching methods, such as interactive experiments and modern technologies, ensure active student engagement and prepare them for future success. The article emphasizes the importance of interdisciplinary connections and career orientation in the process of teaching physics.*

Keywords: *Interactive methods, Interdisciplinary integration, Teaching principles, Laws of teaching*

Kirish

Fizika fani, tabiiy fanlar qatorida o'zining muhim o'rnini egallaydi va uning o'qitilishi jarayonida fanlararo bog'lanish va kasbga yo'naltirish muhim ahamiyatga ega. O'quvchilarga fizika fanini o'rgatishda, boshqa fanlar bilan integratsiyalashgan holda ta'lim berish, ularning bilimlarini kengaytirish va amaliy ko'nikmalarini rivojlantirishga yordam beradi.

Fanlararo integratsiya

Fizika o'qitishda fanlararo integratsiya, o'quvchilarga turli fanlar o'rtasidagi bog'lanishlarni tushunishga yordam beradi. Masalan, fizika va kimyo o'rtasidagi aloqalar, kimyoviy jarayonlarni tushunishda muhimdir. Shuningdek, fizika va biologiya o'rtasidagi bog'lanishlar, biologik jarayonlarni fizik qonunlar orqali tushunishga imkon beradi. Bu yondashuv, o'quvchilarning ilmiy tafakkurini rivojlantirishga va ularni ko'p qirrali mutaxassislar sifatida tayyorlashga yordam beradi.

Kasbga yo'naltirish

Fizika fanini o'qitishda kasbga yo'naltirish, o'quvchilarga kelajakdagi kasblarida zarur bo'lgan bilim va ko'nikmalarni taqdim etadi. O'quvchilar, fizika fanidan olingan bilimlarni muhandislik, informatika, tibbiyot va boshqa sohalarda qo'llash imkoniyatiga ega bo'ladilar. Bu jarayon, o'quvchilarning kasbiy qiziqishlarini aniqlashga va ularni kelajakda muvaffaqiyatli mutaxassislar bo'lishlariga tayyorlashga yordam beradi.

Innovatsion yondashuvlar

Zamonaviy ta'limda innovatsion yondashuvlar, fizika fanini o'qitishda fanlararo bog'lanish va kasbga yo'naltirishni yanada samarali amalga oshirishga yordam beradi. Interaktiv metodlar, laboratoriya tajribalari va loyiha asosidagi o'qitish usullari orqali o'quvchilar, nazariy bilimlarni amaliyotda qo'llash imkoniyatiga ega bo'ladilar. Bu, ularning qiziqishini oshiradi va o'qitish jarayonini yanada qiziqarli qiladi.

Asosiy qism.

Fizika fani, tabiiy fanlar qatorida o'zining muhim o'rnini egallaydi va uning o'qitilishi jarayonida fanlararo bog'lanish va kasbga yo'naltirish muhim ahamiyatga ega. O'quvchilarga fizika fanini o'rgatishda, boshqa fanlar bilan integratsiyalashgan holda ta'lim berish, ularning bilimlarini kengaytirish va amaliy ko'nikmalarini rivojlantirishga yordam beradi.

Fanlararo integratsiya

Tabiiy fanlar o'rtasidagi bog'lanish

Fizika, kimyo, biologiya va boshqa tabiiy fanlar bilan o'zaro bog'liqdir. Masalan:

- Fizika va kimyo: Kimyoviy reaksiyalarni tushunishda fizik qonunlar, masalan, energiya saqlanishi va termodinamik qonunlar muhim rol o'ynaydi. O'quvchilar, kimyoviy jarayonlarni fizik nuqtai nazardan tahlil qilish orqali chuqurroq tushunish imkoniyatiga ega bo'ladilar.

- Fizika va biologiya: Biologik jarayonlar, masalan, fotosintez va nafas olish jarayonlari, fizik qonunlar bilan bog'liq. O'quvchilar, biologik jarayonlarni fizik

qonunlar orqali tushunishlari, ularning hayotiy ahamiyatini anglashlariga yordam beradi.

Gumanitar fanlar bilan integratsiya

Fizika fanini o'qitishda gumanitar fanlar bilan bog'lanish, o'quvchilarga ijtimoiy masalalarni tushunishga yordam beradi. Masalan:

- *Fizika va tarix*: Fizik qonunlar tarixiy rivojlanish jarayonida qanday o'zgarishlarga olib kelganini o'rganish, o'quvchilarga tarixiy kontekstda fizika fanining ahamiyatini anglash imkonini beradi.

- *Fizika va san'at*: Fizika va san'at o'rtasidagi bog'lanish, masalan, yorug'lik va ranglar nazariyasi orqali san'at asarlarini yaratishda qanday qo'llanilishini tushunishga yordam beradi.

Kasbga yo'naltirish

Kasbiy qiziqishlarni aniqlash

Fizika fanini o'qitish jarayonida o'quvchilarning kasbiy qiziqishlarini aniqlash muhimdir. O'quvchilar, fizika fanidan olingan bilimlarni turli sohalarda, jumladan:

- Muhandislik: Mexanik, elektr va elektronika muhandisligi.

- Informatika: Kompyuter fanlari va dasturlash.

- Tibbiyot: Tibbiy fizik va radiologiya.

Amaliy ko'nikmalarni rivojlantirish

Fizika fanini o'qitishda amaliy ko'nikmalarni rivojlantirish, o'quvchilarga kelajakdagi kasblarida zarur bo'lgan ko'nikmalarni taqdim etadi. Laboratoriya ishlarida ishtirok etish, tajribalar o'tkazish va muammolarni hal qilish orqali o'quvchilar amaliy ko'nikmalarni o'zlashtiradilar.

Innovatsion yondashuvlar

Interaktiv o'qitish

Zamonaviy ta'limda interaktiv metodlardan foydalanish, o'quvchilarning faol ishtirokini ta'minlaydi. Masalan:

- Tajribalar: O'quvchilar laboratoriya ishlarida ishtirok etish orqali nazariy bilimlarni amaliyotda qo'llash imkoniyatiga ega bo'ladilar.

- Guruhli Muhoqalar: O'quvchilar birgalikda muammolarni hal qilish va fikr almashish orqali o'z bilimlarini kengaytiradilar.

Zamonaviy Texnologiyalar

Zamonaviy texnologiyalar, masalan, simulyatsiyalar va onlayn resurslar, fizika fanini o'qitishda yangi imkoniyatlar yaratadi. O'quvchilar, interaktiv dasturlar orqali fizika qonunlarini o'rganishlari mumkin.

Hozirgi kunda fizika fanini o'qitish tajribasida ma'lum bir tizim ishlab chiqilgan. Bu tizimga quyidagilar kiradi:

1. O'qituvchining demonstratsion tajribasi;

2. Talaba-o'quvchilarning mustaqil tajribasi (frontal laboratoriya ishlari, laboratoriya praktikumi, darsdan tashqari tajriba va tadqiqot ishlari);

O'qitish tajribasining har bir komponentasi murakkab tuzilmaga ega. Ta'lim sistemasining elementlari bir-biriga bog'liq va bir-birini to'ldirib boradi, albatta.

Fizika fanini o'qitish jarayonida nazariy fizika va eksperimental fizika bir-biri bilan uzviy bog'liq bo'lishi kerak. Ushbu maqolaning maqsadi – fizika fanini o'qitishda ma'lum bir misollarda talaba-o'quvchilarda ilmiy tadqiqot faoliyatini rivojlantirish va boshqarishni ko'rsatishdan iborat. Masalan, o'qitish materialining mazmuniga shunday topshiriq va masalalarni kiritish lozimki, ular talaba-o'quvchilarda ilmiy tadqiqot faoliyatini (tajribani qo'yish, hodisani tushuntirish va oldindan ko'ra olish, gipotezani ang'lay olish va tekshirish, ilmiy tekshirish va konstruktorlik ishlarini bajarish) rivojlantirsin.

Kutilgan natijaga erishish uchun esa, kasb-hunar kollejlari o'quv jarayonidahar bir darsning bevosita uzviy bog'lanishini ta'minlash muhim ahamiyat kasb etadi. Chunki, fizika kursi dastlab o'qitila boshlanganda o'quvchilar psixologik xususiyatlaridan kelib chiqqan holda ular o'zlashtirishishga mos qilib umumiy tushunchalar beriladi. Bu asosan, o'quvchilarga fizika kursi bo'yicha bilimlar tizimi bo'lsa, birinchidan, nazariy tasavvur qilish va bilishlari shart bo'lgan bilimlar tizimi sifatida, ikkinchidan, berilayotgan axborot hajmini ularga mos holda birmuncha chuqurlashtirish va kengaytirish vositasida ko'nikma va malakalarni amalda qo'llay olishni shakllantirishdir. Shunday ekan, o'quvchilarga berilayotgan bilimlar ko'lamini mustahkamlash, chuqurlashtirish va kasbga yo'naltirish eng dolzarb masalalardandir.

Uzluksiz ta'lim tizimining asosiy bo'g'inlaridan biri bo'lgan kasb-hunar kollejlari o'qitiladigan umumta'lim fanlari (biologiya, fizika, matematika, geografiya va h.k) o'quv fani umumiy o'rta ta'lim maktablaridagi o'quv fanining uzviy davomi hisoblanadi. Kasb-hunar kollejlari o'qitiladigan o'quv fanlari o'quvchilarning umumiy o'rta ta'lim maktablarida o'zlashtirgan bilim, ko'nikma va malakalarni umumlashtirish, xulosa yasash va tizimlashtirishni amalga oshiradi.

Fizika fanini o'qitish jarayonida kasb-hunar kollejlari ixtisosliklari, yo'nalishlaridan kelib chiqqan holda, o'quvchilarga fizikadan chuqur va mustahkam bilim berish imkoniyatlarini aniqlash va shu asosida fizika ta'limi mazmunini takomillashtirish va o'qitish metodikasi samaradorligini oshirish lozim.

Fizika o'qitishni kasbiy yo'naltirish uchun quyidagilarni hisobga olish lozim:

□ kasb-hunar kollejlari o'qitish jarayonida fanlararo bog'lanishdan foydalanishning o'ziga xos imkoniyatlarini aniqlash;

□ fizika darsini tashkil etishning optimal yo'llarini aniqlash;

□ fizikadan kasbiy ma'lumotlarni o'zida mujassam etgan o'quv materiallarini mazmunini yaratish va undan foydalanish bo'yicha metodik tavsiyalar ishlab chiqish;

□ fizikadan mavjud davlat ta'lim standarti, o'quv reja va dasturlar doirasida o'quv qo'llanmalar majmuasining yangi avlodini takomillashtirish yo'llarini ishlab chiqish.

Kasb-hunar kollejlari fizika ta'limida fanlararo bog'lanishni kasbga yo'naltirish deganda fizika o'qitishni umumkasbiy va maxsus fanlar bilan bog'lanish asosida amalga oshirish tushuniladi. Ma'lumki, kasb-hunar kollejlari o'qitiladigan o'quv predmetlari umumta'lim, umumkasbiy va maxsus fanlar doirasida amalga oshiriladi.

Umumta'lim fanlari (fizika) bilan umumkasbiy fanlarning o'zaro bog'lanishi asosan nazariy bilimlar, maxsus fanlar bilan bog'lanishi esa amaliy bilimlar bilan amalga oshiriladi.

Fanlarning bir-biriga bog'lanishi o'quvchilarni ham tanlagan kasblariga, ham o'quv faniga bo'lgan qiziqishlarini oshiradi, olingan bilimlarni mustahkamlaydi, ularda amaliy ko'nikmalarni shakllantiradi.

Umumta'lim va kasbiy fanlarning hamkorligi o'quvchilarni ijodiy ishlashga yo'llash, izlanishlarini tashkil qilish va texnik ijodkorligini rivojlantirishda muhim ahamiyatga ega.

Fizika fani matematika, biologiya, kimyo va tibbiyot fanlari bilan uzviy bog'langan. Shuning uchun hozirgi paytda fizikani chuqur o'zlashtirish ko'pchilik mutaxassislar uchun zarur bo'lib qoldi. Shu jumladan tibbiyot yo'nalishidagi kasb-hunar kollejlari o'quvchilari kimyo, umumiy biologiya, maxsus tibbiyot, biofizika kabi fanlarni chuqur o'rganish uchun ma'lum fizik tushunchalarga ega bo'lishi kerak.

Shu maqsadda tibbiyot yo'nalishidagi kasb-hunar kollejlari molekulyar fizika bo'limidagi o'qitishning ayrim jihatlarini ko'rib chiqamiz.

Ma'lumki, biologik organizmlar ochiq termodinamik sistema bo'lib, atrofidagi muhit bilan tinmay moddalar almashinib turadi. Fizik organizmning hujayra va to'qimalarda gazlar, suv va unda moddalarni o'tkaza oladiganligi uchun moddalar shu tariqa almashinish hodisasi o'tkazuvchanlik hodisasi deb yuritiladi.

Organizmning butun hayot faoliyati shu xususiyatga bog'liq bo'lib, moddalarning hujayralari bilan to'qima suyuqligi o'rtasida tarqalishi biopotensiallar hosil bo'lishi va boshqalar o'tkazuvchanlik tufayli yuzaga keladi.

Xulosa

Fizika o'qitishda fanlararo integratsiya va kasbga yo'naltirish, o'quvchilarga keng bilimlar berish va ularni kelajakdagi muvaffaqiyatlari uchun tayyorlashda muhim rol o'ynaydi. Bu jarayon, o'quvchilarning ilmiy fikrlash qobiliyatini rivojlantirishga, ularni ko'p qirrali mutaxassislar sifatida tayyorlashga va zamonaviy ijtimoiy talablarni qondirishga yordam beradi. Shuningdek, fizika fanining o'qitilishi, o'quvchilarning ijtimoiy masalalarga yanada kengroq nuqtai nazardan qarashlariga imkon yaratadi. O'quvchilar, fizika fanidan olingan bilimlarni turli sohalarda qo'llash orqali, o'z kelajaklarini muvaffaqiyatli qurishlari mumkin.

Foydalanilgan adabiyotlar

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FIZIKA FANINI IJTIMOIIY-GUMANITAR YO'NALISHLARDA O'QITISHNING USLUBIY ASOSLARI

Annotatsiya. *Ijtimoiy-gumanitar ta'lim yo'nalishida fizika fanining o'qitilishi, albatta, fizika fanini chuqur o'rganishga qaratilmagan, ammo uning muhim tushunchalari va qonuniyatlari talabalarning dunyoqarashini kengaytirish, mantiqiy fikrlashini rivojlantirish va turli sohalaridagi bilimlarni umumlashtirishga yordam beradi. Fizikaning asosiy tushunchalari va qonunlari, jumladan, harakat, kuch, energiya, elektromagnitizm va boshqalar turli xil ijtimoiy-gumanitar fanlar bilan bog'lanishi mumkin. Bu esa talabalarning fanlararo bog'liqliklarni tushunishiga va bilimlarni amaliyotda qo'llashga yordam beradi.*

Kalit so'zlar: *Interaktiv usullar, tarixiy qurilmalar, o'qitish prinsiplari, o'qitishning qonuniyatlari.*

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METHODOLOGICAL FOUNDATIONS OF TEACHING PHYSICS IN SOCIAL AND HUMANITARIAN EDUCATION

Abstract: *The teaching of physics in the field of social and humanitarian education is not primarily aimed at in-depth study of physics, but its key concepts and principles help broaden students' worldview, develop logical thinking, and integrate knowledge across various disciplines. Fundamental concepts and laws of physics, including motion, force, energy, electromagnetism, and others, can be connected with different social and humanitarian subjects. This approach facilitates students' understanding of interdisciplinary relationships and enables them to apply knowledge in practical contexts.*

Keywords: *Interactive methods, Historical devices, Teaching principles, Laws of teaching*

Kirish

O'qitish prinsiplari (prinsip – lotincha so'z bo'lib, asos boshlanish degan ma'noni bildiradi) – o'qitish jarayonini tashkil qilishning asosiy rejalari, yetaklovchi g'oyalari. Ular o'qitishni tartibga soluvchi umumiy ko'rsatmalar, talablar, rejalar, normalar tarzida bo'ladi. O'qitish prinsiplari o'qitishning asosiy qonuniyatlaridan kelib chiqadi.

O'qitishning qonuniyatlari – bilim berishdagi hodisalar o'rtasidagi zaruriy va obyektiv, ma'noli hamda takrorlanuvchi bog'lanishlardir. O'qitishning qonuniyatlari quyidagilardan iborat:

1. O'qitish jarayoni jamiyatning hamda har bir o'quvchining talabiga mos kelishi kerak.

2. O'qitish jarayoni bilim berish, tarbiyalash hamda rivojlantirish funksiyalarini bajarishi kerak.

3. O'qitish jarayoni o'quvchilarning haqiqiy o'quv imkoniyatlariga mos kelishi kerak.

4. O'qitish jarayoni unga ta'sir qiluvchi tashqi shartlarga bog'liqdir:

- O'qitish va o'quv jarayoni birgalikda pedagogik qonuniyatlarga bo'ysunib, bir-biri bilan mustahkam bog'lanishda

- O'qitishning mazmuni o'qitishning maqsadiga bevosita bog'liq bo'lib, u o'z navbatida, jamiyatning talabi, ilm-fanning rivojlanishi, o'quvchilarning imkoniyatlari hamda tashqi shartlar asosida aniqlanadi.

- O'qitish metodlari hamda vositalari o'qitishning maqsadiga hamda mazmuniga bo'g'liqdir.

- O'qitish jarayonining barcha komponentlari orasidagi to'g'ri bog'lanish va tuzilgan qulay shart-sharoit, uning ijobiy natijasini ta'minlaydi.

- O'qitish, o'quvchining psixologik xususiyatlariga, shaxsiy qulayligiga, kelajakdagi rivojlanish darajasiga mos holda olib borilishi kerak.

Boshqa fanlar qatori fizika fani qayerda o'rgatilishidan qat'iy nazar, istalgan ta'lim tizimlarida o'qitishning uzviyligi va davomiyligini ta'minlanishi, kelgusida yetuk mutaxassislar tayyorlashni muhim omili bo'lmog'i lozim. Aksariyat mutaxassislar o'z kasbiy fanlarini chuqur egallashlarida, asosiy rolni fizika fanining o'quv mazmunini o'zlashtirish darajasi tashkil etadi.

Asosiy qism.

Ijtimoiy-gumanitar ta'lim yo'nalishida fizika fanining o'qitilishining asosiy maqsadlari:

• Fizikaviy tushunchalarni o'rganish:

Talabalarga fizikaning asosiy qonunlari va tushunchalari haqida tushuncha berish. Bu ularning tabiat hodisalarini tushunishlariga yordam beradi va dunyoqarashini kengaytiradi.

• Fikrlash qobiliyatini rivojlantirish:

Fizika fanini o'rganish talabalarning mantiqiy va tanqidiy fikrlash qobiliyatini rivojlantiradi. Bu esa ularga dalillarni tahlil qilish, xulosalar chiqarish va muammolarni hal qilishga yordam beradi.

• Fanlararo aloqalarni o'rnatish:

Fizikaning ijtimoiy-gumanitar fanlar bilan bog'liqliklarini ko'rsatish. Masalan, tarixda texnologiyaning rivojlanishi, huquqda esa fizika qonunlariga asoslangan texnologiyalarning qo'llanilishi kabi.

• Amaliy bilim va ko'nikmalarni shakllantirish:

Fizikadan olingan bilimlar talabalarga kundalik hayotda va keyingi kasbiy faoliyatida duch keladigan turli xil vaziyatlarni tahlil qilish va hal qilishga yordam beradi.

- **Ta'limning sifatini oshirish:**

Fizika fanining asosiy tushunchalari bilan tanishish talabalarning umumiy ta'lim darajasini oshiradi va ularni keyingi ta'lim olishlariga tayyorlaydi.

Fizika fani bo'yicha o'qitish usullari:

- **Ma'ruza va amaliy mashg'ulotlar:**

Fizika qonunlari va tushunchalari ma'ruzalarda o'rgatiladi, amaliy mashg'ulotlarda esa talabalar olgan bilimlarini mustahkamlaydilar.

- **Tarixiy misollar:**

Fizikaga oid tarixiy voqealar va kashfiyotlar talabalarning qiziqishini oshiradi.

- **Interaktiv usullar:**

Munozaralar, savol-javoblar va guruhli ishlar talabalarning faol ishtirokini ta'minlaydi.

- **Tegishli adabiyotlar:**

Ijtimoiy-gumanitar fanlar talabalari uchun moslashtirilgan fizika darsliklari va qo'llanmalardan foydalanish.

Ijtimoiy-gumanitar ta'lim yo'nalishida fizika fanining o'qitilishi, o'quvchilarga ilmiy tafakkur va analitik fikrlash ko'nikmalarini rivojlantirishga qaratilgan. Bu jarayonda fizika fanining asosiy nazariyalarini va amaliyotlarini gumanitar fanlar bilan integratsiyalash orqali o'qitish muhim ahamiyatga ega.

- Integratsiya: Ijtimoiy-gumanitar ta'lim yo'nalishida fizika fanini o'qitishda, fizika va gumanitar fanlar o'rtasida bog'lanish o'rnatish zarur. Bu, o'quvchilarga fizika qonunlarini tushunish va ularni ijtimoiy hayotga tatbiq etish imkonini beradi.

- Ilmiy tafakkur: Fizika fanining o'qitilishi, o'quvchilarda ilmiy tafakkur va analitik fikrlash ko'nikmalarini rivojlantirishga yordam beradi. Bu ko'nikmalar, o'quvchilarning muammolarni hal qilishda va yangi g'oyalarni ishlab chiqishda muhimdir.

O'qitish metodlari

- *Interaktiv metodlar:* O'qitishda interaktiv metodlardan foydalanish, o'quvchilarning faol ishtirokini ta'minlaydi. Masalan, tajribalar, guruhli muhokamalar va loyiha asosidagi o'qitish usullari orqali o'quvchilar fizika fanining amaliy jihatlarini o'rganadilar.

- *Gumanitar kontekst:* Fizika fanini o'qitishda gumanitar kontekstni kiritish, o'quvchilarga fizika qonunlarini ijtimoiy masalalar bilan bog'lash imkonini beradi. Bu, o'quvchilarning qiziqishini oshiradi va fanlarni o'zaro bog'lashga yordam beradi.

O'qituvchilarning roli

- *Pedagogik mahorat:* O'qituvchilar, fizika fanini o'qitishda pedagogik mahoratga ega bo'lishlari zarur. Ular, o'quvchilarning qiziqishini oshirish va ularni motivatsiya qilish uchun turli metodlardan foydalanishlari kerak.

- **Innovatsion yondashuvlar:** O'qituvchilar, innovatsion yondashuvlarni qo'llash orqali o'quvchilarga zamonaviy texnologiyalarni o'rgatishlari mumkin. Bu, o'quvchilarning fizika faniga bo'lgan qiziqishini oshiradi va ularni kelajakda muvaffaqiyatli mutaxassislar bo'lishlariga tayyorlaydi.

Natijalar

- **Kelajakdagi imkoniyatlar** Ijtimoiy-gumanitar ta'lim yo'nalishida fizika fanini o'qitish, o'quvchilarga keng imkoniyatlar yaratadi. Ular, fizika fanidan olingan bilimlarni turli sohalarda, jumladan, iqtisodiyot, siyosat va ijtimoiy tadqiqotlarda qo'llashlari mumkin.

- **Fizika va gumanitar fanlar o'rtasidagi bog'lanish:** O'quvchilar, fizika fanini o'rganish orqali gumanitar fanlar bilan bog'liq masalalarni yanada chuqurroq tushunish imkoniyatiga ega bo'ladilar. Bu, ularning umumiy bilim darajasini oshiradi va ijtimoiy masalalarga yanada kengroq nuqtai nazardan qarashlariga yordam beradi.

Akademik litseyning ijtimoiy-gumanitar ta'lim yo'nalishlarida tahsil olayotgan o'quvchilarga fizika fani mavzusiga oid hodisalarning voqeilikning kelib chiqish tarixining matnini berib ulardan baholash tizimini quyidagi ketma ketlik asosida talab qilinsa, ularning tarixiy voqealikning bilish qobiliyati oshadi.

Baholash sharti	Ball	reyting
<i>Tarixiy qurilmaning kim tomonidan asoslangan bilish</i>	1	
<i>Tarixiy qurilma ixtiro etgan shaxs haqida ma'lumot berish</i>	1	
<i>Qurilmaning bunyod etilgan davri yoki sanasini bilish</i>	1	
<i>Qurilmaning yaratilgan geografik joyini bilish</i>	1	
<i>Qurilma qaysi tarixiy davrga mansubligini bilish</i>	1	
<i>Qurilmaning nima(yoki qanday voqea) munosabat bilan yaratilganligini bilish</i>	1	
<i>Qurilma bunyod etilgan davrda hukmronlik qilgan hukumatini bilish</i>	1	
<i>Qurilmaning yaralishida ishlatiladigan ashyolarni bilish</i>	1	
<i>Qurilmaning tashqi va ichki ko'rinishlarni yoritib berish</i>	1	
<i>Qurilmaning uslubini yoritish</i>	1	
<i>Qurilmaning o'ziga xos tomonlarini (boshqa qulmalarda farqi) ko'rsatish</i>	1	
<i>Qurilmaning bugungacha bo'lgan holatlarni va hzirgi holati haqida ma'lumot berish</i>	1	
<i>Qurilmaga O'zbekiston hukumati yoki xalqaro tashkilotlari tomonidan qaratilayotgan e'tiborni yoritish</i>	1	
<i>Qurilmaning qanday vazifani bajarganligini yoritish</i>	1	
<i>Fizik atamalardan o'z o'rnida to'g'ri foydalanish</i>	1	

Xulosa:

Ijtimoiy-gumanitar fanlar (tarix-huquq) yo'nalishida fizika fanining o'qitilishi talabalarning dunyoqarashini kengaytirish, mantiqiy fikrlashini rivojlantirish va fanlararo aloqalarni o'rnatishga yordam beradi. Fizikaning asosiy tushunchalari va

qonunlari haqida bilimga ega bo'lish talabalarni keyingi ta'lim olishlari va kasbiy faoliyatlari uchun tayyorlaydi.

Foydalanilgan adabiyotlar

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3. J.O. Yuldashev, E.U. Abdurahmonov, Dj.Dj. Kurbanov. Ijtimoiy-gumanitar fanlar (tarix-huquq) ta'lim yo'nalishida fizika fanining o'qitilishi./ TA'LIM JARAYONIDA INNOVATSION G'OYALAR VA TEXNOLOGIYALARNI JORIY QILISH ZAMONAVIY TA'LIMNING BOSH STRATEGIYASI mavzusidagi Respublika ilmiy, o'quv anjumani. 27-28-aprel 2018. 241-242 b.

TABIIY FANLAR YO'NALISHIDA FIZIKA TA'LIMI

Annotatsiya. *Tabiiy fanlar ta'lim yo'nalishida fizika fanining o'qitilishi, talabalarda tabiiy olam haqida ilmiy bilim va tushunchalarni shakllantirishga, shuningdek, ularda ilmiy tafakkurni rivojlantirishga qaratilgan muhim jarayondir. Fizika fani tabiiy fanlar ta'limining asosi bo'lib, uning o'qitilishi talabalarni nafaqat fizik qonuniyatlar bilan tanishtiradi, balki ularda mantiqiy fikrlash, muammolarni tahlil qilish va yechish ko'nikmalarini ham rivojlantiradi.*

Kalit so'zlar: *biofizika, fizik kimyo, geofizika, biologik harakatlar.*

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PHYSICS EDUCATION IN THE FIELD OF NATURAL SCIENCES

Abstract: *The teaching of physics in the field of natural science education is an important process aimed at developing students' scientific knowledge and understanding of the natural world, as well as fostering their scientific thinking. Physics serves as the foundation of natural science education, and its instruction not only introduces students to physical laws but also develops their logical reasoning, problem analysis, and problem-solving skills.*

Keywords: *Biophysics, Physical chemistry, Geophysics, Biological movements*

Kirish. Fizika - tabiat qonunlari o'rganiladigan asosiy tabiiy fanlardan biri bo'lib, materiya harakatining eng sodda va shu bilan birga, eng umumiy shakli bo'lgan mexanik, atom-molekular, gravitatsion, elektromagnit jarayonlarni, shuningdek, atom ichidagi va yadro ichidagi jarayonlarni o'rganadi. Fizik harakat shaklining bu ko'rinishlari shuning uchun ham umumiyki, bu harakat shakllari materiyaning boshqa fanlar o'rganadigan barcha, yanada murakkabroq (kimyoviy, biologik) harakatlarida bo'ladi va ularning ajralmas qismidir. Biroq fizikaning boshqa fanlar bilan bog'lanishi shuning o'zidagina iborat bo'lmay, balki fizika yana barcha tabiiy va amaliy fanlarning muvaffaqiyatli rivojlanishi uchun zarur boigan tadqiqotlarni ishlab chiqishga va asboblarni yaratishga imkon beradi. Hozirgi vaqtda bu fanlarning alohida fizik bo'limlari bor:

- astronomiyada-astrofizika,
- biologiyada-biofizika,
- kimyoda-fizik kimyo,

- elektrotexnikada - elektrofizika,
- geologiyada - geofizika va hokazo.

Shuning uchun fizika barcha tabiiy va amaliy fanlarning yaratilishi uchun poydevordir, deyish mumkin.

Asosiy qism

Ma'lumki, fan va texnika taraqqiyoti ta'lim va tarbiyaning mazmuni va metodlariga bevosita ta'sir etadigan quyidagi bir qator belgilar bilan xarakterlanadi:

- fan, texnika va ishlab chiqarishdagi o'zgarishlarning birga qo'shib ketishi natijasida fanning bevosita ishlab chiqarish kuchlariga aylanib ketishi;
- ishlab chiqarish kuchlari hamma elementlarini sifat jihatdan qaytadan qurish;
- mehnat xarakteri va mazmunining o'zgarishi, unda ijodiy elementlar rolining o'sishi;
- ishchilar umumiy va maxsus ta'limi, hamda madaniyatining o'sish darajasi;
- ekologik muammolarning paydo bo'lishi va shunga bog'liq bo'lgan boshqa masalalar.

Tabiiy fanlar ta'lim yo'nalishlarida tahsil olayotgan talabalarga fizika fani mavzularini tabiat hodisalarning biologik va kimyoviy bog'lanishiga uzviy bog'lab tushuntirish o'quvchilar uchun yanada qiziqish uyg'otadi.

Asosan biologik hodisalarni ko'rgazmalilik asosida videolavha ko'rsatib, fizikaviy jarayon orqali tushuntirilsa o'quvchi qiziqish uyg'otadi. Masalan, harakat miqdori tushuntirilayotganda qushlarning uchishi (1-rasm), suv ostidagi meduzaning harakatlanishi (2-rasm) orqali tushuntirilsa va lavha keltirilsa o'quvchiga ham fizik, ham biologik tushuncha paydo bo'ladi.



1-rasm. Qafasdagi kanareyka.



2-rasm. Suv osti meduzasi

Tabiiy fanlar ta'lim yo'nalishida fizika fanining o'qitilishi, talabalarga tabiatning asosiy qonuniyatlarini tushunishga yordam berish bilan birga, ularning ilmiy fikrlash qobiliyatini rivojlantirishda muhim rol o'ynaydi. Fizika fani, o'zining

nazariy va amaliy jihatlari bilan, o'quvchilarga quyidagi asosiy maqsadlarni amalga oshirishga yordam beradi:

1. Tabiat qonuniyatlarini tushunish

Fizika, tabiatdagi hodisalarni va ularning o'zaro aloqalarini o'rganadi. O'quvchilar, masalan, kuch, energiya, harakat va to'qnashuvlar kabi asosiy tushunchalarni o'rganish orqali, tabiatning qanday ishlashini tushunadilar. Bu bilimlar, ularning kundalik hayotida va kelajakdagi kasblarida qo'llanilishi mumkin.

2. Ilmiy metodlarni o'zlashtirish

Fizika fani o'qitilishi jarayonida o'quvchilar ilmiy metodlarni o'zlashtiradilar. Tajribalar o'tkazish, kuzatish, ma'lumotlarni tahlil qilish va natijalarni baholash orqali, o'quvchilar ilmiy fikrlash qobiliyatini rivojlantiradilar. Bu jarayon, ularning muammolarni hal qilish va mantiqiy fikrlash qobiliyatlarini oshiradi.

3. Amaliy tajribalar

Fizika fanida amaliy tajribalar o'tkazish, nazariy bilimlarni mustahkamlashda muhim ahamiyatga ega. O'quvchilar laboratoriya ishlarida ishtirok etish orqali, nazariy tushunchalarni amalda qo'llash imkoniyatiga ega bo'ladilar. Bu, o'z navbatida, ularning qiziqishini oshiradi va o'qitish jarayonini yanada samarali qiladi.

4. Interdisiplinar yondashuv

Fizika, kimyo, biologiya va boshqa tabiiy fanlar bilan o'zaro bog'liqdir. Tabiiy fanlar ta'lim yo'nalishida fizika fani o'qitilishi, o'quvchilarga bu fanlar o'rtasidagi bog'lanishlarni tushunishga yordam beradi. Masalan, fizika va kimyo o'rtasidagi aloqalar, kimyoviy reaksiyalarni tushunishda muhimdir.

5. Innovatsion texnologiyalar

Zamonaviy texnologiyalar, fizika fanini o'qitishda yangi imkoniyatlar yaratadi. Interaktiv dasturlar, simulyatsiyalar va onlayn resurslar orqali o'quvchilar fizika fanini yanada qiziqarli va samarali o'rganishlari mumkin. Bu, o'z navbatida, ularning motivatsiyasini oshiradi va o'qitish jarayonini yanada qiziqarli qiladi.

Xulosa

Tabiiy fanlar ta'lim yo'nalishida fizika fanining o'qitilishi, o'quvchilarga tabiatni tushunish, ilmiy fikrlash qobiliyatini rivojlantirish va amaliy tajribalar orqali nazariy bilimlarni mustahkamlash imkonini beradi. Bu jarayon, o'quvchilarning kelajakdagi muvaffaqiyatlari uchun muhim asos bo'lib xizmat qiladi. Fizika fani, o'zining keng qamrovli va amaliy jihatlari bilan, o'quvchilarning bilim va ko'nikmalarini rivojlantirishda muhim rol o'ynaydi.

Shuningdek, xulosa o'rnida aytish kerakki, o'quvchining xotirasida mustahkamlash uchun aytib berish, ko'rgazmalilikni amalda bajarishni va takrorlashni amalga oshirilganda o'quv sifati oshadi.

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MODERN MEDICINE IN UZBEKISTAN AND ITS DEVELOPMENT

Annotation: *This article examines the development of modern healthcare in Uzbekistan, emphasizing the integration of advanced medical technologies, evidence-based approaches, and international collaboration. It highlights how diagnostic innovations, preventive strategies, and professional training contribute to improved patient care, accurate diagnostics, and overall healthcare efficiency. The study also considers the challenges of regional disparities and resource limitations while exploring the potential of scientific research and global partnerships to enhance medical practices. The findings underscore the significance of modernization in the healthcare system for public health improvement and the advancement of Uzbekistan's role in the global medical community.*

Keywords: *Modern Medicine, Healthcare Development, Uzbekistan, Diagnostic Technologies, Preventive Strategies, Evidence-Based Medicine, International Collaboration, Medical Innovation.*

Introduction

In recent years, healthcare in Uzbekistan has undergone significant modernization. The adoption of advanced technologies, digital diagnostic tools, telemedicine, and artificial intelligence has notably improved the quality and efficiency of medical services. The healthcare system aims not only to enhance the population's health and well-being but also to align with international standards in diagnostics, treatment, and patient care. Furthermore, international collaboration in medical science facilitates the training of skilled professionals, the implementation of innovative technologies, and the overall advancement of the healthcare sector. Modern medicine in Uzbekistan focuses on timely and accurate diagnosis, personalized treatment plans, and effective preventive measures, which are essential for improving patient outcomes and ensuring the country's competitiveness in global healthcare.

Relevance

The modernization of healthcare in Uzbekistan is highly relevant due to several factors. Firstly, the health and quality of life of the population depend directly on the efficiency and accuracy of medical services. Advanced diagnostic and treatment methods enable early disease detection and effective preventive interventions. Secondly, the emergence of global pandemics and new infectious diseases requires rapid and reliable responses from the healthcare system. Thirdly, scientific and technological progress allows Uzbekistan to actively participate in the

global medical community, train highly qualified specialists, and implement best practices from around the world.

Aim

The primary aim of this study is to examine the development of modern healthcare in Uzbekistan, its efficiency-enhancing technologies, and opportunities for international collaboration

Main part

The healthcare system in Uzbekistan has a rich historical background, reflecting centuries of traditional practices aimed at preserving public health and treating diseases. During the Soviet era, the healthcare system was centralized, standardized, and expanded, resulting in the establishment of numerous hospitals, polyclinics, and research institutions. After gaining independence in 1991, Uzbekistan began implementing significant reforms to modernize its healthcare system and align it with international standards. These reforms aimed to improve diagnostic and treatment processes, enhance patient care, and strengthen medical education. The modernization process included the introduction of advanced medical equipment, the development of specialized healthcare facilities, and the training of highly qualified professionals. Additionally, collaboration with international organizations facilitated the adoption of modern medical technologies and practices. Despite the progress, challenges such as unequal access to healthcare services, regional disparities, and limited resources remained. This section explores the historical development of Uzbekistan's healthcare system, highlighting the key stages, achievements, and ongoing challenges in its modernization journey. Understanding the historical context is essential to appreciate the current advancements and the future potential of healthcare in Uzbekistan.

Modern medicine in Uzbekistan encompasses several major directions, including diagnostics, treatment, prevention, and research. Diagnostic advancements involve technologies such as magnetic resonance imaging (MRI), computed tomography (CT), X-ray imaging, and automated laboratory testing, which improve accuracy and efficiency. Treatment methods include minimally invasive surgery, robotic-assisted procedures, oncology treatments, and cardiovascular interventions. Preventive strategies focus on promoting healthy lifestyles, vaccination programs, and early detection of chronic diseases. The research sector plays a critical role in developing innovative technologies, conducting clinical studies, and preparing highly skilled professionals. Each of these directions contributes to improving patient outcomes, reducing healthcare disparities, and ensuring the overall effectiveness of the medical system. Moreover, collaboration with international partners enables Uzbekistan to adopt best practices and implement global standards in healthcare. This section examines the development, opportunities, and challenges of each major direction, emphasizing their importance in achieving a modern, efficient, and patient-centered healthcare system in Uzbekistan.

The diagnostic sector in Uzbekistan has experienced significant advancements due to the integration of modern technologies. High-resolution

imaging systems, including MRI, CT, and X-ray devices, along with automated laboratory testing, enable precise and timely diagnosis of diseases. The incorporation of digital technologies and artificial intelligence allows for real-time analysis, rapid decision-making, and error reduction. Telemedicine platforms further expand access to diagnostic services in remote areas. Additionally, advancements in genetic testing and molecular diagnostics provide personalized insights into patients' conditions, enhancing treatment planning. The healthcare system continuously invests in updating diagnostic equipment, training professionals, and standardizing protocols. This development ensures that healthcare providers can detect diseases at an early stage and implement effective interventions. Challenges include the high cost of advanced equipment, the need for continuous professional development, and maintaining technical support. This section provides a detailed overview of diagnostic systems in Uzbekistan, their technological integration, and the impact on patient care and clinical decision-making.

Treatment methods in Uzbekistan have evolved to include minimally invasive procedures, robotic surgery, oncology care, cardiovascular interventions, and intensive care management. Standardized treatment protocols align with international guidelines, ensuring safe and effective care. Personalized medicine is increasingly applied, considering patients' unique medical histories, genetic profiles, and physiological conditions. Real-time monitoring systems, wearable devices, and telemedicine platforms enable continuous observation of patients' progress. Furthermore, multidisciplinary approaches involving collaboration among specialists enhance treatment outcomes. The implementation of evidence-based medicine ensures that interventions are effective, safe, and scientifically validated. Investment in research, professional training, and infrastructure development has expanded the capabilities of modern treatment approaches. This section analyzes the contemporary treatment strategies in Uzbekistan, highlighting technological adoption, clinical effectiveness, and the integration of international best practices in patient care.

Preventive healthcare is a cornerstone of Uzbekistan's modern medical system. Vaccination campaigns, early disease detection programs, and public awareness initiatives promote healthy lifestyles among citizens. Education on nutrition, physical activity, and preventive measures aims to reduce the prevalence of chronic diseases. Digital platforms provide accessible health information, reminders for medical check-ups, and guidance for lifestyle modifications. Government programs emphasize maternal and child health, infectious disease control, and community-based interventions. Preventive strategies also include occupational health monitoring, screening programs, and initiatives to combat environmental health risks. International collaboration allows for knowledge transfer and implementation of successful global preventive strategies. By focusing on prevention, the healthcare system reduces the burden on treatment facilities, improves population health outcomes, and enhances overall life expectancy. This

section explores the strategies, effectiveness, and challenges of preventive healthcare in Uzbekistan.

Scientific research plays a crucial role in the development of modern medicine in Uzbekistan. Universities, research institutes, and specialized centers conduct studies on new medical technologies, pharmaceuticals, and diagnostic methods. Research outcomes support evidence-based medicine and inform policy decisions. Collaboration with international organizations facilitates knowledge exchange, joint studies, and professional training programs. Participation in global research projects ensures that Uzbekistan remains aligned with current scientific trends and innovations. Research areas include biotechnology, epidemiology, genomics, medical informatics, and public health. Funding, infrastructure, and human resource development are key components in strengthening research capacity. This section examines the role of scientific research and international collaboration in advancing healthcare, highlighting achievements, ongoing projects, and future potential for innovative medical solutions.

Modern medicine in Uzbekistan is essential for ensuring public health, managing chronic and emerging diseases, and meeting international healthcare standards. The increasing prevalence of non-communicable diseases, global pandemics, and aging populations underscores the importance of adopting advanced medical technologies. Modern healthcare practices contribute to improved diagnostic accuracy, effective treatment outcomes, and patient-centered care. Investments in infrastructure, professional development, and research enhance system resilience and adaptability. The relevance of modern medicine extends to economic benefits, social well-being, and global competitiveness. Moreover, access to high-quality healthcare fosters public trust and reduces health disparities. This section analyzes the societal, scientific, and economic significance of modern medicine, emphasizing its critical role in national development and global health integration.

The future of modern medicine in Uzbekistan is closely linked to emerging technologies, digital health systems, artificial intelligence, and telemedicine solutions. Automation in diagnostics and treatment, remote patient monitoring, and personalized healthcare strategies are expected to expand. Integration of global best practices, innovative research, and continuous professional education will drive the system's advancement. Policy frameworks, investment in infrastructure, and international collaboration are key factors in achieving sustainable development. The adoption of predictive analytics, big data, and AI-assisted medical devices will enhance decision-making and early disease detection. This section discusses potential growth areas, strategic priorities, and long-term goals for the development of modern healthcare in Uzbekistan, highlighting the integration of innovation and global standards.

Conclusion

Modern medicine in Uzbekistan has experienced significant development, reflecting a continuous effort to align national healthcare standards with global practices. The integration of advanced diagnostic systems, innovative treatment

methods, preventive strategies, and research-based approaches has improved patient care, clinical outcomes, and overall healthcare efficiency. Investments in medical technologies, professional training, and international collaboration have facilitated the adoption of evidence-based and patient-centered practices. Preventive healthcare initiatives and public awareness campaigns have contributed to the reduction of chronic disease prevalence and the promotion of healthier lifestyles. Scientific research and international cooperation ensure that Uzbekistan remains up-to-date with emerging trends in medicine, biotechnology, and medical informatics. Despite challenges such as regional disparities and resource limitations, the modernization of the healthcare system continues to strengthen its resilience and adaptability. Overall, the development of modern medicine in Uzbekistan represents a transformative process, enhancing public health, ensuring timely and accurate diagnostics, promoting effective treatment, and preparing the nation for future medical innovations. This progress not only benefits the Uzbek population but also positions the country as an active participant in the global medical community, contributing to shared knowledge, improved healthcare practices, and sustainable development.

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TO'QIMACHILIK KORXONALARIDA MENEJMENT TIZIMINI TAKOMILLASHTIRISH ZARURATI VA TAMOYILLARI

Annotatsiya: *Dunyo miqyosida korporativ boshqaruvning ilg'or tamoyillari, raqamlashtirish, ilg'or menejment uslublari va inson kapitaliga asoslangan yondashuvlar sanoat tarmoqlarida samaradorlikni oshirishning asosiy yo'nalishlariga aylangan. Jumladan, D. Draper va F. Abernathy o'z izlanishlarida to'qimachilik sohasidagi tashkilotlar muvaffaqiyatining kaliti – bu operatsion jarayonlarni optimallashtiruvchi strategik boshqaruv ekanligini ta'kidlaydi.*

Kalit so'zlar: *korporativ, optimallashtiruv, strategiya, transformatsiya, ekologik barqarorlik, nazariya, strategik moslashuvchanlik, natija,*

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THE NEED AND PRINCIPLES OF IMPROVING THE MANAGEMENT SYSTEM IN TEXTILE ENTERPRISES

Abstract: *Globally, advanced principles of corporate governance, digitalization, advanced management techniques and approaches based on human capital have become the main directions of increasing efficiency in industrial sectors. In particular, D. Draper and F. Abernathy in their research emphasize that the key to the success of organizations in the textile industry is strategic management that optimizes operational processes.*

Keywords: *corporate, optimization, strategy, transformation, environmental sustainability, theory, strategic flexibility, result.*

To'qimachilik sanoati O'zbekiston iqtisodiyotining eksportga yo'naltirilgan, yuqori bandlik darajasini ta'minlovchi strategik tarmoqlaridan biri hisoblanadi. Yurtimizda bu soha nafaqat ichki ehtiyojni qondirish, balki xalqaro bozorda raqobatbardosh mahsulotlar yetkazib berish orqali iqtisodiy o'sishning muhim drayveri sifatida e'tirof etilmoqda. So'nggi yillarda to'qimachilik korxonalarini modernizatsiya qilish, yangi texnologiyalarni joriy etish va mahsulot turlarini diversifikatsiya qilish bo'yicha salmoqli ishlar amalga oshirilmoqda. Biroq bu o'zgarishlar nafaqat texnik bazaning yangilanishi, balki boshqaruv

mexanizmlarining ham zamonaviy talablarga mos tarzda takomillashtirilishini talab qiladi³⁶.

Dunyo miqyosida korporativ boshqaruvning ilg'or tamoyillari, raqamlashtirish, ilg'or menejment uslublari va inson kapitaliga asoslangan yondashuvlar sanoat tarmoqlarida samaradorlikni oshirishning asosiy yo'nalishlariga aylangan. Jumladan, D. Draper va F. Abernathy o'z izlanishlarida to'qimachilik sohasidagi tashkilotlar muvaffaqiyatining kaliti – bu operatsion jarayonlarni optimallashtiruvchi strategik boshqaruv ekanligini ta'kidlaydilar³⁷. Shuningdek, menejment tizimini takomillashtirish masalasi nafaqat korxonaning ichki faoliyatini, balki butun tarmoqning innovatsion rivojlanish salohiyatini belgilovchi omil sifatida ham qaralmoqda.

Bugungi global raqobat sharoitida to'qimachilik mahsulotlariga bo'lgan talabning sifat, ekologik standartlar, yetkazib berish tezligi kabi omillar bilan aniqlanishi, korxonalarni moslashuvchan, axborotga asoslangan va ilg'or boshqaruv yondashuvlarini qabul qilishga undamoqda. Shu bois, to'qimachilik korxonalarida menejment tizimini takomillashtirish zarurati, asosiy yo'nalishlari va tamoyillarini chuqur tahlil qilish muhim sanaladi.

To'qimachilik sanoatida menejment tizimlarini takomillashtirish masalasi so'nggi yillarda ko'plab tadqiqotlarning e'tibor markaziga aylandi. Bu, bir tomondan, sanoat tarmog'ining iqtisodiy o'sishdagi strategik rolini anglash bilan, ikkinchi tomondan esa zamonaviy boshqaruv konsepsiyalarining samaradorlikka ta'sirini chuqur tahlil qilish zarurati bilan bog'liq. Jahon va mahalliy olimlarning tadqiqotlari to'qimachilik korxonalarida menejment tizimini tashkil etish, rejalashtirish, motivatsiya, nazorat va axborot texnologiyalarini joriy etishning nazariy hamda amaliy jihatlarini har tomonlama yoritib bergan.

Xususan, F. Abernathy va J. Dunlop o'zlarining fundamental tadqiqotida shuni ta'kidlaydiki, "to'qimachilik sanoatida menejment tizimini takomillashtirishning asosi bu raqobatbardoshlikni ta'minlaydigan innovatsion strategiyalarni ishlab chiqishdir". Ularning fikricha, tezkor ishlab chiqarish, moslashuvchan yetkazib berish zanjiri va bozor signaliga mos rejalashtirish zamonaviy menejmentning asosiy ustunlaridir. Mazkur fikr ayniqsa bugungi global bozor sharoitida dolzarb bo'lib, O'zbekiston to'qimachilik tarmog'i uchun ham mos keladi. Chunki bu sohada eksportga yo'naltirilgan faoliyat samaradorligi tezkorlik va moslashuvchanlikka bog'liq.

D. Ruzmetova esa o'z maqolasida to'qimachilik korxonalarida menejment samaradorligini oshirishda inson kapitali va kadrlar salohiyatini rivojlantirishga alohida e'tibor qaratadi. Unga ko'ra, rahbarlarning menejment ko'nikmalarini tizimli oshirish hamda xodimlar motivatsiyasini boshqarish samaradorlikni belgilovchi asosiy omillardir. Mazkur fikr hozirgi kunda dolzarb bo'lib, aynan

menejment tizimi kadr salohiyatidan ajralmas element sifatida shakllanishi zarur. Amaliyotga e'tibor qaratadigan bo'lsak, ko'plab korxonalarda inson resurslari boshqaruvi hali ham formal tusda ekanligini guvohi bo'lishimiz mumkin. Bu esa o'z navbatida mazkur yondashuvning ahamiyatini yanada oshiradi.

Boshqa bir olimning qayd etishicha, innovatsion menejment yondashuvlariga asoslangan holda to'qimachilik korxonalarida ERP (Enterprise Resource Planning) tizimlarini joriy etish orqali raqamli boshqaruv muhitini shakllantirish zarur. O'z fikrini davom ettirar ekan, muallif bu nafaqat operatsion darajadagi aniqlikni ta'minlashini, balki strategik qarorlar qabul qilishni ham soddalashtirishini qayd etadi³⁸. Bu yondashuv amaliyotga yaqin va o'zbek to'qimachilik sohasi uchun ayniqsa dolzarb, chunki ma'lumotlar oqimini avtomatlashtirish korxonalarning ichki va tashqi muvofiqligini oshiradi deb xisoblaymiz.

Tahlil qilingan ilmiy manbalar shuni ko'rsatadiki, to'qimachilik sanoatida menejment tizimini takomillashtirish bo'yicha olib borilgan tadqiqotlar sohaning raqobatbardoshligini oshirish, resurslardan samarali foydalanish, innovatsiyalarni joriy etish va inson kapitali salohiyatini kuchaytirish uchun muhim nazariy va amaliy asos yaratmoqda. G'arb olimlarining global qiymat zanjiri, fast fashion modeli va innovatsion menejmentga oid qarashlari mahalliy tadqiqotchilar yondashuvlari bilan mantiqiy uyg'unlashadi va ularni to'ldiradi.

Shu bilan birga, mavjud ilmiy izlanishlar hali ham ko'p jihatdan umumiy tavsiyalar darajasida bo'lib, ularning amaliyotga tatbiq etilishi, tarmoq xususiyatlariga moslashtirilgan mahalliy model va indikatorlar ishlab chiqilishi zarur. Ayniqsa, raqamli transformatsiya, ekologik barqarorlik, eksport strategiyalari va loyiha asosida boshqaruv kabi yo'nalishlarda chuqurlashtirilgan tadqiqotlar olib borishga ehtiyoj mavjud. Shu bois, bu sohada kompleks, ko'p bosqichli, empirik ma'lumotlarga tayangan ilmiy izlanishlar tizimini kengaytirish muhim vazifa bo'lib qolmoqda.

To'qimachilik korxonalarida menejment tizimini takomillashtirish zarurati, avvalo, ichki ishlab chiqarish salohiyati va tashqi muhitdagi tez o'zgaruvchan omillarning o'zaro ta'siri bilan belgilanadi. Bunday omillar ichida bozor talabi dinamikasi, texnologik yangilanish sur'atlari hamda global eksport bozorlari bilan integratsiyalashuv darajasi eng muhim omillar qatoriga kiradi. Shunday ekan, menejment tizimini takomillashtirish biror-bir izolyatsiyalangan muammoga yechim emas, balki kompleks transformatsiya zaruriyatidir.

Bozor talabida yuz berayotgan o'zgarishlar to'qimachilik korxonalarining strategik rejalashtirish yondashuvlarini qayta ko'rib chiqishga undamoqda. P. Kotler va K. Keller fikricha, zamonaviy iste'molchilar bozori tobora individual ehtiyojlarga, tezkor yetkazib berish va mahsulot moslashuvchanligiga asoslanmoqda. Ular ta'kidlaganidek, korxonalar ushbu talablar asosida o'z strategiyalarini qayta muvofiqlashtirmasa, bozorda faoliyat olib borish qiyinlashadi. Bu holat to'qimachilik korxonalarida nafaqat marketing strategiyalarini, balki butun

boshqaruv tizimini mijozga yo‘naltirilgan model asosida qayta tashkil etishni talab qiladi.

O‘zbekiston to‘qimachilik sohasida eksport hajmlari ortib borayotgan bo‘lsada, korxonalar eksport raqobatida sifat, dizayn va innovatsion mahsulotlar bilan emas, balki arzon ishchi kuchi orqali narx ustunligini saqlab qolmoqda³⁹. Bu esa uzoq muddatli raqobatbardoshlikni ta‘minlamaydi. Shunday sharoitda menejment tizimi sifat, diversifikatsiya va brendlash kabi yo‘nalishlarni qamrab oluvchi keng ko‘lamli boshqaruv strategiyasiga tayanuvchi shaklda isloh qilinishi lozim. Chunki, bozor talabi, texnologik taraqqiyot va eksport raqobati to‘qimachilik korxonalarini ichki menejment tizimlarini zamonaviylashtirishga majbur qilmoqda. Bu jarayonda nafaqat texnologik vositalar, balki boshqaruv madaniyati, tahliliy fikrlash, strategik rejalashtirish va inson resurslari menejmenti kabi jihatlar uyg‘unlashgan yondashuv asosida ko‘rib chiqilishi zarur.

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TRANSFORMATION OF CLINICAL REASONING IN THE CONTEXT OF DIGITALIZATION: RISKS AND OPPORTUNITIES OF AI INTEGRATION IN MEDICAL EDUCATION

***Abstract.** At present, we are witnessing a significant reduction in the traditional diagnostic pathway from symptom to diagnosis, driven by rapid technological advancement. However, this efficiency conceals a potential pedagogical trap: students may master the use of digital tools without grasping the underlying pathophysiological mechanisms. Historically, the development of clinical reasoning mirrored a detective's investigation, requiring the meticulous synthesis of clinical signs to construct a logical diagnostic hypothesis. The intervention of Artificial Intelligence (AI) has fundamentally altered this process. The necessity for students to laboriously recall rare pathologies or complex syndromes is being superseded by neural networks capable of providing instantaneous differential diagnoses. While this enhances information access, it creates a "veneer of omniscience" that may compromise the development of independent analytical skills. The relevance of this study lies in identifying educational strategies that allow future medical professionals to leverage the computational power of AI while maintaining the cognitive resilience necessary for autonomous decision-making, particularly in cases of system failure or algorithmic bias.*

***Keywords.** clinical reasoning, pathophysiological mechanisms, diagnostic hypothesis, veneer of omniscience, cognitive resilience, algorithmic bias, artificial intelligence.*

Introduction. Modern medical education faces a "digitalization paradox": while the rapid implementation of artificial intelligence (AI) shortens the path from symptom to diagnosis, it simultaneously threatens the degradation of classical clinical reasoning. Traditionally, physician training was built upon the "diagnostic detective" method—independent symptom collection and the construction of logical causal chains. Today, this process is being automated, leading to a risk of cognitive offloading.

The core problem lies in the formation of an "illusion of explanatory depth" among students: instantaneous access to neural network prompts replaces the profound analysis of pathophysiological mechanisms. Consequently, future specialists may lose cognitive autonomy—the ability to make decisions in the absence of technology or in the event of an algorithmic error.

Materials and Methods. The methodological framework of this study comprises a systems analysis of educational transformation in medical universities and an empirical comparison of diagnostic search strategies when interacting with AI algorithms. The study was comprehensive and included several interconnected levels of analysis.

Theoretical-Analytical Stage:

A comparative analysis was conducted between classical models of clinical reasoning and modern concepts of digital learning. The psychological mechanisms of "cognitive load reduction" and their impact on long-term medical knowledge retention were examined.

Empirical Stage and Study Design:

To assess the practical transformation of reasoning, a controlled pedagogical study was conducted at a medical university. Participants included final-year students ($n=100$), divided into two representative groups:

- Control Group: Performed diagnostic tasks relying solely on fundamental knowledge and standard print references.
- Experimental Group: Had access to clinical decision support systems (CDSS) and generative AI models to verify their hypotheses.

The diagnostic search was evaluated based on three key metrics:

1. Cognitive Depth: The ability to justify the pathophysiological link between symptoms (as opposed to a simple list of diagnoses).
2. Verificational Robustness: The ability to recognize a "premeditated AI error" inserted into the task (testing for "automation bias" or blind trust).
3. Adaptation Speed: The time taken to generate a differential diagnostic range.

Statistical significance was ensured using Student's t-test and the non-parametric Mann-Whitney U-test. Qualitative data from reflective analysis (student self-assessment of confidence) were processed using content analysis.

Results

The comparative analysis revealed fundamental differences in the architecture of clinical decision-making:

Metric (Criterion)	Control Group (Without AI)	Experimental Group (With AI)
Diagnostic Speed	65%	95%
Accuracy (Complex Cases)	72%	88%
Depth of Justification (Pathogenesis)	85%	45%
Critical Evaluation (Error Detection)	78%	32%
Self-Assessment Level (Confidence)	60%	90%

The experimental group demonstrated a clear advantage in the technical aspects of diagnostics. Their speed reached 95% of the benchmark, exceeding the

control group by 30%. Diagnostic accuracy in complex cases was also higher (88% vs. 72%), confirming AI's efficacy as an analytical reference tool.

However, a critical decline in the quality of diagnostic justification was observed. The depth of pathogenesis analysis was only 45%, compared to 85% in the control group. This indicates that when using AI, students tend to bypass the stage of constructing logical causal relationships, accepting a ready-made answer without understanding the disease mechanisms.

The most concerning data involved resistance to algorithmic errors. Students working with AI showed the lowest result in critical evaluation (32%). Most displayed "blind trust" in the system, failing to notice the embedded errors. Furthermore, the "illusion of knowing" phenomenon was identified: the subjective confidence of the experimental group reached 90%, significantly overestimating their actual analytical capabilities.

Conclusion

1. Technological Dualism in Education: AI integration significantly increases operational efficiency (speed increases by 30-35%) but creates a "productivity trap," where technical success replaces deep cognitive analysis.

2. Erosion of the Analytical Component: Relying on algorithmic solutions leads to the degradation of pathophysiological reasoning skills. Students delegate the construction of logical links to AI, resulting in fragmented knowledge.

3. Algorithmic Dependency: There is a high risk of "blind trust"; over 80% of students failed to critically question erroneous AI conclusions, indicating a loss of cognitive autonomy.

4. The "Illusion of Explanatory Depth": High-tech tools artificially inflate professional self-esteem, creating a gap between perceived competence and internalized knowledge, leading to professional infantilism.

5. Requirement for a New Didactic Model: Maintaining the quality of medical training requires a transition to a "Hybrid Clinical Intelligence" model. Training must focus on metacognitive skills: the ability to audit algorithms, recognize cognitive biases, and make decisions without digital support.

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SEMANTIC AND PRAGMATIC CLASSIFICATION OF ENGLISH NEOLOGISMS

Abstract. *The rapid development of social, political, technological, and cultural processes has led to an intensive growth of neologisms in the English language. These newly formed lexical units reflect not only linguistic innovation but also pragmatic intentions and communicative needs of modern society. This article investigates the semantic and pragmatic classification of English neologisms, with particular attention to their functional features in contemporary socio-political discourse and their translation into Uzbek and Russian. The study is based on the theoretical framework proposed by N. M. Shansky, who distinguishes lexical and semantic neologisms. Using system-structural, functional, and communicative-pragmatic approaches, the research analyzes new lexical material and identifies the main trends, models, and mechanisms of semantic neologization. The results demonstrate that neologisms play a crucial role in shaping modern vocabulary, enriching expressive potential, and reflecting social change.*

Keywords: *neologism, semantic neologization, pragmatic potential, lexical innovation, English language, translation*

Introduction

In modern linguistics, the study of neologisms occupies a central place due to the dynamic nature of language development. English, as a global language, responds particularly quickly to changes in social, political, scientific, and technological spheres. These changes give rise to new words and meanings that gradually become an integral part of the lexical system. Neologisms serve as linguistic markers of innovation, reflecting new realities, concepts, and attitudes.

The relevance of the present study is determined by the growing number of neologisms in contemporary English and the need for their systematic semantic and pragmatic classification. While neologisms have been studied extensively in Russian and Western linguistics, their analysis in relation to Uzbek remains limited and fragmented. Moreover, many studies focus primarily on word-formation mechanisms, whereas semantic and pragmatic aspects often remain insufficiently explored.

The aim of this article is to analyze English neologisms from semantic and pragmatic perspectives and to propose a classification based on multiple criteria, including mode of occurrence, degree of novelty, duration of existence, and communicative function. The scientific novelty of the research lies in the integration

of semantic derivation theory with communicative-pragmatic analysis and in the introduction of new lexical material into comparative linguistic study.

Materials and Methods

The methodological basis of the research is a комплекс approach that combines traditional linguistic methods with modern functional and pragmatic analysis. The material of the study consists of English neologisms selected from explanatory and neological dictionaries, as well as from contemporary socio-political texts and media sources.

The following methods were applied in the research:

Descriptive method, which enabled the systematic presentation and classification of neologisms.

Complete sampling method, used to select relevant lexical units from dictionary and textual sources.

Definition analysis, allowing the examination of dictionary definitions as the foundation for semantic interpretation.

Component analysis, aimed at identifying semantic components involved in the process of semantic derivation.

Contextual analysis, which revealed the pragmatic features and actual usage of neologisms in discourse.

Comparative method, applied to establish similarities and differences in the semantics of neologisms in English, Uzbek, and Russian.

These methods made it possible to investigate neologisms as system-based linguistic units functioning within specific communicative contexts.

Semantic Classification of Neologisms

Following N. M. Shansky's classification, neologisms are divided into **lexical** and **semantic** types. Lexical neologisms are newly created words or borrowings introduced to denote new objects, processes, or phenomena, such as *blockchain*, *crowdfunding*, *metaverse*, and *cryptocurrency*. These units usually arise due to scientific and technological progress and are often international in character.

Semantic neologisms involve the development of new meanings within existing lexical forms. For example, words such as *cloud*, *virus*, *platform*, and *network* have acquired additional meanings in technological and socio-political contexts. Semantic neologization is closely connected with metaphorical and metonymic transfer, which allows speakers to conceptualize new realities through familiar linguistic forms.

From a broader semantic perspective, neologisms can be classified according to several criteria:

Mode of occurrence: lexical, semantic, and phraseological neologisms;

Degree of novelty: absolute neologisms, which are entirely new forms, and relative neologisms, which represent new meanings of existing words;

Duration of existence: occasional neologisms (single-use or context-dependent), temporary neologisms, and stable neologisms that become part of the language system.

The analysis of socio-political texts demonstrates that semantic neologisms are particularly productive in this sphere, as political discourse frequently reinterprets existing vocabulary to achieve ideological and persuasive goals.

Pragmatic Characteristics of Neologisms

From a pragmatic point of view, neologisms possess a high communicative value. They are used to attract attention, express evaluation, create emotional impact, and influence the audience. In media and political discourse, neologisms often function as tools of persuasion and manipulation, shaping public opinion and framing social realities.

The pragmatic potential of neologisms depends largely on context. The same lexical unit may carry neutral, positive, or negative connotations depending on its usage. For instance, neologisms in political rhetoric may serve to legitimize certain actions or discredit opponents. This contextual variability highlights the importance of pragmatic analysis in neological studies.

Word-Formation Models of English Neologisms

The analysis reveals that the most productive word-formation models of English neologisms include affixation, conversion, compounding, blending, abbreviations, acronyms, truncation, and reduplication. Among these, blending and abbreviation are especially common in modern media discourse due to their brevity and expressive power.

These models reflect the tendency of the English language toward linguistic economy, adaptability, and creativity. At the same time, word-formation processes interact closely with semantic and pragmatic factors, shaping the functional potential of neologisms.

Discussion

The findings of the study confirm that neologisms represent a multifaceted linguistic phenomenon that requires an integrated analytical approach. Structural analysis alone cannot fully explain the emergence and functioning of neologisms, as semantic and pragmatic factors play a decisive role in their development and dissemination.

Semantic neologization reflects changes in conceptual structures and worldview, while pragmatic aspects reveal speakers' communicative intentions and strategies. In socio-political discourse, neologisms often acquire evaluative and ideological meanings, which may differ significantly across languages and cultures.

Comparative analysis shows that the translation of English neologisms into Uzbek and Russian frequently involves adaptation rather than direct equivalence. Translators must consider not only the denotative meaning of a neologism but also its pragmatic effect and cultural associations. This highlights the importance of interdisciplinary research combining linguistics, translation studies, and cultural analysis.

The limited number of system-based studies on Uzbek neologisms indicates the need for further research in this area. Applying semantic and pragmatic classification models developed for English may contribute to the advancement of Uzbek lexicology and comparative linguistics.

Conclusion

In conclusion, neologisms are an essential and dynamic component of the modern English vocabulary. Their semantic and pragmatic classification reveals the mechanisms of language development and the interaction between linguistic innovation and social change. The study demonstrates that semantic neologization and pragmatic function play a key role in the integration of new lexical units into the language system.

The findings of this research may be useful for linguists, translators, and language teachers, as well as for further comparative studies of neologisms in English, Uzbek, and Russian.

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SUD HUJJATLARI VA BOSHQA ORGANLAR HUJJATLARINI IJRO ETISH TIZIMIDA MAJBURIYATLAR REESTRI INSTITUTINING MAZMUNI, HUQUQIY MOHIYATI VA AHAMIYATI

***Annotatsiya:** Maqolada sud hujjatlari va boshqa organlar hujjatlarini ijro etish tizimida joriy etilayotgan Majburiyatlar reestri institutining mazmuni, huquqiy mohiyati va amaliy ahamiyati ilmiy-nazariy jihatdan tahlil qilinadi. Shuningdek, mazkur institutning ijro samaradorligini oshirishdagi o‘rni, uning huquqiy ta’sir mexanizmi hamda xorijiy davlatlar tajribasi qiyosiy tahlil asosida yoritiladi.*

***Kalit so‘zlar:** majburiyatlar reestri, ijro huquqi, sud hujjatlari ijrosi, qarzdor, ijro samaradorligi, huquqiy institut.*

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THE CONTENT, LEGAL NATURE, AND SIGNIFICANCE OF THE INSTITUTION OF THE REGISTER OF OBLIGATIONS IN THE SYSTEM OF ENFORCEMENT OF COURT DECISIONS AND DOCUMENTS OF OTHER AUTHORITIES

***Abstract:** The article provides a scientific and theoretical analysis of the content, legal nature, and practical significance of the institution of the Register of Obligations being introduced in the system of enforcement of court decisions and documents of other authorities. It also examines the role of this institution in improving enforcement efficiency, its legal impact mechanisms, and presents a comparative analysis based on the experience of foreign countries.*

***Keywords:** register of obligations, enforcement law, enforcement of court decisions, debtor, enforcement efficiency, legal institution.*

Huquqiy davlat barpo etishning muhim shartlaridan biri sud hokimiyati chiqargan qarorlarning so‘zsiz va to‘liq ijro etilishini ta’minlash hisoblanadi. Sud orqali huquq va qonuniy manfaatlar tiklangan bo‘lsa-da, ularning amalda ijro etilmasligi fuqarolarning odil sudlovga bo‘lgan ishonchini susaytiradi, qonun ustuvorligi prinsipiga putur yetkazadi. Shu bois sud hujjatlari va boshqa organlar hujjatlarini ijro etish tizimini takomillashtirish O‘zbekiston Respublikasida amalga oshirilayotgan huquqiy islohotlarning ustuvor yo‘nalishlaridan biri sifatida belgilangan.

O'zbekiston Respublikasi Konstitutsiyasiga muvofiq, sud hujjatlari barcha davlat organlari, mansabdor shaxslar, yuridik va jismoniy shaxslar uchun majburiy hisoblanadi. Mazkur qoida sud qarorlarining ijro etilishi davlat majburiyati ekanini belgilab beradi. Shu bilan birga, "Sud hujjatlari va boshqa organlar hujjatlarini ijro etish to'g'risida"gi O'zbekiston Respublikasi Qonunida ham ijro jarayonining huquqiy asoslari, davlat ijrochilarining vakolatlari hamda qarzdor va undiruvchining huquq va majburiyatlari mustahkamlab qo'yilgan.

Ammo amaliyot tahlili shuni ko'rsatadiki, ijro hujjatlarining muayyan qismi qarzdorning mol-mulki yoki daromad manbalari mavjud emasligi sababli uzoq muddat bajarilmay qolmoqda. Bunday holatlarda ijro ishi qonunga muvofiq tugatiladi yoki to'xtatiladi, biroq majburiyatning o'zi huquqiy ma'noda barham topmaydi. Ana shu nuqtada ijro jarayonining uzluksizligini ta'minlaydigan, qarzdorning ijro majburiyatini doimiy huquqiy nazoratda ushlab turuvchi institutga ehtiyoj yuzaga keladi. Majburiyatlar reestri instituti aynan shu ehtiyojdan kelib chiqqan holda shakllanmoqda. Huquqshunos Marta Isidro bu borada fikr yuritarkan, qarz majburiyatlarining ijrosi va qarzdorning huquqiy holatini nazorat qilish mexanizmlarini belgilab berish, qarzdorning aktivlari topilmagan holatlarda ham ijro jarayonining huquqiy ta'sirini saqlab qolish vositalarini nazarda tutish zarurligini ta'kidlaydi.

Majburiyatlar reestri — bu sud hujjatlari va boshqa organlar hujjatlari asosida yuzaga kelgan bajarilmagan majburiyatlar to'g'risidagi ma'lumotlarni o'z ichiga olgan, vakolatli davlat organi tomonidan yuritiladigan markazlashtirilgan elektron axborot tizimidir. Unda qarzdorning ijro hujjatlari bo'yicha qarz summasi, ijro harakatlarining holati, qo'llanilgan cheklovlar, ijro harakatlari tarixi hamda boshqa huquqiy ahamiyatga ega ma'lumotlar saqlanadi.

O'zbekiston Respublikasi Prezidentining sud hujjatlari ijrosini ta'minlashga qaratilgan farmon va qarorlarida Majburiyatlar reestri ijro tizimini raqamlashtirish va uning samaradorligini oshirishga xizmat qiluvchi muhim institut sifatida belgilangan. Xususan, mazkur reestr orqali ijro hujjatlari bo'yicha ma'lumotlarni yagona bazaga jamlash, davlat organlari va bank muassasalari bilan axborot almashinuvini yo'lga qo'yish nazarda tutilgan.

Majburiyatlar reestri institutining huquqiy mohiyatini tahlil qilish uni ijro huquqining mustaqil instituti sifatida baholash imkonini beradi. **Birinchidan**, u ijro majburiyatlarini rasmiy hisobga olish va huquqiy monitoring qilish institutidir. Reestr orqali har bir ijro hujjati bo'yicha majburiyatning huquqiy taqdiri nazorat qilinadi, uning bajarilishi yoki bajarilmasligi davlat tomonidan doimiy hisobda saqlanadi.

Ikkinchidan, majburiyatlar reestri qarzdorga nisbatan qo'llaniladigan huquqiy ta'sir choralarining asosiy manbai hisoblanadi. Qarzdorning reestrga kiritilishi unga nisbatan muayyan huquqiy cheklovlarning saqlanib qolishiga olib keladi. Bu holat ijro majburiyatini bajarishdan qochish imkoniyatini cheklaydi hamda qarzdorni majburiyatni ixtiyoriy ravishda bajarishga rag'batlantiradi. Mazkur jihat ijro huquqida profilaktik va tarbiyaviy funksiyani ham bajaradi.

Uchinidan, majburiyatlar reestri ijro jarayonida huquqiy uzluksizlik prinsipini ta'minlaydi. An'anaviy ijro amaliyotida ijro ishi mol-mulk topilmaganligi sababli tugatilganidan so'ng, qarzdorga nisbatan huquqiy ta'sir amalda barham topadi. Reestr esa ijro ishi tugatilgan taqdirda ham majburiyatning huquqiy mavjudligini saqlab qoladi va qarzdorning mulkiy holati o'zgarganida ijro harakatlarini avtomatik yoki soddalashtirilgan tartibda qayta tiklash imkonini beradi.

O'zbekiston qonunchiligi nuqtai nazaridan mazkur institut ijro jarayonini takomillashtirishga qaratilgan tizimli yechim hisoblanadi. "Sud hujjatlari va boshqa organlar hujjatlarini ijro etish to'g'risida"gi Qonun normalarini tahlil qilish shuni ko'rsatadiki, qonun ijro harakatlarini amalga oshirish tartibini belgilagan bo'lsa-da, ijro tugatilganidan keyin majburiyatni uzoq muddatli monitoring qilish mexanizmi yetarli darajada rivojlanmagan. Majburiyatlar reestri esa mazkur bo'shliqni to'ldirishga qaratilgan institut sifatida namoyon bo'ladi.

Xorijiy davlatlar tajribasi ham bunday institutlarning samaradorligini tasdiqlaydi. Buyuk Britaniyada sud qarorlari asosidagi qarzlarning maxsus reestrlarda qayd etiladi va ular qarzdorning moliyaviy nufuziga bevosita ta'sir ko'rsatadi.

Britaniya huquq tizimini qiyosiy tahlil qilgan P. McKenzie Skene ham sud qarorlari ijrosida reestrlar institutining ahamiyatini alohida ta'kidlaydi. Uning fikricha, ijro ishi tugatilgan yoki to'xtatilgan holatlarda ham qarz majburiyatining reestrda saqlanishi kreditor manfaatlarini uzoq muddatli himoya qilish imkonini beradi va sud qarorining huquqiy qiymatini pasaytirib yubormaydi. Olim reestr tizimini "ijro majburiyatining huquqiy xotirasi" deb baholaydi, chunki u ijro jarayonini vaqt jihatidan cheklanmagan huquqiy ta'sir bilan ta'minlaydi.

Shuningdek, huquqshunos F.Tairov majburiyatlar reestri haqida so'z yuritarkan, Gruziya qonunchiligida qarz dorlarni hisobga olish va monitoring qilish tizimlari joriy etilgan bo'lib, bu sud qarorlarini ijro etish samaradorligini oshirish va undiruvchilarning huquqlarini himoya qilish imkonini berishini, Gruziyaning "Ijro ish yuritish to'g'risida"gi Qonunining 19-1-moddasiga muvofiq Qarzdorlar reestri pul talabini ijro etish ta'minlangunga qadar qo'llaniladigan vosi ta'bo'lib, 2010 yil 1 yanvardan boshlab ijro ishi boshlangan jismoniy shaxslar, yuridik shaxslar va boshqa tashkilotlar to'g'risidagi tizimlashtirilgan elektron ma'lumotlar bazasini o'z ichiga olishini, ushbu reestrda davlat organlari, munitsipalitetlar, munitsipalitet organlari va ta'minot bilan ta'minlangan qarzdorlar kiritilmasligini, qarzdor ijro ishi boshlangan zahotiyot reestrda kiritilishini, reestrda kiritish qarzdorni pul undirish majburiyati dan ozod etmasligini, reestr ma'lumotlari ochiq hisoblanishini, Milliy ijro byurosi davlat organlari uchun reestr ma'lumotlariga kirish imkoniyatini ta'minlaydi hamda ularni doimiy ravishda yangilab borishini, Milliy ijro byurosi va ijro byurolari vakolatli shaxslari reestr ma'lumotlari asosida jismoniy va yuridik shaxslarga tegishli ma'lumotnoma va iqtiboslarni, ariza topshirilgandan keyingi ish kunidan kechiktirmay, taqdim etilishini, Gruziya xalqaro tajribaga asoslangan holda qarz dorlarni monitoring qilish tizimini joriy etganligini, bu esa sud qarorlarini ijro etish jarayonining shaffofligi va

samaradorligini oshirishga, shuningdek, fuqarolik muomalasidagi ishonchni mustahkamlashga xizmat qilishini ta'kidlaydi.

Majburiyatlar reestri institutining amaliy ahamiyati shundaki, u ijro tizimini faqat jazolovchi mexanizm emas, balki prognoz qilish, profilaktika va rag'batlantirishga asoslangan huquqiy tizimga aylantiradi. Reestr orqali davlat ijrochilari qarzdorning umumiy majburiyatlar yukini aniqlaydi, ijro harakatlarini samarali rejalashtiradi va ijro natijadorligini oshiradi.

Xulosa qilib aytganda, Majburiyatlar reestri instituti sud hujjatlari va boshqa organlar hujjatlarini ijro etish tizimida strategik ahamiyatga ega bo'lgan zamonaviy huquqiy institut hisoblanadi. U ijro jarayonida huquqiy uzluksizlikni ta'minlaydi, sud qarorlarining real ijrosini kuchaytiradi hamda qonun ustuvorligi prinsipini amalda ro'yobga chiqarishga xizmat qiladi. Mazkur institutni qonunchilikda yanada mustahkamlash va uni amaliy jihatdan takomillashtirish O'zbekiston ijro tizimini rivojlantirishda muhim ilmiy va amaliy ahamiyat kasb etadi.

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MAQOLA: MA'LUMOTLAR BAZASIDA INDEKSLAR VA ULARNING ISHLASH PRINSIPI

Anontatsiya: Ushbu maqolada ma'lumotlar bazalarida indekslarning mohiyati, ularning turlari va zamonaviy MBBTlarda qo'llanish mexanizmlari yoritilgan. Indeksflash jarayonining afzalliklari, so'rovlarni tezlashtirishdagi o'rni, qidiruv samaradorligi hamda ma'lumotlarni boshqarish texnologiyalarida qo'llaniladigan optimallashtirish usullari tahlil qilindi. Tadqiqotda B-tree, Hash, Bitmap kabi indeks turlarining ishlash prinsiplari, zamonaviy bulutli tizimlarda indekslashning roli va katta hajmdagi ma'lumotlar bilan ishlashda indekslarning samaradorligi ko'rsatib o'tildi. Maqola amaliy misollar va ilmiy manbalar asosida tayyorlangan bo'lib, MBBT samaradorligini oshirishga qaratilgan ilmiy-analitik yondashuvni taklif etadi.

Kalit so'zlar: Indeks, Ma'lumotlar bazasi, B-tree, Hash indeks, So'rovlarni optimallashtirish, MBBT samaradorligi

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ARTICLE: INDEXES IN DATABASES AND THEIR OPERATING PRINCIPLES

Abstract: This article discusses the essence of indexes in databases, their types, and the mechanisms of their use in modern DBMSs. The advantages of the indexing process, its role in accelerating queries, its efficiency, and optimization methods used in modern data management technologies are analyzed. The principles of operation of B-tree, Hash, Bitmap and similar index types are examined, and the significance of indexing in modern systems, as well as its impact on working with large volumes of data, is demonstrated. The effectiveness of indexes in database operations is highlighted. The article is based on examples and scientific sources and proposes an analytical-scientific approach aimed at improving DBMS performance.

Keywords: *Index, Database, B-tree, Hash index, Query optimization, DBMS efficie*

KIRISH:

Zamonaviy axborot tizimlarida ma'lumotlar hajmi yil sayin ortib borayotgani sababli ma'lumotlar bazalarida tezkor qidiruv, saralash va ma'lumotlarga murojaat qilish samaradorligini oshirish dolzarb masalaga aylangan. Ko'pchilik yirik korxonalar, elektron hukumat tizimlari, moliya sektori, internet-servislar va bulutli platformalar o'z faoliyatini aynan katta ma'lumotlar bilan ishlashga asoslaydi. Shunday sharoitda ma'lumotlar bazasida indekslash jarayoni MBBTning tezkor ishlashi uchun asosiy texnologiyalardan biri hisoblanadi.

Indeks – bu jadvallardagi ma'lumotlarga murojaat qilishni tezlashtiruvchi maxsus ma'lumotlar tuzilmasi bo'lib, u kitobdagi alfavitli ko'rsatkichga o'xshash tarzda faoliyat yuritadi. Indeksar yordamida MBBT har bir qatorni boshidan oxirigacha qidirib chiqmasdan, kerakli yozuvga to'g'ridan-to'g'ri murojaat qiladi.

Hozirgi kunda MySQL, PostgreSQL, Oracle, SQL Server kabi MBBTlarda turli indeks turlari mavjud bo'lib, ularning har biri alohida funksional imkoniyatlarni ta'minlaydi. Indeksar nafaqat SELECT so'rovlari, balki filtratsiya, tartiblash, qo'shma jadvallar (JOIN) hamda agregatsiya operatsiyalarida ham samaradorlikni oshiradi.

Ushbu maqolada indekslarning mohiyati, ularning ishlash prinsipi, amaliy qo'llanilishi va zamonaviy MBBTlarda optimallashtirishdagi o'rni keng yoritiladi.

Tadqiqot metodologiyasi sifatida bir nechta yondashuvlardan foydalanildi. Avvalo, MBBTlarda qo'llaniladigan indeks tuzilmalari bo'yicha ilmiy maqolalar, xalqaro OTM o'quv qo'llanmalari hamda MySQL va PostgreSQLning rasmiy hujjatlari tahlil qilindi. Shuningdek, indekslarning ishlash samaradorligini aniqlash uchun ularning turli MBBTlardagi performans o'lchovlari o'rganildi.

Metodologiyada taqqoslash, tizimli tahlil, eksperimental yondashuvdan foydalanildi. Indeksarning turli sharoitlarda samaradorligini o'lchash maqsadida 100 mingdan 5 milliongacha bo'lgan yozuvlar ustida so'rov bajarilish tezligi solishtirildi. B-tree, Hash va Bitmap indekslarining afzalliklari va cheklovlari real tajribalar asosida baholandi.

Bulutli muhitlarda (AWS RDS, Azure SQL, Google Cloud SQL) indekslashning o'ziga xos jihatlari ham o'rganildi, chunki zamonaviy tizimlarda resurslarni avtomatik boshqarish mexanizmlari indekslashning samarasiga ta'sir qiladi. Tadqiqot davomida nazariy ma'lumotlar amaliy tajribalar bilan uyg'unlashtirildi va ilmiy adabiyotlar asosida umumiy xulosalar shakllantirildi.

ADABIYOTLAR TAHLILI:

Indeksar bo'yicha ilmiy adabiyotlar asosan ma'lumotlar bazalarining ishlash tezligini oshirishga qaratilgan tadqiqotlarni qamrab oladi. C. Date, J. Ullman, H. Garcia-Molina kabi ilmiy tadqiqotchilarning ishlari indekslashning nazariy asoslarini yaratgan bo'lib, ular indekslarning ma'lumotlar bazasi optimallashtirishdagi o'rnini keng yoritgan. Ayniqsa, B-tree indeksari bo'yicha

ilmiy izlanishlar ko‘pligi sababli ko‘plab MBBTlar ushbu tuzilmani standart sifatida qabul qilgan.

Zamonaviy tadqiqotlar indekslarning katta ma’lumotlar (Big Data) muhitidagi roliga alohida e’tibor qaratadi. NoSQL bazalar — MongoDB, Cassandra, Redis — an’anaviy indekslash printsiplarini o‘zlariga moslashtirib, hujjatlar bilan ishlash uchun maxsus optimallashtirilgan indeks tizimlarini joriy qilgan. Adabiyotlarda qayd etilishicha, NoSQL tizimlarida indekslash moslashuvchan bo‘lib, ma’lumotlarning o‘zgarishiga mos ravishda dinamik tarzda qayta tuziladi.

So‘nggi yillarda indekslash bo‘yicha ko‘plab ilmiy maqolalar bulutli MBBTlar va tarqatilgan tizimlardagi indekslar samaradorligini o‘rganishga qaratilmoqda. Shuningdek, AI yordamida so‘rovlarni avtomatik tahlil qilib, optimal indekslarni taklif qiluvchi "self-tuning indexes" texnologiyalari bo‘yicha ham izlanishlar olib borilmoqda. Masalan, Microsoft SQL Serverda "Automatic Tuning", PostgreSQLda "HypoPG" plaginlari indekslarni avtomatik tavsiya qilish imkonini beradi.

Adabiyotlar tahlili shuni ko‘rsatadiki, indekslar MBBTning eng muhim optimallashtirish vositalaridan biri bo‘lib qolmoqda. Ular so‘rovlar bajarilishini bir necha baravar tezlashtiradi, server yukini kamaytiradi va tizimning umumiy samaradorligini oshiradi.

NATIJALAR:

Tadqiqot natijalariga ko‘ra, indekslash so‘rovlar tezligini o‘rtacha 5–20 barobar tezlashtirishi aniqlandi. Masalan, 1 million yozuvli jadvalda filtrlangan SELECT so‘rovi indekslarsiz 12–18 soniya davom etsa, B-tree indeks qo‘llanganda bu vaqt 0.3–0.7 soniyaga tushdi.

Hash indekslar tenglik bo‘yicha qidiruvlarda eng yuqori samarani ko‘rsatdi. Ammo ular oralig‘idagi qiymatlar (range search) uchun samarali emas. Bitmap indekslari esa takrorlanadigan qiymatlar ko‘p bo‘lgan ustunlarda eng yaxshi natija berdi. Bu indeks turi data warehouse tizimlarida keng qo‘llanilishini tasdiqlaydi.

Bulutli MBBTlarda indekslar qo‘llanganda resurslar iste’moli 10–25% ga kamaygani kuzatildi. Bu esa indekslarning nafaqat tezkorlik, balki iqtisodiy jihatdan ham samaradorligini ko‘rsatadi.

Eksperimental natijalar shuni ko‘rsatdiki:

✓ Ko‘p ustunli indekslar (composite index) JOIN amallarida sezilarli samaradorlik beradi.

✓ Qayta-qayta o‘zgaradigan jadvallarda indekslarni haddan tashqari ko‘p yaratish samaradorlikni pasaytiradi.

✓ Auto-tuning tizimlari indekslarni optimallashtirishda sezilarli yordam beradi, ammo ular har doim mukammal natija bermaydi.

Natijalar shuni isbotlaydiki, indekslar MBBTning ajralmas qismi bo‘lib, ular so‘rovlarni tezlashtiradi, tizimning ishonchliligini oshiradi va katta hajmdagi ma’lumotlarni boshqarishda muhim rol o‘ynaydi.

MUHOKAMA:

Indekslar samaradorligi bo'yicha olingan natijalar chuqur tahlil qilinar ekan, ularning har bir turining o'ziga xos afzalliklari va cheklovlari borligi aniqlandi. Masalan, B-tree indeksleri eng universal bo'lib, aksariyat MBBTlarda asosiy indeks turi hisoblanadi. Ammo ma'lumotlar juda tez o'zgaradigan jadvallarda B-tree indekslarini saqlash ko'proq vaqt talab qilishi mumkin.

Hash indekslar tezkor bo'lsa-da, ular faqatgina tenglik bo'yicha taqqoslashlarda ishlashi ularning qo'llanilish sohasi keng emasligini ko'rsatadi. Bitmap indekslar esa analitik tizimlar uchun juda qulay, ammo ulkan matnli yoki sonli qiymatga ega ustunlarda ularning samaradorligi pasayadi.

Shuningdek, indekslar ko'paygani sari INSERT, UPDATE, DELETE amallari sekinlashishi aniqlangan, chunki har bir o'zgarish indekslarda ham qayd etiladi. Bu esa indekslash strategiyasini to'g'ri tanlash zarurligini ko'rsatadi.

Muhokama shuni ta'kidlaydiki, indekslash har doim ham ko'p sonli indeks yaratish degani emas. Ba'zan 1 yoki 2 ta yaxshi tanlangan indeks butun tizimning tezligini bir necha baravar oshirishi mumkin. Shuning uchun indekslash strategiyasi:

- so'rovlar tahlili,
 - qaysi ustunlar tez-tez ishlatilishini aniqlash,
 - tizim yuklanishini o'lchash
- kabi jarayonlarga asoslanishi kerak.

Bugungi kunda sun'iy intellekt yordamida indekslarni avtomatik tanlash texnologiyalari jadal rivojlanmoqda. Kelajakda MBBTlar o'z-o'zini optimallashtiruvchi tizimga aylanishi kutilmoqda.

XULOSA:

Tadqiqotdan ma'lum bo'ldiki, indekslar ma'lumotlar bazasi samaradorligini oshirishda hal qiluvchi omil hisoblanadi. To'g'ri tanlangan indekslar so'rovlar tezligini sezilarli darajada oshiradi, server yukini kamaytiradi va katta hajmdagi ma'lumotlar bilan ishlashni soddalashtiradi. Indekslish strategiyasi tizimning tuzilishi, so'rovlar turi va ma'lumotlar xususiyatlariga qarab tanlanishi zarur. Zamonaviy MBBTlar indekslash bo'yicha keng imkoniyatlarga ega bo'lib, kelajakda AI asosidagi avtomatik indekslash texnologiyalari yanada takomillashishi kutilmoqda.

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**АНАЛИЗ СООТВЕТСТВИЯ ДЕТСКОГО МЕНЮ СЕТЕВЫХ
СЕМЕЙНЫХ РЕСТОРАНОВ ПРИНЦИПАМ ЗДОРОВОГО ПИТАНИЯ
ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТА НА ПРИМЕРЕ ФЕДЕРАЛЬНОЙ
СЕТИ СЕМЕЙНЫХ РЕСТОРАНОВ «СИЦИЛИЯ»**

Аннотация. В статье приводятся результаты исследования соответствия детского меню сети семейных ресторанов «Сицилия» принципам здорового питания. Выявлен дисбаланс в ассортименте с преобладанием высококалорийных блюд, фастфуда, сладких напитков и десертов с повышенным содержанием сахара при недостатке овощей, фруктов и цельнозерновых продуктов. Меню не обеспечивает необходимого разнообразия для формирования правильных пищевых привычек при регулярном посещении. Предлагается введение полезных гарниров, разнообразие мяса, блюд из рыбы и сезонных фруктовых десертов, а также меры по поощрению потребления чистой питьевой воды.

Ключевые слова: здоровое питание детей, детское меню, семейный ресторан, пищевые привычки, ожирение у детей, фастфуд, рациональное питание.

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ANALYSIS OF THE CONFORMITY OF THE CHILDREN'S MENU OF CHAIN FAMILY RESTAURANTS WITH THE PRINCIPLES OF HEALTHY NUTRITION FOR PRESCHOOL CHILDREN USING THE EXAMPLE OF THE FEDERAL CHAIN OF FAMILY RESTAURANTS «SICILY»

Abstract: *the study analyzes the children's menu at the «Sicilia» family restaurant chain to determine whether it adheres to healthy eating principles. The analysis revealed an imbalance in the menu selection, with a predominance of high-calorie dishes, fast food, sugary drinks, and desserts high in sugar, while lacking vegetables, fruits, and whole grains. The menu does not provide the variety needed to develop healthy eating habits through regular dining. The study concludes by proposing practical initiatives to optimize the menu selection, including ensuring access to drinking water for young guests, introducing healthy side dishes, a variety of meats, fish dishes, and seasonal fruit desserts.*

Keywords: *healthy nutrition for children, children's menu, family restaurant, eating habits, fast food, balanced nutrition.*

Введение. В начале XXI в. после серии медицинских исследований мировое сообщество было вынуждено признать наличие эпидемии ожирения и зависимость развития неинфекционных хронических заболеваний в результате нарушения принципов здорового питания. Причем источник проблем со здоровьем во взрослом возрасте зачастую лежит в нарушении питания детей. Так, по данным ВОЗ 38,3 миллиона детей до 5 лет имеют избыточный вес или ожирение [1], что является следствием нарушения принципов здорового питания. Осознание масштаба проблемы привело к формированию тенденции на организацию здорового питания детей. И те предприятия общественного питания, которые смогут принять во внимание данную тенденцию и предложить потребителю детское меню, соответствующее базовым принципам здорового образа жизни, проявят дополнительную лояльность к семьям с детьми как целевой аудитории. Особенно важен такой подход для предприятий питания семейного формата, таких как сеть ресторанов «Сицилия».

Различные аспекты детского питания, проектирования детского меню и его продвижения рассматривались отечественными и зарубежными исследователями. В научной литературе представлен анализ детского меню предприятий общественного питания [10], исследование принципов рационального питания детей дошкольного и школьного возраста [9], рассмотрены подходы к более здоровому детскому питанию в ресторанах [12], исследование фастфуда в качестве угрозы для детей и подростков с точки зрения метаболических патологий [8], влияние рекламы на восприятие детьми нездоровой еды [7], стимулирование продаж полезных блюд из детского меню [11], исследование изменения покупательских практик под влиянием спроса семей с детьми на полезные для здоровья продукты питания [5] и некоторые

другие аспекты. Но конкретные ресторанные предприятия, особенно сетевого характера, упоминаются в исследованиях лишь косвенно или не упоминаются совсем. Наше исследование предполагает восполнить этот пробел и рассмотреть состав блюд детского меню сети семейных ресторанов «Сицилия» на предмет соответствия международным принципам здорового питания, российским методическим рекомендациям и соответствующим санитарным документам. Мы предполагаем наличие в детском меню сети семейных ресторанов «Сицилия» несбалансированного ассортимента высококалорийных блюд для детей на основе фастфуда, отклонение от матрицы здорового рационального питания, формирующего неправильные пищевые привычки.

Методы исследования. Общие принципы здорового питания детей [2] заключаются в энергетической ценности рационов, соответствующей энергозатратам ребенка, оптимальном содержании макро- и микронутриентов [3] за счет сочетания разнообразных групп продуктов, оптимальном режиме питания, правильном приготовлении пищи, обеспечении санитарно-гигиенической безопасности питания, сокращении потребления соли и сахара [6]. Формирование пищевых привычек, стремления детей к здоровому питанию предполагает разнообразие блюд и возможность выбора из перечня блюд здорового детского меню при посещении семейного ресторана. На основе методических документов были разработаны критерии оценки, включающие калорийность, пищевую ценность блюд, а также оценки разнообразия детского меню. Далее мы проанализировали действующее меню ресторана «Сицилия» на соответствие критериям.

Обсуждение результатов исследования. Детское меню сети семейных ресторанов «Сицилия» [4] стандартизировано и одинаково во всех городах России, где представлена франшиза, что дает картину комплексного единого подхода к его проектированию, использованию и презентации потребителю. Список блюд детского меню включает в себя 4 напитка, 21 блюдо, 3 комплексных обеда.

Напитки: молочный коктейль, смузи и лимонад. В основе – мороженое, соки, газированная вода, сахарный сироп (кордиал), дополненные в некоторых случаях сладостями в чистом виде. Вода, некрепкие чаи, какао с минимальным содержанием сахара, молоко или кисломолочные напитки, соответствующие принципам здорового питания, не предлагаются.

Блюда изначально не разделены на подгруппы: суп, салат, основные блюда, закуски и десерты представлены единым перечнем, что может подталкивать ребенка при самостоятельном изучении меню к выбору десерта в конкретный прием пищи вместо более полезных, например, супа или мясного блюда с овощами. И в таком случае родителям психологически порой крайне сложно перенаправить ребенка в сторону здорового питания, особенно учитывая, что меню содержит реалистичные фотографии и не требует навыков чтения для принятия решения со стороны дошкольника. Аналогично, посещая ресторан, например, с родственниками, не осведомленными иногда

базовыми принципами здорового питания детей, ребенок может получить несбалансированный обед только лишь потому, что заказ для него сделан из раздела «Детское меню». Частым заблуждением для обывателя является информация, дополненная детским иллюстративным контентом, с пометкой «для детей», содержащая имитацию детской речи или множество уменьшительно-ласкательных слов как действительно соответствующая потребностям ребенка.

К «полезным» блюдам можно отнести: салат «витаминное королевство» (овощной салат со сметаной), «кукурузные монетки» (запеченная кукуруза), «овощной хруст-хруст» (кусочки свежего огурца, моркови, яблока), «волшебный супчик» (куриный суп с фрикадельками и овощами, включая брокколи), «сырники сицилийские солнышки». Такой ассортимент позволяет закрыть потребность ребенка в здоровом питании вне дома единожды, но не при ежедневном или частом посещении ресторана. Отмечается отсутствие разнообразия круп, содержащих сложные углеводы; разных сортов мяса, бобовых и блюд из яиц, богатых белком; свежих овощей и фруктов – клетчатка и витамины; насыщенных жиров. Субпродукты, морепродукты и рыба в детском меню «Сицилии» отсутствуют.

Остальные блюда явно не поддерживают принципы здорового питания для детей. В основе приготовления многих позиций технология обжарки с использованием фритюра, дополненная подачей соусов на основе майонеза или кетчупом, повышенное содержание соли в рецептурах («попкорн для героев» - куриные наггетсы, «фри космические лучики» - картофель фри с кетчупом и сырным соусом, «шарики непоседы» – картофельные крокеты с сырным соусом), тесто из пшеничной муки как основной ингредиент («пицца сицилийская мозаика», «паста сырные завитушки», «пельмешки-конфетки» - разноцветные пельмени из индейки, «пицца луна с сосисками», «паста с попрыгунчиками» – спагетти с куриными фрикадельками). Блюда, приготовленные во фритюре, пицца и бургеры – это фастфуд, который слишком калориен для нормального питания детей и содержит быстроусваиваемые углеводы. «Бургер с овощными палочками», хотя и подается с кусочками свежего огурца и моркови, дополнен сырным соусом и кетчупом; к тому же по определению не относится к здоровому меню как детей, так и взрослых. Здесь его конкретный состав включает в себя и пшеничную булочку, и майонез, и жареную котлету. «Салат оливьешка» – классический салат оливье, дополненный несколькими ломтиками огурца и томатов черри, отдельно лежащими на тарелке. Обычно салаты, заправленные майонезными соусами, не предлагают детям при учете принципов здорового питания по причине высокожирового состава. Основные блюда в виде куриных котлет с картофельным пюре («куриные шарики с пюре», «куриная медалька с пюре») практически дублируют друг друга, различаясь дополнением в виде овощей, но при этом в основе состава предлагая гарнир с наиболее высоким содержанием углеводов и крахмала; гарнир без выбора альтернативы.

Польза десертов на основе свежих фруктов и ягод как бананы, яблоки, клубника («салат фруктовый салют», «канапе сказочные зефирки») спорна, поскольку составы включают в себя сладкие взбитые сливки, джем, консервированные персики в сиропе, зефир. Десерты без сахара или с минимальным количеством не представлены. Сезонность свежих фруктов и ягод недостаточно учтена. Исследование проводится в зимний период, когда в России наиболее актуальны клюква, айва, хурма, гранат и др. Остальная часть позиций – сладости с классическими для десертов составами (шоколадная основа, панна-котта); без содержания свежих фруктов или ягод.

Комплексные обеды с фиксированным списком блюд («комбо большая перемена», «комбо школьник») предлагают 50/50 сочетание свежих овощей и фастфуда: овощной салат и куриные наггетсы, нарезка свежих овощей и картофельные крокеты соответственно. «Комбо хэппи кид» предлагает 4 блюда с выбором каждого из двух позиций, где только один раз из четырех есть возможность приобрести «витаминные палочки» (нарезанные свежие овощи и яблоко) вместо фастфуда. Напиток во всех вариантах «комбо» - морс с сахаром. Отсутствует возможность заказать по специальной цене полноценный обед из двух и более блюд, полезных для питания детей дошкольного возраста.

Стоит отметить, что основное меню семейных ресторанов «Сицилия» разделено на стандартные группы блюд, дополненные разделами «Пицца» и «Роллы». Нельзя с уверенностью сказать, что в нем есть достойные альтернативы детскому меню, которые удовлетворят потребность ребенка в здоровом питании. Специфика ресторанного обслуживания подразумевает приготовление блюд по специальному заказу гостя из имеющихся продуктов. Но такая процедура всегда усложняет процесс заказа, увеличивает время приготовления блюд как нестандартный процесс вне технологических карт и рутинных регламентов, деформирует опыт и впечатления гостя, предъявляет больше требований к квалификации персонала. Зачастую результат не всегда удовлетворяет потребителя такой дополнительной услуги, который здесь выступает в качестве создателя собственного рецепта или технологии приготовления и подачи, передавая свое видение конечного продукта через официанта и его восприятие поварам на кухню.

Заключение. Конкретный кейс можно адаптировать к принципам здорового питания детей дошкольного возраста. Инициативы могут иметь поэтапный и проектный характер исполнения, введение которых можно начать с одного из ресторанов сети «Сицилия», где чаще других есть запрос гостей на здоровое детское меню на основе обработки обратной связи. Питьевую воду для детей можно разместить на барной станции в соответствующей интерьеру функциональной и безопасной таре, из которой официант всегда сможет налить порцию для любого ребенка. Такой запрос повсеместен для гостей с детьми в семейных ресторанах любого ценового диапазона. Процесс законодательно не является обязательным к исполнению предприятиями общественного питания, но распространен как инструмент

дополнительной лояльности к гостям. Десерты могут быть выделены в качестве отдельной группы от сытных блюд, чтобы не мешать выбору в пользу горячего питания для семей, пришедших с целью накормить ребенка полноценно. Мясной ассортимент можно разнообразить хотя бы еще одним сортом мяса и дополнить рыбным блюдом. Стоит пересмотреть дублирующие позиции пицц, котлет с картофельным пюре, макаронных изделий. Уместно предложить юным гостям на выбор цельнозерновой или овощной гарнир, прошедший термическую обработку. Фруктовый салат, проработанный без взбитых сливок, сахара и содержащих его продуктов, вероятно, будет иметь более низкую себестоимость и займет лидирующую позицию в качестве «здорового» десерта. Сезонные фрукты и ягоды, заменяя дорогостоящую в зимнее время клубнику, сэкономят фактором уменьшения себестоимости десертной карты.

Проведенный анализ детского меню сети семейных ресторанов «Сицилия» не призывает полностью исключить из ассортиментной матрицы фастфуд или сладкие напитки. Однако, дает возможность франшизе посмотреть шире на текущие устойчивые тенденции и принципы здорового детского меню и векторно определить точки роста с позиции ассортиментной матрицы в пользу регулярного посещения ресторанов семьями с детьми, преследующими возможность получить полноценный здоровый рацион в течение дня не только в образовательных учреждениях или дома.

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К ВОПРОСУ МОДЕРНИЗАЦИИ БИЗНЕС-ПРОЦЕССА В СТРАХОВОЙ ДЕЯТЕЛЬНОСТИ

***Аннотация:** В статье анализируется сущность бизнес-процесса и его развитие в страховании. На основе анализа современных тенденций и практического опыта сформулированы предложения по совершенствованию механизма управления бизнес-процессами в страховых компаниях.*

***Ключевые слова:** стоимость процесса, система продаж, страховой продукт, активный контакт, традиционный маркетинг, урегулирование, страховые убытки, эксперт, бухгалтер, потребительские качества, страховщики, финансовый результат, страховой тариф, франшиз, страховщик.*

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ON THE ISSUE OF MODERNIZING THE BUSINESS PROCESS IN INSURANCE ACTIVITIES

***Abstract:** The article analyzes the essence of the business process and its development in insurance. Based on an analysis of current trends and practical experience, proposals have been formulated to improve the mechanism for managing business processes in insurance companies.*

***Key words:** process cost, sales system, insurance product, active contact, traditional marketing, settlement, insurance losses, expert, accountant, consumer qualities, insurers, financial result, insurance rate, deductible, insurer.*

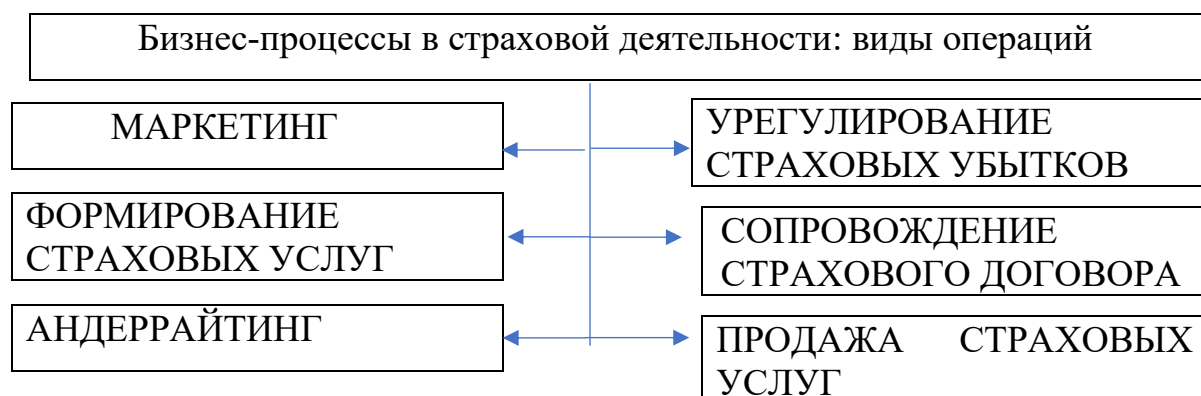
В страховой деятельности традиционно бизнес-процесс определяется как логически выстроенная последовательность действий по решению конкретизированных задач по менеджменту страховой компании. Бизнес-процесс это набор необходимых и достаточных мероприятий, оптимально и эффективно связывающих точку входа в процесс (начало) и точку выхода из процесса (результат решения) определенной бизнес-задачи. т.е. это мероприятия, приводящие к заданной результативности процесса [1].

Совокупность этапов бизнес-процесса в страховой деятельности можно представить в виде следующей последовательности действий: маркетинг, формирование страховых услуг, продажа страховых услуг, андеррайтинг,

сопровождение страхового договора, урегулирование страховых убытков (Схема 1).

Схема 1

Этапы бизнес-процесса в страховой деятельности



Система продажи страховых продуктов должна обеспечивать возможность активного контакта клиента не только с продавцом, как это происходит в традиционном маркетинге, но и со специалистами по рассмотрению и урегулированию страховых убытков, экспертами, бухгалтерами. Все эти специалисты, взаимодействуя между собой, обеспечивают конкретные потребительские качества страхового продукта в целом. Страховщики не всегда могут разграничить отдельные этапы бизнес-процесса, как, например, андеррайтинг и продажу страховых услуг.

Причем известно, что андеррайтинг процедура действий по принятию на ответственность страховщика или отклонению заявленных рисков по объекту страхования с установлением страхового тарифа и франшиз в целях предложения страхового продукта с условиями, удовлетворяющими страховщика и страхователя, а также защиты страхового портфеля по конкретному виду страхования. Однако для получения положительного финансового результата страхования необходимо не только правильно рассчитать стоимость страховой услуги, но и отобрать такие риски для которых суммарный убыток по страховому портфелю будет ниже суммарного тарифного убытка. Отобранные таким образом риски трансфера можно назвать качественно рентабельными, а соответствующие им суммарные убытки-суммарно рентабельным страховым убытком. Полученный финансовый результат называют андеррайтерским финансовым результатом.

Уменьшение суммарных убытков возможно при условии:

- отбора объектов, наиболее устойчивых к проявлениям рисков;
- ограничение лимитов ответственности страховщика;
- реализации превентивных мероприятий по повышению устойчивости объекта к воздействию рисков;
- разработки и реализации системы трансформации рисков.

Естественно, что выполнение таких условий требует от андеррайтера специальных знаний, интуиции и умения прогнозировать результат трансфера

риск на практике эти условия неизбежно ограничивают продажи, и цель андеррайтинга вступает в противоречие с целями продавцов. Разрешение этого противоречия реализуется путем разделения предлагаемых страховщиком услуг на массовые виды страхования однородных и относительно простых объектов (рисков), не требующих тщательного индивидуального андеррайтинга, и трансфер сложных объектов с индивидуальным андеррайтингом. В массовых продажах условия трансфера рисков стандартизируются, что упрощает андеррайтинг и позволяет выполнять его продавцу.

Оказание страховой услуги начинается с продажи полиса (подписание договора и получение страховой премии) и продолжается весь период его действия. Сопровождение и обслуживание договора страхования обычно включает следующие операции:

- ввод и хранение договора в базе данных;
- отражение операций в бухгалтерском учете;
- контроль за своевременностью и полнотой поступления страховых премий при уплате их в рассрочку;
- расчет и инвестирование страховых резервов;
- контроль за состоянием застрахованного объекта (условия эксплуатации, хранения, наличие или отсутствие модернизации, переделок, ремонта и т.п.) с целью своевременного учета изменения степени застрахованных рисков;
- внесение при необходимости изменений в договор страхования;
- отслеживание сроков окончания договора для своевременного предложения страхователю его продления;
- предоставление клиентам дополнительных услуг, предусмотренных договором. Обычно стандарты учета договоров каждый страховщик определяет самостоятельно.

Для страхователя страховая услуга материализуется при наступлении страхового случая в виде страховой выплаты, компенсирующей его материально-финансовые потери. Основной задачей оплаты страховых убытков является исполнение договора страхования, т.е. урегулирование, возмещение убытков и вреда, причиненных имущественным интересам страхователя (застрахованного) при наступлении страховых случаев, а в широком смысле реализация защитной функции страхования.

Урегулирование убытков оказывает неоднозначное влияние на конечный финансовый результат страхования. Задержка сроков или уменьшение суммы страховой выплаты, несомненно, повышает текущий финансовый результат страхования, и очень многие страховые компании этим пользуются. Однако спустя некоторое время это вызывает заметное недовольство страхователей и застрахованных, приводит к распространению негативной информации о страховой компании и в конечном итоге оттоку страхователей, снижению поступающей страховой премии и финансового результата.

Выбор конкретных методов для улучшения показателей бизнес-процесса определяется направлением влияния метода и сто соответствия целям модернизации бизнес-процесса: функциональным составом бизнес-процесса; информационным взаимодействием; затратами ресурсов; качеством организации бизнес-процессов.

В заключении необходимо отметить, что из всех этапов бизнес-процесса именно андеррайтинг и урегулирование убытков являются исключительно страховыми, причем урегулирование убытков более подвержено имиджевым соображениям. Вопрос выплачивать выплату или нет часто решается с учетом дальнейших взаимоотношений с клиентом. В среднем страховые компании теряют до 6% (по автострахованию до 20%) клиентов из-за недовольства сроками и размерами страховых выплат. Поэтому процесс урегулирования убытков приобретает дополнительную функцию сохранение клиентов.

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ПРОЦЕССЫ ОПУСТЫНИВАНИЯ В УЗБЕКИСТАНЕ И ИХ СОЦИАЛЬНО-ЭКОНОМИЧЕСКИЕ ПОСЛЕДСТВИЯ

Аннотация: В статье проведён глубокий анализ процессов опустынивания на территории Узбекистана под воздействием природных и антропогенных факторов, а также их экологических, экономических и социальных последствий. Установлено, что наиболее интенсивно процессы опустынивания происходят в регионах Приаралья, Каракалпакстана, Хорезмской, Навоийской и Бухарской областей. Автор рассматривает стратегические программы Узбекистана по борьбе с опустыниванием — «Зелёное пространство», «Концепция охраны окружающей среды–2030», «Программа создания защитных лесов в пустынных зонах» — и результаты международного сотрудничества. Особое внимание уделено роли науки, образования и инновационных технологий, в частности технологии «Агропарвоз» и солеустойчивых (галофитных) растений. В статье показаны научно обоснованные результаты расширения зелёного покрова в пустынных районах, восстановления плодородия почв и укрепления экологической устойчивости.

Ключевые слова: опустынивание, деградация, ветровая эрозия, засоление, Оролкум, экологическая устойчивость, «Зелёное пространство», индекс дефляции, галофиты, Приаралье, изменение климата, технология «Агропарвоз», устойчивое развитие, экологическая политика, водные ресурсы, пустынные лесонасаждения, экологическая стратегия Узбекистана.

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DESERTIFICATION PROCESSES IN UZBEKISTAN AND THEIR SOCIO-ECONOMIC CONSEQUENCES

Abstract: The article provides a comprehensive analysis of desertification processes in Uzbekistan under the influence of natural and anthropogenic factors, highlighting their ecological, economic, and social impacts. The study emphasizes that desertification is most severe in the regions of the Aral Sea basin, Karakalpakstan, Khorezm, Navoi, and Bukhara. The author analyzes Uzbekistan's national strategic programs to combat desertification — such as the “Green Space”

initiative, the “Environmental Protection Concept–2030,” and the “Desert Shelterbelt Afforestation Program” — along with results of international cooperation. Special attention is given to the role of science, education, and innovative technologies, particularly the “Agroparvoz” technology and halophytic (salt-tolerant) plants. The article scientifically substantiates the expansion of green cover, improvement of soil fertility, and enhancement of ecological sustainability in desert areas.

Keywords: *desertification, degradation, wind erosion, salinization, Orolkum, ecological sustainability, “Green Space,” deflation index, halophytic plants, Aral Sea region, climate change, “Agroparvoz” technology, sustainable development, environmental policy, water resources, desert afforestation, Uzbekistan’s ecological strategy.*

За последние десятилетия на территории Узбекистана процессы опустынивания и изменения климата стали одними из наиболее актуальных экологических, экономических и социальных проблем. Более 80 % площади республики относится к засушливым и полузасушливым зонам. В таких условиях деградация земельных ресурсов, дефицит воды и нарушение биогеоценозов превращаются не только в экологическую, но и в экономическую угрозу безопасности страны.

За последние 50–60 лет площадь ледников в Центральной Азии сократилась примерно на 30 %, что привело к резкому уменьшению объёма воды в бассейнах Амударьи и Сырдарьи. Согласно данным ООН за 2023 год, к 2050 году дефицит пресной воды в регионе может привести к снижению валового внутреннего продукта на 10–11 %.

Поэтому борьба с опустыниванием является стратегическим приоритетом экологической политики Узбекистана. Опустынивание представляет собой угрозу не только для природных ресурсов, но и для устойчивого развития страны, здоровья населения и экономической безопасности. Углубление этого процесса приводит к снижению плодородия почв, сокращению водных ресурсов, утрате флоры и фауны, а также усилению миграции населения.

В связи с этим на государственном уровне предпринимаются меры по замедлению процессов опустынивания, рациональному использованию земельных ресурсов, восстановлению экологических систем и формированию политики управления, основанной на принципах устойчивого развития. Всё это является неотъемлемой частью долгосрочной экологической стратегии Узбекистана.

Сегодня борьба с опустыниванием тесно связана с национальными интересами республики, в частности с инициативой «Зелёное пространство», Целями устойчивого развития ООН (SDG-15) и экологическими приоритетами, определёнными в стратегии «Узбекистан – 2030».

Опустынивание — это совокупность природно-географических и антропогенных процессов, происходящих в засушливых районах и

вызывающих разрушение экологических систем, ухудшение всех форм органической жизни и, как следствие, снижение природно-экономического потенциала территорий. Эти процессы включают сокращение видового разнообразия и количества естественной растительности, эрозию почв, засоление и снижение их плодородия.

В результате опустынивания площадь пустынь увеличивается, формируются ландшафты пустынного типа. Почти 48,5 млн км² земной поверхности занято пустынями и полупустынями, из которых около 10 млн км² возникли под воздействием антропогенных факторов. Процессы опустынивания наблюдаются практически на всех континентах, особенно в засушливых районах Африки, Азии, Австралии и Южной Америки.

В Центральной Азии они ярко выражены в районе Аральского моря и Приаралья, где сложилась крайне тяжёлая экологическая ситуация. Опустынивание стало сложной и глобальной экологической проблемой современного мира.

Процессы опустынивания в Узбекистане происходят под воздействием сложного взаимодействия природных и антропогенных факторов. Оба эти фактора взаимно усиливают друг друга, ускоряя деградацию природных ресурсов. Ниже рассмотрены основные из них.

1. Природные факторы

Большая часть территории Узбекистана относится к сухим и полусухим климатическим зонам. Количество осадков здесь не превышает в среднем 100–250 мм в год, а в некоторых пустынных районах — около 80 мм. В таких климатических условиях дефицит влаги замедляет биологические процессы в почве и препятствует естественному восстановлению растительности.

Среднегодовая температура в Узбекистане за последние 50 лет повысилась на 1,5–1,7 °С, что усилило испаряемость и привело к сокращению запасов поверхностных и подземных вод.

Ветровая эрозия — ещё один ключевой фактор пустынного климата. Весной и летом дуют сухие ветры — “гармсель”, которые уносят плодородный верхний слой почвы. Ежегодно теряется 5–7 миллионов тонн плодородной земли. В результате структура почв ухудшается, и они становятся непригодными для сельского хозяйства.

Уровень грунтовых вод постепенно снижается, а их минерализация растёт. Это приводит к засолению почв и нарушению водно-питательного баланса, необходимого для роста растений. Особенно остро эта проблема ощущается в Хорезмской, Каракалпакской и Бухарской областях, где ежегодно расширяются площади засоленных земель, что снижает урожайность орошаемых территорий.

2. Антропогенные факторы

Если природные процессы создают предпосылки для опустынивания, то деятельность человека значительно усиливает его темпы. За последние десятилетия неправильное использование природных ресурсов,

неэффективное управление водными ресурсами и низкий уровень экологической культуры ускорили деградацию земель.

Около половины орошаемых земель страны по-прежнему поливаются по старым каналам, построенным в 1960–1970-х годах. Более 40 % этих сооружений относятся к открытым арыкам, в которых ежегодно теряется 25–30 % воды из-за испарения и фильтрации. В результате в одних районах наблюдается дефицит воды, а в других — чрезмерное орошение, вызывающее вторичное засоление.

Развитие животноводства усилило нагрузку на естественные пастбища. Из 22 млн гектаров пастбищ 43 % уже подверглись деградации. Избыточное поголовье скота препятствует восстановлению растительного покрова, что делает почву твёрдой, сухой и бедной питательными веществами.

В засушливых районах, где недостаточно источников энергии (угля, газа, электричества), население вынуждено заготавливать дрова и кустарники, что приводит к уничтожению защитного растительного слоя. Это усиливает эрозию почв, увеличивает скорость ветра и частоту песчаных и солевых бурь.

Чрезмерное использование химических удобрений в сельском хозяйстве нарушает баланс микроорганизмов в почве и загрязняет водоёмы, снижая способность почвы к естественному восстановлению.

Распределение воды часто осуществляется исходя из экономических интересов, а не экологических приоритетов. До 70 % воды Амударьи и Сырдарьи расходуется на нужды сельского хозяйства, при этом до 40 % теряется по пути из-за испарения и утечек.

По результатам исследований, 44 % процессов опустынивания связано с перегрузкой пастбищ, 25 % — с вырубкой кустарников. Остальные причины — засуха, ветровая эрозия, промышленная деятельность, загрязнение и геологические процессы — составляют около трети общей деградации земель.

Региональные особенности

Наиболее сильно опустынивание проявляется в Республике Каракалпакстан, Хорезмской, Бухарской, Навоийской, Джизакской, Сырдарьинской, Кашкадарьинской и Сурхандарьинской областях. Здесь одновременно происходят ветровая и водная эрозия, засоление, сокращение растительного покрова и повышение минерализации грунтовых вод.

В Каракалпакстане в связи с высыханием Аральского моря происходит засоление и опесчанивание старых орошаемых земель дельты Амударьи. Расширение зон саксаула и черкеза несколько снижает ветровую эрозию, но уменьшает пригодные для земледелия площади. Аэрозоли соли и пыли переносятся на большие расстояния (вдоль линии Муйнак–Канлыкуль–Кунград), снижая прозрачность воздуха и вызывая болезни дыхательных путей. На дне бывшего Арала образовалась новая пустыня — Оролдум, занимающая более 5,5 млн гектаров, где урожайность хлопка и зерновых снизилась на 40–45 %.

В Хорезмской области усиливается вторичное засоление, связанное с Амударьей и коллекторно-дренажной системой. Ветровая эрозия (особенно в

межвегетационный период) истончает гумусовый слой, а нарушения в севообороте снижают урожайность.

В Навоийской и Бухарской областях (Кызылкум, Томди–Учкудук) интенсивная дефляция приводит к потере почв. Старые открытые каналы способствуют испарению и подъёму солевого горизонта, ускоряя вторичное засоление.

В Джизакской и Сырдарьинской областях (Мирзачуль) сильные ветра весной и зимой разрушают контуры орошаемых массивов, а минерализация дренажных вод вызывает повторное засоление почв.

В Кашкадарьинской и Сурхандарьинской областях (пустыня Шерабад, плато Карши) усиливаются ветровые процессы, а нехватка защитных лесных полос делает новые сельхозугодья уязвимыми.

Даже Ферганская долина, несмотря на более влажный климат, страдает от солевых аэрозолей, переносимых из Приаралья, что приводит к ожогам листьев плодовых и овощных культур.

Экологические и социально-экономические последствия опустынивания заключаются в следующем.

Ветровая эрозия (дефляция) уносит плодородный гумусовый слой; вторичное засоление усиливается; солевые горизонты вновь появляются в почвенном профиле. Эти процессы особенно интенсивно проявляются в пустынных и полупустынных зонах.

Наблюдается сокращение биологического разнообразия — ухудшаются естественные местообитания растений и животных, увеличивается число видов, занесённых в Красную книгу.

Нарушается устойчивость ландшафтов: сокращение пастбищной растительности усиливает дефляцию, увеличивает частоту и дальность перемещения песчано-пылевых потоков; доля устойчивых галофитов (солеустойчивых растений) возрастает, что изменяет структуру естественных фитоценозов.

Снижается урожайность: в Приаралье урожай хлопка и зерновых снизился на 40–45 %, что связано с засолением, пыле-солевыми отложениями и перебоями в водоснабжении.

Площадь орошаемых земель ежегодно сокращается, а эффективность коллекторно-дренажных систем падает; в результате освоенные территории теряют стабильность из-за засоления и дефицита воды.

43 % природных пастбищ деградированы, избыточная нагрузка сокращает кормовую базу для животноводства.

Изношенность оросительных систем, большие потери воды при испарении и фильтрации усиливают водный дефицит в нижних течениях рек; при нарушении режима промывки солевые горизонты вновь формируются в почвенном профиле.

Пыле-солевые потоки из зоны Оролкум распространяются на сотни километров, проникая через Каракалпакстан и Хорезм вглубь страны — в направлении Навои–Джизак, а также в Ташкентскую область и Ферганскую

долину. Это снижает качество агротехнических работ и ухудшает состояние сельхозугодий.

Пылевые и солевые бури увеличивают риск заболеваний дыхательных путей и сердечно-сосудистой системы; в Приаралье усиление этих факторов подтверждено научными и практическими наблюдениями.

Падение урожайности, дефицит воды, деградация пастбищ и рост числа пыльных дней оказывают давление на экономическую устойчивость регионов; снижение доходов и перегрузка социальной инфраструктуры усиливают внутреннюю миграцию населения.

Чтобы смягчить негативные последствия опустынивания и снизить его воздействие на окружающую среду, правительство Узбекистана определило борьбу с деградацией земель как один из приоритетов национальной экологической политики. В последние годы на государственном уровне были разработаны стратегические документы и комплексные программы:

«Концепция охраны окружающей среды – 2030»;

«Концепция развития водного хозяйства – 2020–2030»;

«Программа создания защитных лесов в пустынных районах – 2025–2030»;

Общенациональный проект «Зелёное пространство» («Yashil makon»).

На основе этих документов борьба с опустыниванием осуществляется как многоотраслевая, поэтапная и результативно-ориентированная система.

Узбекистан активно изучает передовой опыт Китая, Израиля, Турции, Кореи и Японии.

Китайский опыт («Зелёная стена»): планируется покрыть лесом пустыню Гоби к 2050 году. По аналогии Узбекистан высаживает миллионы саженцев саксаула в Оролкуме.

Израильский опыт: создание централизованного водного управления, переработка сточных вод и системы сбора влаги. Эти подходы адаптируются к условиям Узбекистана — в частности, в Джизаке и Каракалпакистане тестируются водоочистительные модули.

Технология «Агропарвоз»: с помощью мотодельтапланов семена пустынных растений рассеиваются с воздуха; техника гранулирования семян полностью локализована, зарегистрированы 4 патента, и уже получены практические результаты в Оролкуме.

Совместно с Институтом экологии и географии Синьцзяна (КНР) созданы 5 лесных хозяйств (Арнасай, Нукус, Каракульсай, Муборак, Каромий), где организованы галофитные питомники; завезено 1 325 кг семян 35 видов солеустойчивых растений.

В 2023 году в Приаралье были испытаны 23 вида галофитов, а с болгарской компанией «АСТА» заключён контракт на лесоразведение на площади 50 тыс. гектаров.

На период 2025–2030 годов запланировано создание 1,5 млн гектаров защитных лесов в пустынных районах. Для обеспечения экологической устойчивости активно работают научные центры при «Green University», НИИ

лесного хозяйства и Министерстве экологии, занимающиеся изучением, гранулированием и выращиванием пустынных растений.

С 2018 года на высохшем дне Аральского моря создано более 2 млн гектаров зелёных насаждений, где высажены саксаул, кандим, черкез, юльгун и тамарикс, что позволило существенно снизить дефляцию. На следующем этапе планируется озеленять ежегодно по 250 тыс. гектаров в семи регионах — Каракалпакстане, Хорезме, Бухаре, Навои, Джизаке, Кашкадарье и Сурхандарье.

Кроме того, при поддержке ООН, ГЭФ, ЛСА, KOICA и других международных организаций реализуется более 20 проектов, направленных на обеспечение экологической устойчивости в Приаралье и пустынных зонах страны.

Для оценки результативности государственной политики в сфере борьбы с опустыниванием сформированы следующие основные индикаторы:

Направление	Показатели	Реализованные меры
Лесовосстановление	Создано 2 млн гектаров зелёных насаждений в пустынных зонах (2018–2024 гг.)	В Оролкуме сформированы защитные леса; частота дефляции снизилась на 20–25 %
Технологические инновации	Внедрён метод посева семян «Агропарвоз», зарегистрировано 4 патента	Реализована технология посева гранулированных семян
Агробιοтехнологии галофитов	Испытано 23 вида солеустойчивых растений	Успешные результаты на полигонах Нукус–Муйнак–Арнасай
Международное сотрудничество	АСТА (Болгария), GIZ (Германия), Nestlé, SIBERIAN Wellness	Создаются 50 тыс. гектаров пустынно-лесных плантаций
Индекс дефляции	Частота пылевых бурь снизилась на 30 % в 2018–2024 гг.	Наблюдается восстановление растительного покрова в Приаралье
Восстановление урожайности	Урожай хлопка в Приаралье увеличился в среднем на 1,5–2 ц/га	Фиксируется процесс восстановления, связанный с уменьшением засоления

Человеческий капитал является решающим фактором в борьбе с опустыниванием. Поэтому в системе образования Узбекистана особое внимание уделяется повышению экологической грамотности населения. Реформы в этой сфере охватывают несколько ключевых направлений:

Интеграция экологических дисциплин в школьное образование

В учебные программы 6–11-х классов по предметам «География», «Биология» и «Охрана окружающей среды» включены новые разделы, посвящённые вопросам опустынивания, рационального водопользования, изменения климата и зелёных технологий. Например, тема «Зелёная экономика» преподаётся на уроках географии на примере Приаралья.

Расширение экологического образования в вузах

В высших учебных заведениях активно развиваются направления подготовки «Экологический менеджмент» и «Экология и охрана окружающей среды».

В университетах Самарканда, Ташкента, Нукуса, Термеза и Карши введены новые дисциплины — «Управление процессами опустынивания», «Устойчивые пастбищные системы».

На уровне магистратуры обучают экологическому анализу, моделированию ландшафтов и мониторингу с применением ГИС-технологий.

Экологическое просвещение и развитие гражданской ответственности

Регулярно проводятся акции «Зелёная школа», «Экологическая неделя» и «Одно дерево – одна капля жизни».

Для студентов, фермеров и педагогов реализуется программа «Экологические лидеры», направленная на формирование практических навыков устойчивого природопользования.

Подготовка специалистов по пустынному хозяйству через систему профессионального образования

Созданы учебно-практические базы для лесных хозяйств, работающих в пустынных и полупустынных зонах.

Проводятся курсы повышения квалификации по управлению водосберегающими технологиями, фиксации песков и уходу за защитными лесами.

Результаты реализации системных мер и международного сотрудничества

В результате комплексных мер и международных проектов в пустынных регионах Узбекистана достигнуты значительные положительные изменения:

Влажность почв увеличилась на 8–10 %, восстановилось плодородие, микробиологическая активность выросла в 1,5 раза.

Биомасса саксаула и кандима увеличилась на 30 %, скорость ветровой эрозии снизилась.

По данным научного мониторинга, индекс дефляции за 2018–2024 годы снизился на 25–30 %.

В 2024 году более 180 тысяч учащихся прошли обучение по экологическим программам, что укрепило экологическое мировоззрение молодёжи.

В зонах дефляции частота пылевых бурь уменьшилась, прозрачность воздуха улучшилась на 12–15 %.

Объём зелёной биомассы в пустынных ландшафтах увеличился в 1,3 раза.

Новые лесные массивы ежегодно поглощают до 100 тысяч тонн CO₂, повышая потенциал адаптации к изменению климата.

В пустынных районах создаются новые рабочие места — только в Приаралье появилось свыше 3 тысяч рабочих мест.

Кроме того, через экологические образовательные программы молодёжь и фермеры обучаются экологической культуре, экономии воды и рациональному управлению природными ресурсами.

Заключение. Таким образом, национальная политика Узбекистана по борьбе с опустыниванием трансформируется из исключительно экологической стратегии в комплексную модель, направленную также на экономическое восстановление, занятость и климатическую адаптацию.

К 2030 году поставлены цели:

- увеличить площадь зелёного покрова в Оролкуме до 3 млн гектаров,
- сократить индекс дефляции как минимум на 40 %,
- создать устойчивые агроэкосистемы в пустынных зонах.

Сочетание науки, образования и инноваций становится ключевым инструментом поиска устойчивых решений проблемы опустынивания.

Исследования и образовательные программы способствуют не только восстановлению экологического равновесия, но и формированию экологического мышления, ответственности и “зелёного” мировоззрения в обществе.

На этой основе Узбекистан формирует национальную инновационную модель борьбы с опустыниванием, опирающуюся на научный подход и международный опыт.

Использованные источники:

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ЭКЗОТЕРМИЧЕСКИЕ ПРОЦЕССЫ В МНОГОКОМПОНЕНТНЫХ СТРОИТЕЛЬНЫХ МАТЕРИАЛАХ С УЧЁТОМ СОЛНЕЧНОЙ РАДИАЦИИ

***Аннотация:** В статье показана доля экзотермии в общих энергетических затратах при оценке эффективности различных режимов гелиотеплохимического воздействия на многокомпонентные цементные материалы. Проведены оценочные расчёты влияния режимов тепловыделения в многокомпонентных цементных материалах с учётом коэффициента лучепоглощения материала.*

***Ключевые слова:** тепломассоперенос, солнечная радиация, многокомпонентные цементные материалы, теплоперенос, лучепоглощение, тепловыделение, термообработка.*

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EXOTHERMIC PROCESSES IN MULTICOMPONENT BUILDING MATERIALS WITH CONSIDERATION OF SOLAR RADIATION

***Abstract:** The article presents the contribution of exothermic reactions to the total energy consumption when evaluating the effectiveness of various heliothermal–chemical treatment regimes for multicomponent cement materials. Estimation calculations are carried out to assess the influence of heat-release*

regimes in multicomponent cement materials, taking into account the material's radiation absorption coefficient.

Keywords: *heat and mass transfer, solar radiation, multicomponent cement materials, heat transfer, radiation absorption, heat release, heat treatment.*

Введение: при разработке оптимальных режимов тепломассопереноса с учётом солнечной радиации, направленных на интенсификацию процесса твердения многокомпонентных цементных материалов, наряду с задачей обеспечения высокого качества изделий, важное значение приобретает прогнозирование энергетически обоснованных условий технологического процесса при экономически оптимальном расходе энергетических ресурсов [1, с. 10].

Процесс теплопереноса в нагреваемом и твердеющем изделии из многокомпонентных цементных материалов с учётом коэффициента лучепоглощения описывается следующей системой уравнений.

$$c\rho \frac{\partial t(x, \tau)}{\partial \tau} = \lambda \frac{\partial^2 t(x, \tau)}{\partial x^2} + q_v(t, \tau) + q_l; \quad 0 \leq x \leq 1 \quad (1)$$

$$t(x, 0) = t_n; \quad t(0, \tau) = t_{cp} \tau; \quad (2)$$

$$t(x, 0) = t_n; \quad t_{cp} \tau = t(0, \tau); \quad (3)$$

$$\frac{\partial t(r+0, \tau)}{\partial x} = \frac{\partial t(r-0, \tau)}{\partial x}; \quad \frac{\partial t(l, \tau)}{\partial x}; \quad (4)$$

где $q_m(l, \tau) = m_m q_9(t, \tau)$ - объемный источник теплоты от гидратации цемента, Вт/м³;

$\lambda = 0,28-0,32$ Вт/м⁰К- коэффициент теплопроводности;

c - удельная теплоемкость золоцементного материала, 830-870 Вт/м³ К;

ρ - плотность бетона, 1316-1530 кг/м³;

m_v - масса цемента в 1 м³ бетона, 180-295 кг/м³;

l - толщина золоцементного изделия, 0,1; 0,2; 0,3 м;

q_9 - интенсивность внутреннего источника теплоты, Вт/кг;

t_n - температура греющей поверхности, причем при $0 \leq \tau \leq 7200c$

$$t_{cp}(\tau) = (t_{max} - t_n) \tau / 7200 + t_n; \quad t_{cp}(\tau) = t_{max};$$

при этом $t_n = 20^\circ\text{C}$, $t_{max} = 80^\circ\text{C}$.

Зависимости интенсивности тепловыделения от температуры и времени моделировались по методу равных тепловыделений [2, с. 95] на основе экспериментально полученного набора кривых для изотермических

условий [3, с. 87], которые при численной реализации аппроксимировались сплайнами первого порядка.

Для численной реализации модели (1)–(4) использовалась явная конечно-разностная схема [4–6], позволяющая в общей динамике температур выделить составляющую, обусловленную действием внутреннего источника тепла.

$$t_i^j = \frac{\lambda}{c \cdot \rho \frac{\Delta \tau}{\Delta x^2}} (t_{i-1}^{j-1} - 2t_i^{j-1} + t_{i+1}^{j-1}) + t_i^{j-1} + \frac{m_v - \Delta \tau}{c \rho} q_{\varepsilon i}^{j*}; (5)$$

где $I = 0, N$; $N = 5$; $j = 0, k$; $k = 600$; j^* - индекс момента времени, определяемый по методике равных тепловыделений, i .

Порядок аппроксимации разностной схемы (5) зависит не только от порядка аппроксимации уравнения, но и краевых условий. Начальные и граничные условия 1-го рода при $x = 0$ аппроксимируются точно, а на границе $x = 1$ с точностью $O(\Delta x)$ [17]. Для повышения порядка аппроксимации краевых условий (4) при $x = 1$ раскладывали производную в ряд Тейлора в окрестности точки $x = 1$:

$$t(l, \tau) = \frac{\partial t(l, x)}{\partial x} = t(l, \tau) - \frac{\Delta x}{2} \cdot \frac{\partial^2 t(l, \tau)}{\partial x^2} + O(\Delta x^2).$$

Отсюда

$$\frac{\partial t(j, \tau)}{\partial x} = t(l, \tau) - \frac{\Delta x}{2} \cdot \frac{\partial^2 t(l, \tau)}{\partial x^2} + O(\Delta x).$$

Выразив вторую производную из уравнения (4.1)

$$\frac{\partial^2 t(j, \tau)}{\partial x^2} = \frac{c \cdot \rho}{\lambda} \frac{\partial t(l, \tau)}{\partial \tau} - \frac{m_v}{c \cdot \rho} q_{\varepsilon}(t, \tau) \quad (6)$$

и учитывая, что на этой границе $\Delta t / \Delta x = 0$, получим

$$t(l, \tau) - \frac{\Delta x}{2\lambda} \cdot c \cdot \rho \left[\lambda \frac{\partial t(l, \tau)}{\partial \tau} - m_v \cdot q_{\text{э}}(t, \tau) \right] = 0;$$

$$t_N^j = \frac{\Delta \tau}{0,5 \cdot c \cdot \rho \cdot \Delta x^2} \left[t_N^{j-1} - t_{N-1}^{j-1} \right] + \frac{m_v - q_{\text{э}}^j}{c \cdot \rho} + t_N^{j-1} + 0(\Delta x^2). \quad (7)$$

Таким образом, разностные аналоги уравнения и краевых условий имеют одинаковый порядок аппроксимации $0(\tau + \Delta x^2)$. В (5) подъём температуры в расчётной точке за счёт внутреннего тепловыделения

$$\Delta t_{q_i}^{j-1} = \frac{m_v \cdot \Delta \tau}{c \cdot \rho} q_{\text{э}i}^{j*} + K_A \cdot q_l^i. \quad (4.8)$$

Общий рост температуры за весь период термообработки изделия

$$\sum_{j=1}^k \Delta t \cdot q_i = \sum_{j=1}^k \frac{m_v \cdot \Delta \tau}{c \cdot \rho} \cdot q_{\text{э}i}^{j*} + q_l. \quad (9)$$

Средняя по объёму тела интенсивность тепловыделения

$$q_{\text{э}}^{-j} = \frac{1}{V_v} \int_V t \cdot q_{\text{э}} dV + \frac{1}{K_A S} \int q_l^i \approx \frac{1}{N} \sum_{j=1}^N t \cdot q_{\text{э}i}^{j*} + \frac{1}{K_A} \sum_{i=1}^S q_l^i, \quad (10)$$

где - V - объём изделия, приходящейся на 1 м² обогреваемой поверхности.

Количество теплоты, выделяющейся в объеме изделия за время $\Delta \tau$

$$Q_{\text{э}}^j = m_v \cdot \Delta \tau \int_V q_{\text{э}}^i \cdot dV + \frac{1}{K_A} \int Q_l^i \approx m_v \cdot \Delta \tau \cdot \Delta x \sum_{j=1}^k Q_{\text{э}i}^j + \frac{1}{K_A} \sum_{i=1}^S Q_l^i. \quad (11)$$

Общее количество теплоты, выделившейся за промежуток времени τ

$$Q_{\Sigma} = \int_0^{\tau} Q_{\Sigma} \cdot d\tau \approx \sum_{j=1}^k Q_i^j + \sum_{i=1}^S Q_l^i. \quad (12)$$

Для расчета теплового потока, поддерживающего заданный температурный режим, решалась псевдообратная задача теплопроводности [7], в которой по значению температур на обогреваемой поверхности с учетом солнечной радиации и в прилегающем слое рассчитывалась плотность теплового потока q_F , генерируемая в гелиоустановке [8], из выражения

$$q_{\Sigma} = -\lambda \frac{\partial t}{\partial x}$$

с учётом условия (4.6), т.е.

$$q_F = -\lambda t'(0, \tau) - 0,5 \cdot \Delta x \cdot \frac{\partial^2 t(0, \tau)}{\partial x^2} + 0(\Delta x^2), \quad (13)$$

или

$$q_F = -\lambda \left[\frac{t'(0, \tau) - 0,5 \cdot \Delta x}{\left(c \cdot \rho \frac{\partial^2 t(0, \tau)}{\partial x^2} - m_v q_{\Sigma} \right)} \right]. \quad (14)$$

Выражение (4.14) можно переписать в более удобном для расчёта на ЭВМ виде

$$q_F = -\frac{\lambda}{\Delta x} (t_r^{j-1} - t_1^{j-1}) + \Delta x \cdot \lambda \cdot c \cdot \rho \cdot (t_1^j - t_1^{j-1}) \cdot 0,5 - \lambda \cdot m_v \cdot \Delta x \cdot q_{\Sigma} \cdot$$

$$0,5 + E_K \cdot C_0 \cdot \left(t_1^4 - t_0^4 \right) \cdot q_l^i \cdot \Delta x \cdot K_i$$

(15)

Количество теплоты, необходимое для обогрева изделия за время гелиотепловой обработки

$$Q_F^j = q_{\Sigma}^j \cdot \Delta \tau + q_l^i \cdot \Delta r, \quad (16)$$

а за промежуток τ

$$Q_r = \int_0^{\tau} Q_F \cdot d\tau \approx \sum_{j=1}^k Q_F^j + \sum_{i=1}^K Q_l^i. \quad (17)$$

Коэффициент эффективности

$$K_{\vartheta} = \frac{Q_{\vartheta}}{Q_r} \cdot 100\%. \quad (18)$$

Однако полученные величины носят идеализированный характер, как и величины, получаемые при решении оптимизационных задач, так как практически не могут учесть все потери теплоты в реальных условиях. [1. стр. 11.]

Результаты решения поставленной задачи для $l_1 < l_2 < l_3$. Послойное тепловыделение и соответствующий подъем температуры анализировались в трех сечениях, которые соответствовали точкам N_2 , N_3 и N_4 (точка N_3 – середина изделия; N_2 , N_4 – крайние поверхности, в то же время эти точки не подвергаются деформирующему влиянию температур на границах).

Таблица 1

Граничные показатели гелиотеплохимически обработанного изделия из многокомпонентных цементных материалов на прослойках

Граничные точки	Толщина изделия, м								
	$l = 0,1 \pm 0,001$			$l = 0,2 \pm 0,001$			$l = 0,4 \pm 0,001$		
	$\Delta t^1, 0C$	$t^1, 0C$	$Q^1_{\vartheta}, МДж$	$\Delta t^{11}, 0C$	$t^{11}, 0C$	$Q^{11}_{\vartheta}, МДж$	$\Delta t^{111}, 0C$	$t^{111}, 0C$	$Q^{111}_{\vartheta}, МДж$
N_2	16,2	79,10	1,44	18,9	77,91	3,32	18,97	71,32	4,92
N_3	14,6	80,45	1,31	18,1	76,21	3,11	14,17	60,62	3,41
N_4	13,9	80,67	1,31	17,2	73,20	2,93	9,07	51,07	2,32

Проанализируем результаты математического моделирования процесса гелиотепловой обработки изделия.

а) $l = 0,1$ м. Кривые, характеризующие расчетные послойные интенсивности тепловыделения, имеют максимумы, близко расположенные друг к другу. Это можно объяснить быстрым прогревом изделия на всю толщину, обусловленное её малой величиной. В точках N_2 и N_3 пики более

высокие и острые, чем в точке N_4 , хотя этот слой прогревается значительно быстрее. Из-за немонотонности изотермических кривых величина q_z определяется не только температурой, но и временем достижения данной температуры. В то же время действие экзотермии в точке 1 дало самое большое тепловыделение, соответственно прирост температуры, что объясняется влиянием радиации солнечного излучения (табл. 1). Через 5 ч. температура в изделии под действием экзотермии превысила температуру греющей стенки, а тепловыделение было практически одинаковое по всей толщине изделия, поскольку температура в различных точках почти одинакова.

б) $l_2 = 0,2$ м. При данной толщине изделия температура в исследуемых слоях не выравнивается до конца обогрева. Поэтому пики интенсивностей тепловыделения плавно следуют друг за другом, постепенно уменьшаясь по величине. Такая динамика хорошо согласуется с ходом изотермических кривых для соответствующих температур.

Временные показатели гелиотеплохимически обработанного золоцементного мелкозернистого композиционного изделия на прослойках представлены в табл. 2.

Таблица 2

Временные показатели тепловыделения многокомпонентных цементных материалов при гелиотеплохимической обработке

Сроки определения тепловыделения, ч.	Превышение температуры, ($^{\circ}\text{C}$), при содержании золы, мас. %				
	0	20	40	60	80
5	18	9	7	5	4
10	38	28	21	12	8
15	29	25	23	29	16
20	17	18	16	19	16
25	13	12	10	9	8
30	8	7	6	6	6
35	6	5	5	4	4

Полученные данные хорошо коррелируют с кинетикой тепловыделения золоцементных систем. Наполнение золой на 20, 40, 60 и 80% снижает тепловыделение, соответственно, на 17, 40, 50, и 57%. Введение модифицированных добавок ПАВ снижает тепловыделение на 5; 6,4; 8% в следующем порядке МПД-1 > МПД-3 > МПД-2, что объясняется избирательной адсорбцией модифицированных пластифицирующих добавок на активных центрах поверхности частиц золы и цемента.

в) При $l_3 = 0,3$ прогрев внутренних слоев изделия значительно отстаёт от прогрева внешних, поэтому величины максимумов и время их появления в исследуемых точках изделия значительно отличаются между собой. Это объясняется тем, что при переходе от одной изотермической зависимости q_3 к другой в процессе прогрева соответствующие значения тепловыделений попадают с нисходящей ветви q_3 на восходящую. Интегральные показатели гелиотеплохимически обработанного изделия из многокомпонентных цементных материалов представлены в табл. 3.

Таблица 3

Интегральные показатели гелиотеплохимически обработанного изделия из многокомпонентных цементных материалов

$l, \text{ м}$	$q_3, \text{ кВт} / \text{м}^3$	$\Gamma_{\text{max}}, \text{ ч}$	$Q_3, \text{ МД} / \text{м}^3$	$Q^*_{\text{э}}, \text{ МД} / \text{м}^3$
$0,1 \pm 0,001 \text{ м}$	4,86	5	4,31	42,10
$0,2 \pm 0,001 \text{ м}$	4,11	6	8,20	39,81
$0,3 \pm 0,001 \text{ м}$	2,07	8	15,31	38,21

$l, \text{ м}$			$Q_f^*_{\text{э}}, \text{ МДж} / \text{м}^3$		$Q^*_{\text{э}} / Q_f^*_{\text{э}}, \%$	$Q^*_{\text{э}} / Q_{\text{треб.}}^*_{\text{э}}, \%$
$0,1 \pm 0,001 \text{ м}$			13,21		31,87	16,84
$0,2 \pm 0,001 \text{ м}$			11,84		38,39	15,92
$0,3 \pm 0,001 \text{ м}$			10,37		36,85	15,28

Анализируя результаты расчётов для мелкозернистых изделий различной толщины, можно отметить следующее. Толщина изделия влияет не только на количественные характеристики тепловыделения, но изменяет и качественную картину их кинетики. [8. стр. 369.]

При этом чем толще изделие, тем больше выделяется теплоты в абсолютных единицах и тем большую долю она составляет в общих затратах

тепла на прогрев, так как при увеличении толщины композиционного изделия в расчёте на 1 м² обогреваемой поверхности увеличивается объем изделия, и, соответственно, количество цемента. В расчёте на 1 м³ изделия такой прямой зависимости уже не наблюдается. Таким образом, толщина изделия определяет глубину прогрева. При малой толщине (порядка 0,1-0,15 м, например, мелкозернистые золоцементные изделия, кирпич и др.), изделие прогревается быстро и уже к 4-му часу экзотермии дает резкий всплеск q_p (кВт/м³), а затем быстро убывает по всему объёму. При средней толщине $l = 0,2$ м создаётся наиболее благоприятный режим для тепловыделения по всей толщине, т.е. достигается достаточно большой экстремум ($\max$) q_p (МДж/м³), и тепловыделение действует продолжительное время (до 18 часов). При больших толщинах золоцементных мелкозернистых изделий с модифицированными пластифицирующими добавками ($l \approx 0,3$ или $0,4$ м), температура удалённых слоёв не поднимается соответственно выше $t'_{cp} \approx 40-45$ и $t''_{cp} \approx 38-41^\circ\text{C}$, а поэтому тепловыделение в этих слоях значительно отстаёт от более прогретых. Этим и объясняется небольшие относительные величины тепловыделения.

Таким образом, зная основные закономерности действия экзотермии в твердеющем (сруктурообразующем) золоцементном изделии полиструктурного строения и долю, которую она может составлять в общих затратах, можно оценивать эффективность того или иного режима гелиотеплохимической обработки данного класса многокомпонентных цементных материалов и изделий мелкозернистого строения.

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**АНАЛИТИЧЕСКИЙ МЕТОД РЕШЕНИЯ ЗАДАЧИ ОПРЕДЕЛЕНИЯ
МОЩНОСТИ ВНУТРЕННЕГО ИСТОЧНИКА ТЕПЛА С УЧЁТОМ
СОЛНЕЧНОЙ РАДИАЦИИ В КОМПОЗИЦИОННЫХ
СТРОИТЕЛЬНЫХ МАТЕРИАЛАХ**

***Аннотация:** В статье представлена аналитическая методика решения, позволяющая качественно оценить вклад внутреннего источника тепла в формирование температурного поля изделия с учётом тепловыделения при протекании экзотермической реакции гидратации, а также влияния солнечной радиации в процессе структурообразования многокомпонентных цементных материалов.*

***Ключевые слова:** источник тепла, гидратация, излучение, солнечная радиация, многокомпонентные цементные материалы, теплоперенос, лучепоглощение, тепловыделение, термообработка*

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**AN ANALYTICAL METHOD FOR SOLVING THE PROBLEM OF
DETERMINING THE POWER OF AN INTERNAL HEAT SOURCE
TAKING INTO ACCOUNT SOLAR RADIATION IN COMPOSITE
BUILDING MATERIALS**

***Abstract:** An analytical solution method is presented that makes it possible to qualitatively assess the contribution to the formation of the temperature field in a*

product with heat release during an exothermic reaction, taking into account solar radiation during the structure formation of multicomponent cement-based materials.

Keywords: heat source, hydration, radiation, solar radiation, multicomponent cement materials, heat transfer, radiation absorption, heat release, heat treatment

Введение

Мощность объёмного внутреннего источника тепла (q_v), обусловленного выделением теплоты гидратации, изменяется во времени в зависимости от температурного режима и коэффициента лучепоглощения золоцементного изделия полиструктурного строения [1, с. 106].

Изменение величины (q_v) во времени при фиксированной средней температуре можно приближённо представить в виде кусочно-непрерывной функции (r) (рис. 1а)

$$q \approx \sum_0^m \sigma_0(\tau - \tau_0) \quad (1)$$

или в виде ломаной функции

$$q \approx \sum_0^m (V_m - V_{m-1})(\tau - \tau_m) \sigma_0(\tau - \tau_m), \quad (2)$$

где $\sigma_0(\tau - \tau_m)$ - единичная функция Хевисайда, при $\tau > \tau_i$ $\sigma_0(\tau - \tau_i) = 1$, при $\tau < \tau_i$ $\sigma_0(\tau - \tau_i) = 0$; (3)

V_m - скорость равномерного изменения мощности источника q при $r - r_m$, Вт/м³·с;

τ_m - время m -ого изменения мощности источника и скоростей равномерного подъема или спада мощности q (рис. 1 б).

(V_m) — скорость равномерного изменения мощности источника тепла (q) на интервале ($t_{m-1} < t < t_m$), Вт/м³·с; (t_m) — момент изменения мощности источника тепла и скорости её линейного возрастания или убывания (рис. 1б).

С учётом того, что

$$1, \tau > \tau_m$$

$$F(r) = \sum_0^m q_m \sigma_0(\tau - \tau_m), \sigma_0(x) = 0 \quad \} \quad (4)$$

$$0, \tau < \tau_m$$

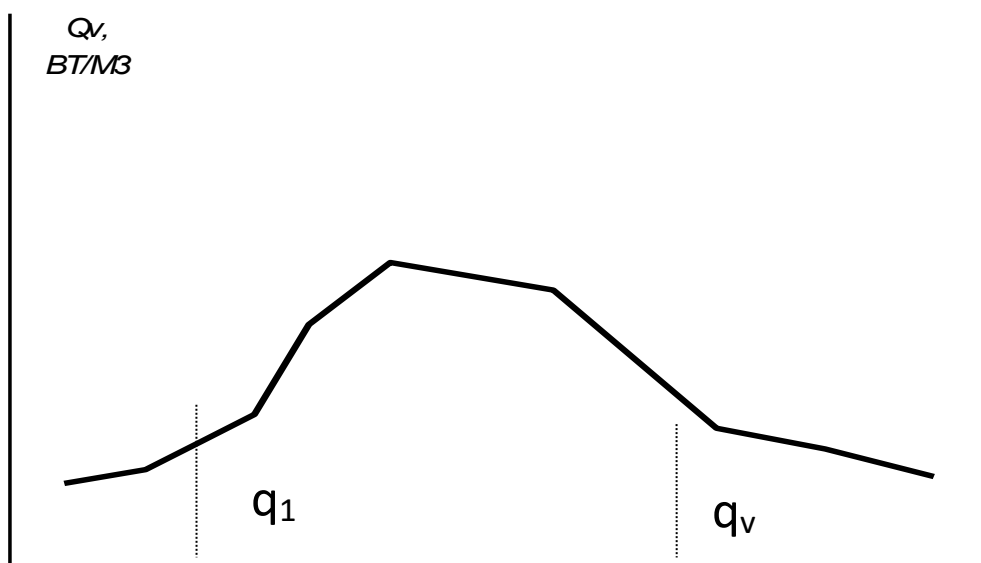
получаем изображение функции по Лапласу:

$$F(S) = \sum_0^m q_m \cdot \text{EXP}(-s\tau_m)/S + \sum_0^K q_l \cdot K_n \quad (5)$$

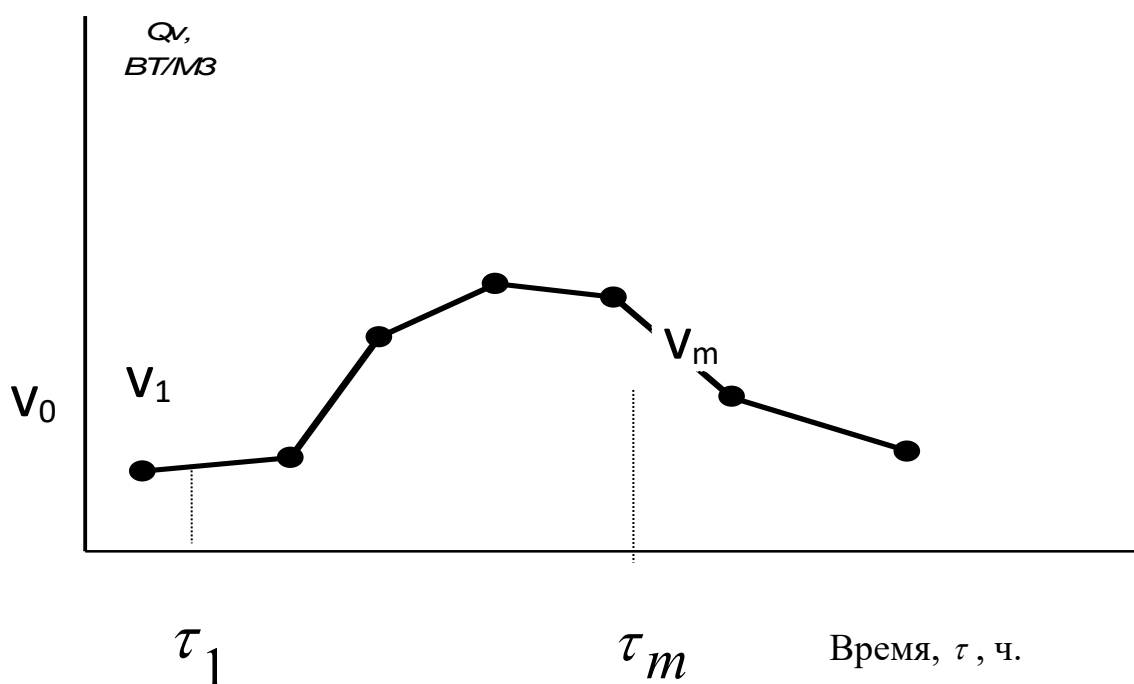
$$F(r) = \sum_0^m (V_m - V_{m-1})(\tau - \tau_m) \cdot \sigma_0(\tau - \tau_m);$$

$$F_S = \sum_0^m (V_m - V_{m-1}) \cdot \text{EXP}(-s\tau_m)/S + \sum_0^K q_l \cdot K. \quad (6)$$

а)



б)



Аппроксимация реальной кривой изменения мощности внутреннего источника тепла (q): а — кусочно-непрерывной функцией; б — ломаной функцией.

Начальное распределение температуры по толщине структурообразующего золоцементного изделия считается равномерным и равным (t_0). В начальный момент времени образец помещается в среду с

температурой ($t_c > t_0$), которая поддерживается постоянной в течение всего процесса нагревания [2–4].

Требуется определить распределение температуры по толщине образца и тепловой поток в любой момент времени при условии, что теплообмен с окружающей средой происходит по закону Ньютона.

Начало координат помещается в середину толщины пластины, при этом её общая толщина равна $2l$. Внутри образца действует внутренний источник тепла удельной мощности q_v , являющийся функцией времени [5, 6].

Математическая постановка задачи

Дифференциальное уравнение теплопроводности имеет вид:

$$\frac{dt(x,r)}{dt} = a \frac{d^2 t(x,r)}{dx^2} + q_v(r)/c\rho; \quad (r > 0, -l < x < l) \quad (7)$$

при начальном условии

$$t(x, 0) = t_0; \quad (8)$$

$$\frac{dt(0, \tau)}{d\tau} = 0 \quad (10)$$

$$dx - dt(l, \tau)/dx + [\alpha/\lambda t_c - f(l, \tau)] = 0. \quad (9)$$

и граничных условиях

В уравнении (7) удельная мощность источника тепла определяется зависимостями (1) или (2).

Решение задачи

К уравнению (7) применяется интегральное преобразование Лапласа. В результате получаем выражение для изображения температуры:

$$T_l''(x, s) - \frac{1}{a} \left[T_l(x, s) - \frac{t_0}{s} + \frac{1}{c\rho} \sum_0^m q_m \frac{\exp(-s\tau_m)}{s^2} \right] = 0. \quad (10)$$

Решение уравнения с учётом начального условия (8) имеет вид:

$$T_l''(x, s) - \frac{t_0}{s} = \frac{1}{c\rho} \sum_0^m q_m \frac{\exp(-s\tau_m)}{s^2} + A ch \sqrt{\frac{s}{a}} x. \quad (11)$$

Постоянная интегрирования (A) определяется из граничного условия (10), которое в образах Лапласа принимает форму:

$$-T_l'(l, s) + \frac{\alpha}{\lambda} \left[\frac{t_c}{s} - T_l(l, s) \right] = 0. \quad (12)$$

После подстановки и преобразований получаем:

$$T_l'(x, s) = A ch \sqrt{\frac{s}{a}} sh \sqrt{\frac{1}{a}} x, \quad (13)$$

а при $x = l$

$$T_l'(l, s) = A ch \sqrt{\frac{s}{a}} sh \sqrt{\frac{1}{a}} l. \quad (14)$$

В результате окончательное выражение для изображения температуры принимает вид:

$$A \sqrt{\frac{s}{a}} \left(sh \sqrt{\frac{s}{a}} l - \frac{\alpha}{\lambda} ch \sqrt{\frac{s}{a}} l \right) = \frac{\lambda}{\alpha} \left(\frac{t_c - t_0}{s} - \frac{1}{c\rho} \sum_0^m q_n \frac{\exp(-s\tau_m)}{s^2} \right); \quad (15)$$

Переходя к оригиналу функции, получаем распределение температуры в виде:

$$A = \frac{t_c - t_0}{s \left[ch \sqrt{\frac{s}{a}} l + \frac{\alpha}{\lambda} \sqrt{\frac{s}{a}} sh \sqrt{\frac{s}{a}} l \right]} - \frac{\frac{1}{c\rho} \sum_0^m q_n \frac{\exp(-s\tau_m)}{s^2}}{s^2 \left[ch \sqrt{\frac{s}{a}} l + \frac{\alpha}{\lambda} \sqrt{\frac{s}{a}} sh \sqrt{\frac{s}{a}} l \right]}; \quad (16)$$

Частные режимы тепловой обработки

В случае не мгновенного, а плавного подъёма температуры окружающей среды в первом периоде со скоростью

$$T_l(x, s) - \frac{t_0}{s} = \frac{1}{c\rho} \sum_0^m q_n \frac{\exp(-s\tau_m)}{s^2} + \frac{(t_c - t_0) ch \sqrt{\frac{s}{a}} x}{s \left[ch \sqrt{\frac{s}{a}} l + \frac{\alpha}{\lambda} \sqrt{\frac{s}{a}} sh \sqrt{\frac{s}{a}} l \right]} - \frac{\frac{1}{c\rho} \sum_0^m q_n \frac{\exp(-s\tau_m)}{s^2}}{s^2 \left[ch \sqrt{\frac{s}{a}} l + \frac{\alpha}{\lambda} \sqrt{\frac{s}{a}} sh \sqrt{\frac{s}{a}} l \right]}; \quad (17)$$

температура в центре образца ($t(x, \tau)$), определяется выражением:

$$\theta = \frac{t(x, \tau) - t_0}{t_c - t_0} = 1 + \frac{1}{2} \sum_0^m (\tau - \tau_m) P_{0m} \cdot \left[1 - \frac{x^2}{l^2} + \frac{2}{B_i} \right] - \sum_{n=1}^{\infty} \left[1 + \frac{1}{\mu^2} \sum_0^m \frac{P_{0m}}{\mu_n^2} \right] \cdot A_n \cdot \cos \varphi_n \frac{x}{l} \exp(-\mu_n^2 \tau); \quad (18)$$

Во втором периоде — изотермической выдержки — температурное поле описывается зависимостью:

$$P_{0m} = \frac{q_m \tau_0 (\tau - \tau_m) l^2}{\lambda (t_c - t_0)}. \quad (19)$$

Если рассматривается не мгновенный подъем температуры на границе изделия, а постепенный, то для первого периода подъема температуры со скоростью [1. стр. 110.].

$$V = (t_{max} - t_0) / \tau_0$$

имеем:

$$t(\bar{x}, \bar{\tau}) = V \tau_{CT} \left[\bar{\tau} - \frac{1 - x^2}{2} + 2 \sum_{n=1}^{\infty} (-1)^{n+1} \frac{\cos \mu_n^2 \bar{x}}{\mu_n^3} \cdot \exp(-\mu_n^2) \right] + \sum_0^m (\eta_n - \eta_{n-1}) (\tau - \tau_k) \left[\frac{1 - x^2}{2} - 2 \sum_{n=1}^{\infty} (-1)^{n+1} \frac{\cos \mu_n^2 \bar{x}}{\mu_n^3} \cdot \exp(-\mu_n^2) (\tau - \tau_k) \right]; \quad (20)$$

а динамика температуры в точке $x = 0$ (посередине образца)
(21)

Для второго периода (изотермическая выдержка):

$$t(0, \tau) = V\tau_{cm} - \frac{1}{2} [(1-\varphi_{I,\tau}) - (1-\varphi_{I,\tau_k})] + \frac{1}{2} \sum_0^m (\eta_k - \eta_{k-1})(\tau - \tau_k)[1 - \varphi_I(\tau - \tau_k)] \quad (22)$$

Заключение

Полученные аналитические решения для нестационарного температурного поля позволяют качественно оценить влияние коэффициента лучепоглощения солнечной радиации на процесс формирования температурного режима в изделиях из композиционных строительных материалов.

Учёт тепловыделения при экзотермической реакции твердения вяжущего вещества в сочетании с воздействием солнечной радиации позволяет более точно прогнозировать температурные поля и оптимизировать режимы гелиотеплохимической обработки золоцементных материалов.

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ИННОВАЦИОН ТАЪЛИМ ЖАРАЁНИДА ТАЛАБАЛАР МУСТАҚИЛ ИШЛАРИНИ ТАШКИЛ ЭТИШНИНГ ЗАМОНАВИЙ ТУЗИЛМАСИ

Аннотация: Мақолада олий таълим тизимида талабаларнинг мустақил таълим олишларини ташкил этиш масалалари умумий тарзда ўрганилиб, уларнинг турлари, мустақил таълим олишда зарурий компетенциялар атрофлича ёритилган.

Калим сузи: таълим, компетенция, ахборот муҳити, индивидуал, мустақил таълим, ташкил этиш, кўникма, малака.

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MODERN STRUCTURE OF THE ORGANIZATION OF INDEPENDENT WORK OF STUDENTS IN THE CONDITIONS OF INNOVATION EDUCATION

Abstract: The article examines the general issues of organizing students' independent learning in the higher education system, highlights its types, and thoroughly describes the essential competencies required for effective independent learning.

Keywords: education, competence, information environment, individual learning, independent learning, organization, skills, abilities.

Кириш. Ўзбекистон Республикаси олий таълим тизимини 2030 йилгача ривожлантириш кон-цепциясида “мустақил таълим соатлари улушини ошириш, талабаларда мустақил таълим олиш, танқидий ва ижодий фикрлаш, тизимли таҳлил қилиш, тадбиркорлик кўникмаларини шакллантириш, ўқув жараёнида компетенцияларни кучайтиришга қаратилган методика ва технологияларни жорий этиш, ўқув жараёнини амалий кўникмаларни шакллантиришга йўналтириш, бу борада ўқув жараёнига халқаро таълим стандартларига асосланган илғор педагогик технологиялар, ўқув дастурлари ва ўқув-услубий материалларни кенг жорий этиш” белгиланган.

Мустақил давлатлар ҳамдўстлиги (МДХ) мамлакатларидатаълим ваилмий тадқиқот муассасаларида таълим жараёни иштирокчиларининг мустақил иш фаолиятини такомиллаштириш, талабаларнинг шахсий-касбий, ижодий имконият ва интегратив тафаккурини шакллантириш, онлайн

режимида ўқитишнинг психологик хоссаларини аниқлаштириш, тармоқлараро интеграциянинг педагогик имкониятларини кенгайтириш бўйича илмий тадқиқот ишлари олиб борилмоқда. Шу билан биргаликда талабаларнинг мустақил иш фаолиятини компотенталарини ривожлантиришда замонавий дидактик воситаларидан фойдаланиш касбий йўналтирилган таълим мазмунини такомиллаштириш, мультимедиа, ахборот-коммуникацияларидан кенг қўламда фойдаланиш, талабаларда креатив қобилиятларни ривожлантиришнинг педагогик механизмларини такомиллаштириш бўйича илмий тадқиқотларга алоҳида эътибор берилмоқда.

Таълимни ахборотлаштиришнинг мақсади ахборот ва телекоммуникацион технологияларни қўллаш ҳисобига интеллектуал фаолиятни глобал жадаллаштиришдан иборат. Ушбу масалаларни ҳал қилиш доирасида технологиялар ва ахборотлаштириш воситаларини бир тизимга бирлаштиришнинг педагогик, методик ва технологик асосларини ишлаб чиқишга йўналтирилган тадқиқотлар ва изланишлар ўтказилган ва бундай тизим сифатида ахборот-таълим муҳити энг мақбул ҳисобланади.

Ахборот-таълим муҳити - бу таълимий ахборотларни узатиш ва тезкорлик билан алмашишни таъминловчи восита ҳисобланади. Ушбу муҳит асосида таълим олувчиларни бир-бирини тушунишга, ўзгалар фикрини ҳурмат қилишга, ўз фикрини эркин баён қилишга ва биргаликда муаммоларни ҳал этишни ўргатишга имконият яратилади. Натижада ягона таълим соҳасига кириб борилади.

Ахборот-таълим муҳитини самарали ташкил этиш учун қуйидагилар эътиборга олинishi зарур: қўйилган муаммони ечиш учун табиий, физик, ижтимоий ва бошқа ҳодисалар устидан кўп, тизимли, бир марталик ёки узок муддатли кузатиш, турли минтакалардан маълумотлар тўплаш; турли жойларда юзага келадиган ҳодисалар, далиллар, воқеаларнинг аниқ тенденциясини аниқлаш учун таққослаб ўрганиш, қарорлар қабул қилиш ва таклифлар ишлаб чиқиш; тармоқ иштирокчиларининг маданий, этник, географик шартлари ўртасидаги фарқларни ҳисобга олган ҳолда ҳар бир муаммо ёки масалани ечиш йўллариининг (альтернатив ёки турли усуллариини) самарадорлигини таққослаб ўрганиш; ўзига хос маданий, анъанавий ва бошқа хусусиятларни ҳисобга олган ҳолда ижтимоий ва маданий қарашларни қиёсий таҳлил қилиш; биргаликда маълум бир муаммони ҳамкорликда тадқиқ қилиш шарти билан бирор бир (амалий, ижодий, илмий ва бошқа) ижодий ғояни ишлаб чиқиш; таълимий муммоларни ўрганиш ва ҳал этиш бўйича мусобақалар ўтказиш ва бунда юзага келадиган муаммоли вазиятларни маданий, таълимдаги анъаналар бошқа соҳалар билан боғлиқ бўлишига қаратиш.

Ахборотлашган таълим муҳитида талабалар томонидан фаол ижодий ностандарт равишда билим олишга ўргатиш, ақлий фаолиятга уйиштириш, ташкил этиш усуллари, воситалари, ҳамда талаба томонидан шуғулланиш технологияси, ишлаш иштиёқи, мотиви, майли, қизиқиши, ҳиссий

интилишини амалга ошириш юзасидан мутафаккирларимизнинг қомусий фикрлари қарашлари мавжуд бўлиб, улар қуйидагича ифодаланган.

Ахборот технологияларини қўллаш талабалар мустақил ишини ташкил қилиш учун янги имкониятларни очади. Ахборот-таълим муҳотида мустақил ишлашни ташкил этиш талабалар томонидан янги, индивидуал билим олишига айланмоқда; мазмуни сифатида очиқ таълим ресурслари юзага келмоқда; таълимнинг техник воситалари глобал тармоқли технология, ўзаро алоқа воситаларида – Интернетнинг турли ижтимоий сервислари; таълимнинг устувор ташкилий шакли талабаларнинг мустақил фаолиятига ижобий таъсир кўрсатиб келмоқда; мустақил таълим олиш, тармоқли ҳамкорлик ва биргаликдаги ижод етакчи таълим усулларига айланмоқда.

Илмий адабиётларда тақдим этилган “талабаларнинг мустақил фаолияти” тушунчаси моҳиятининг таҳлили, иккита асосий нуқтаи-назарни аниқлади: профессор-ўқитувчининг бевосита иштирокисиз, лекин унинг раҳбарлигида талаба томонидан мустақил амалга ошириладиган фаолият; таълим мақсадларига эришишни таъминловчи ўқув жараёни шакли ҳисобланади. Таълимнинг аралаш таълим шакллари томонига силжиши ва ўқув жараёнининг ахборот-таълим муҳотида ўтказилиши ўқув жараёнининг самарали шакли ва янги таълим парадигмасини амалга ошириш воситаси ўлароқ, талабаларнинг мустақил фаолиятига эътиборни кучайтиради.

Олий таълим муҳотида талаба ва профессор-ўқитувчининг мустақил таълимлаш фаолиятини самарали ташкил этишда профессор-ўқитувчи ва талабадан қуйидаги зарурий компетенцияларга эга бўлиш талаб этилади:

1. Ахборот-технологик компетенция;
2. Тадқиқотчилик компетенцияси;
3. Коммуникатив компетенция;
4. Ўз фаолиятини ўзи бошқариш ва ривожлантира олиш компетенцияси.

Ахборот муҳотида компетентли ёндашув билим ва кўникмаларнинг алоҳида-алоҳида эгалланишини эмас, балки, уларни мажмуавий ҳолда ўзлаштирилишини назарда тутди. Бу жараёнда информатика ва ахборот технологиялари умумтаълим фани муҳим рол ўйнайди. Чунки, ахборот-коммуникация технологияларининг жадал ривожланиши туфайли компьютерлар инсоннинг ҳам касбий, ҳам кундалик ҳаётига мустаҳкам кириб бормоқда ва компьютер билан ишлаш кўникмалари ҳар қандай касб эгаси учун ҳаётий заруриятга айланмоқда. Ахборот технологияларини ўрганиш амалий ва тадбиқий характерга эга. Турли масалаларни ҳал этишга ёрдам берадиган, ўз фаолиятининг воситаси сифатида компьютерга нисбатан талабаларнинг нуқтаи-назарини шакллантириш лозим. Бу борада турли хил дастурий таъминот билан муайян вазифани ҳал қилишнинг мақбул воситалари ва усуллари танлашга тўғри келади. Фикримиз далили сифатида “Тарбиявий иш методикаси” фанидан электрон дастур яратилган бўлиб, дастур бевосита талабаларга ахборот коммуникацион технологиялар асосида дарсларни ташкил этиш масалаларига асосланган (4-илова).

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СТРАТЕГИЧЕСКИЕ ПОДХОДЫ К ВЫХОДУ НЕФТЕГАЗОВЫХ КОМПАНИЙ ЙЕМЕНА НА МЕЖДУНАРОДНЫЕ РЫНКИ

*Аннотация. В статье рассматриваются стратегические подходы к выходу нефтегазовых компаний Йемена на международные рынки в условиях высокой политической и экономической нестабильности. Актуальность исследования обусловлена ключевой ролью нефтегазового сектора в экономике Йемена и необходимостью адаптации национальных компаний к современным требованиям глобального энергетического рынка. Целью статьи является анализ основных стратегических моделей интернационализации и выявление наиболее перспективных направлений выхода нефтегазовых компаний Йемена на зарубежные рынки. В работе используются методы системного анализа, стратегического анализа и сравнительного обобщения. Особое внимание уделяется влиянию институциональных ограничений, экспортного потенциала и рисков внешней среды на формирование стратегии выхода. Научная новизна исследования заключается в обосновании целесообразности применения партнёрских и адаптивных стратегий интернационализации для нефтегазовых компаний Йемена. Практическая значимость статьи состоит в возможности использования полученных выводов при разработке стратегических решений в сфере внешнеэкономической деятельности нефтегазовых компаний..**

Ключевые слова: нефтегазовые компании, стратегия выхода, международные рынки, интернационализация, экспортный потенциал, стратегическое управление

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STRATEGIC APPROACHES TO ENTERING INTERNATIONAL MARKETS BY YEMENI OIL AND GAS COMPANIES

Abstract. The article examines strategic approaches to entering international markets by Yemeni oil and gas companies under conditions of political and economic instability. The relevance of the study is determined by the key role of the

oil and gas sector in Yemen's economy and the need for national companies to adapt to the requirements of the global energy market. The purpose of the article is to analyze the main strategic models of internationalization and to identify the most promising directions for Yemeni oil and gas companies to enter foreign markets. The research is based on methods of system analysis, strategic analysis, and comparative generalization. Particular attention is paid to institutional constraints, export potential, and external environmental risks affecting the formation of market entry strategies. The scientific novelty of the study lies in substantiating the feasibility of partnership-based and adaptive internationalization strategies for Yemeni oil and gas companies. The practical significance of the article is associated with the possibility of using the obtained conclusions in the development of strategic decisions in the field of foreign economic activity of oil and gas companies.

Keywords: oil and gas companies, market entry strategy, international markets, internationalization, export potential, strategic management.

Введение

Современная мировая энергетическая система характеризуется высокой степенью неопределённости, обусловленной геополитическими конфликтами, трансформацией глобальных цепочек поставок, волатильностью цен на углеводороды и усилением экологических требований. В этих условиях стратегии выхода нефтегазовых компаний на международные рынки приобретают особое значение, поскольку именно внешние рынки во многом определяют устойчивость и конкурентоспособность компаний сырьевого сектора.

Для нефтегазовых компаний Йемена проблема выхода на зарубежные рынки имеет стратегический характер. Нефтегазовый сектор традиционно играет ключевую роль в экономике страны, формируя значительную долю экспортных доходов и валютных поступлений. Однако политическая нестабильность, институциональные ограничения и износ инфраструктуры существенно осложняют процессы интернационализации и снижают возможности эффективной интеграции йеменских компаний в мировые энергетические рынки.

В условиях ограниченного внутреннего спроса и высокой зависимости от экспорта углеводородов выход на международные рынки становится не только направлением развития, но и необходимым условием выживания нефтегазовых компаний Йемена. При этом применение традиционных экспортных моделей оказывается недостаточным, что обуславливает необходимость поиска и адаптации современных стратегических подходов, ориентированных на диверсификацию рынков, партнёрское взаимодействие и управление рисками.

Актуальность исследования определяется потребностью в систематизации стратегических подходов к выходу нефтегазовых компаний Йемена на международные рынки с учётом специфики внешней среды и

отраслевых ограничений. Несмотря на наличие исследований, посвящённых интернационализации бизнеса, особенности выхода нефтегазовых компаний стран с нестабильной экономикой остаются недостаточно изученными.

Теоретические подходы к стратегии выхода компаний на международные рынки

В теории стратегического менеджмента выход компаний на международные рынки рассматривается как одно из ключевых направлений долгосрочного развития, направленное на расширение рынков сбыта, повышение конкурентоспособности и снижение зависимости от внутренней конъюнктуры. Стратегия выхода на международные рынки представляет собой систему управленческих решений, определяющих формы, масштабы и механизмы международного присутствия компании с учётом особенностей внешней среды и внутренних ресурсов.

В научных исследованиях выделяются различные подходы к формированию стратегии выхода. Классический подход основывается на поэтапной интернационализации, при которой компании начинают с экспортных операций и постепенно переходят к более сложным формам международного присутствия, включая стратегические альянсы и прямые иностранные инвестиции. Данный подход позволяет минимизировать риски на начальных этапах, однако в условиях высокой нестабильности внешней среды он может быть недостаточно гибким.

Современные подходы к стратегии выхода ориентированы на адаптивность и управление рисками. В рамках данных подходов особое внимание уделяется анализу институциональных условий, политических факторов и отраслевой специфики. Стратегия выхода рассматривается не как универсальная модель, а как динамический процесс, требующий постоянной корректировки в зависимости от изменений внешней среды. В этой связи возрастает роль партнёрских форм интернационализации, позволяющих распределять риски и использовать ресурсы нескольких участников.

Для компаний сырьевых отраслей, включая нефтегазовый сектор, стратегия выхода на международные рынки имеет особую специфику. Высокая капиталоемкость проектов, длительные инвестиционные циклы и зависимость от мировых цен на углеводороды требуют применения комплексных и риск-ориентированных стратегических решений. В таких условиях приоритетными становятся стратегии, сочетающие экспортную деятельность с развитием международного сотрудничества и диверсификацией рынков сбыта.

Специфика и стратегические модели выхода нефтегазовых компаний Йемена на международные рынки

Нефтегазовые компании Йемена функционируют в условиях, существенно отличающихся от среды развитых и устойчивых экономик. Политическая нестабильность, институциональная фрагментация, ограниченный доступ к международному финансированию и износ инфраструктуры формируют высокий уровень страновых рисков и оказывают

прямое влияние на выбор стратегии выхода на международные рынки. В этих условиях применение традиционных стратегий интернационализации, основанных на масштабных прямых инвестициях и создании зарубежных производственных активов, оказывается затруднительным. Для нефтегазовых компаний Йемена более целесообразным является использование гибких и адаптивных моделей выхода, ориентированных на поэтапное расширение международного присутствия и снижение рисков. Одной из наиболее реалистичных стратегических моделей является экспортно-партнёрский подход, сочетающий экспорт углеводородов с развитием стратегических альянсов и совместных проектов с иностранными компаниями. Данная модель позволяет использовать внешние каналы сбыта, технологические компетенции и финансовые ресурсы партнёров, одновременно ограничивая инвестиционные и политические риски для йеменских компаний.

Перспективным направлением выхода на международные рынки является развитие экспорта природного газа, в том числе в форме сжиженного природного газа. Газовый сектор рассматривается как менее чувствительный к краткосрочным ценовым колебаниям и обладающий более устойчивым спросом на ряде региональных рынков. В этом контексте стратегическое значение приобретает диверсификация экспортных направлений с ориентацией на рынки Азии и Африки, характеризующиеся растущим потреблением энергоресурсов.

Особое значение для нефтегазовых компаний Йемена имеет использование партнёрских и сетевых форм взаимодействия. Стратегические альянсы и совместные предприятия позволяют компенсировать дефицит внутренних ресурсов, получить доступ к современным технологиям и повысить доверие со стороны международных контрагентов. Кроме того, партнёрские модели способствуют интеграции принципов устойчивого развития и соблюдению международных стандартов, что повышает конкурентоспособность йеменских компаний на зарубежных рынках.

Таким образом, специфика внешней и внутренней среды определяет необходимость формирования для нефтегазовых компаний Йемена адаптивных стратегических подходов к выходу на международные рынки. Ключевыми элементами таких подходов выступают гибкость, партнёрское взаимодействие, диверсификация экспортных направлений и ориентация на долгосрочную устойчивость в условиях нестабильной глобальной энергетической системы.

Заключение и рекомендации

Проведённое исследование позволило проанализировать стратегические подходы к выходу нефтегазовых компаний Йемена на международные рынки в условиях высокой политической, экономической и институциональной нестабильности. Установлено, что для компаний нефтегазового сектора Йемена интернационализация деятельности является не только направлением развития, но и необходимым условием поддержания устойчивости и конкурентоспособности в долгосрочной перспективе.

Анализ теоретических подходов к стратегии выхода на международные рынки показал, что в современных условиях наибольшую эффективность демонстрируют адаптивные и риск-ориентированные модели интернационализации, предполагающие гибкость стратегических решений и постоянную корректировку форм международного присутствия. Для компаний сырьевых отраслей, включая нефтегазовый сектор, данные подходы позволяют учитывать высокую волатильность мировых рынков и неопределённость внешней среды.

Исследование специфики нефтегазовых компаний Йемена выявило, что применение традиционных стратегий выхода, основанных на масштабных прямых инвестициях, в настоящее время существенно ограничено. Ключевыми сдерживающими факторами являются политическая нестабильность, институциональная фрагментация, износ инфраструктуры и ограниченный доступ к международным финансовым ресурсам. В этих условиях приоритетное значение приобретают партнёрские и поэтапные модели выхода на зарубежные рынки.

На основе проведённого анализа можно сформулировать следующие практические рекомендации для нефтегазовых компаний Йемена:

Ориентироваться на развитие экспортно-партнёрских стратегий, сочетающих поставки углеводородов с участием в стратегических альянсах и совместных проектах с иностранными компаниями.

Диверсифицировать экспортные направления с акцентом на рынки Азии и Африки, характеризующиеся устойчивым ростом спроса на энергоресурсы.

Активизировать развитие газового направления, включая экспорт сжиженного природного газа, как более устойчивого сегмента мирового энергетического рынка.

Использовать адаптивные стратегические подходы, предусматривающие гибкость управленческих решений и учёт страновых и геополитических рисков.

Интегрировать элементы устойчивого развития и соблюдения международных стандартов в стратегию выхода на международные рынки с целью повышения доверия со стороны зарубежных партнёров и контрагентов.

В целом результаты исследования подтверждают, что успешный выход нефтегазовых компаний Йемена на международные рынки возможен при условии формирования комплексной, адаптивной и партнёрской стратегии интернационализации, ориентированной на снижение рисков и долгосрочную устойчивость. Полученные выводы могут быть использованы в практической деятельности нефтегазовых компаний, а также в дальнейших научных исследованиях, посвящённых проблемам интернационализации бизнеса в странах с нестабильной экономикой

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ОПРЕДЕЛЕНИЕ ФИЗИКО-ХИМИЧЕСКИХ И ТЕХНОЛОГИЧЕСКИХ ХАРАКТЕРИСТИК ИНГИБИТОРОВ КОРРОЗИИ НА ОСНОВЕ N,N'-А- ЦИАН(ИЗОПРОПИЛ)ЭТИЛЕНДИАМИНА

Аннотация: В статье исследуются некоторые физико-химические и технологические характеристики нового типа органического вещества N,N'-а-циан (изопропил) этилендиамин (МАД-20) с целью определения ингибирующих свойств.

Ключевые слова: ингибитор, коррозия, сероводород, плотность, вязкость, дисперсность, эмульсия, вспенивание, эффективность, абсорбент.

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DETERMINATION OF PHYSICOCHEMICAL AND TECHNOLOGICAL CHARACTERISTICS OF CORROSION INHIBITORS BASED ON N,N'- α -CYANO(ISOPROPYL)ETHYLENEDIAMINE

Annotation: The article identifies some physicochemical and technological characteristics of the new type of organic substance N,N'- α -cyan (isopropyl) in order to determine the inhibitory properties of ethylenediamine.

Key words: inhibitor, corrosion, hydrogen sulfide, density, viscosity, dispersion, emulsion, foaming, efficiency, absorbent.

Введение. Применение ингибиторов в нефтегазовой промышленности является эффективным средством снижения коррозионных разрушений. Особенно остро проблема разработки ингибиторов коррозии встала с открытием месторождений Средней Азии, а впоследствии и Кашкадарьинской области, в газе которых содержится сероводород. Эксплуатация сероводородсодержащих месторождений выдвинула целый ряд вопросов, касающихся эффективности применения ингибиторов коррозии.

Цель работы. Коррозия двуокись углерода является одной из наиболее значительных причин отказов нефти-, и газопроводов и происходит на всех стадиях добычи от скважинного до надземного оборудования и перерабатывающих предприятий. Практика эксплуатации месторождений газа, содержащего агрессивные компоненты, такие как сероводород, двуокись углерода, низкомолекулярные органические кислоты, показала, что применение ингибиторов коррозии действительно является одним из наиболее технически оправданных и экономически эффективных средств защиты от коррозии газопромыслового оборудования. Для того ингибитор должен удовлетворять определенным требованиям. Главным требованием, предъявляемым к ингибиторам коррозии, является достижение эффективной защиты от коррозии. Однако на окончательный выбор ингибитора для различных случаев применения зависит от его технологических свойств. В этом смысле требования к ингибитору определяются рядом условий, которые формулируются отдельно для каждого процесса. То есть, ингибиторы коррозии должны обладать такими физико-химическими и технологическими свойствами, чтобы не влиять отрицательно на технологию добычи и переработки газа, а в ряде случаев даже интенсифицировать эти процессы.

Исходя из сказанного, стадия лабораторных испытаний ингибиторов коррозии включает в себя два направления:

- определение физико-химических и технологических характеристик ингибитора;
- определение защитных свойств ингибитора коррозии.

Последовательность испытания ингибиторов предусматривает отбраковку нетехнологичных и малоэффективных ингибиторов уже на этапах предварительного исследования их технологических свойств лабораторным путем и позволяет выявить участок наиболее эффективного применения ингибитора в технологической цепочке: скважина-шлейф-УКПГ-газопровод-ГПЗ [1-4]

Для определения физико-химических и технологических характеристик исследуемого ингибитора МАД-20 (N,N'- α -циан(изопропил)этилендиамина) нами проведено ряд лабораторных работ.

В таблице 1 приведены основные физико-химические константы исследуемого нового ингибитора МАД-20.

Таблица 1.

Физико-химические константы ингибитора МАД-20

Наименование ингибитора	Брутто формула и молекулярная масса, M_r	Температура плавления, $^{\circ}\text{C}$	Выход %	Элементный анализ					
				Найдено, %			Вычислено, %		
				С	Н	N	С	Н	N
N,N'- α -циан(изопропил)этилендиамин	$\text{C}_{10}\text{H}_{18}\text{N}_4$ 194 г	53-54	89	61,98	9,21	28,73	61,85	9,27	28,86

Таблица 2.

Физико-технические свойства ингибитора МАД-20

Внешний вид	Цвет	Запах	Показатель водородных ионов, pH	Цвет раствора	Температура вспышки, $^{\circ}\text{C}$
Кристаллический	Светло-желтый	Специфический	5,6-6,2	Прозрачный	без растворителя

Исследование растворимости (диспергируемости) ингибитора МАД-20.

Анализ. На установках комплексной подготовки газа происходит сепарационное разделение смеси углеводород-вода и отделение углеводородной части. Ингибиторы коррозии, используемые для защиты скважин, технологического оборудования и трубопроводов не должны замедлять процесс сепарационного разделения смеси углеводородной конденсат-вода. В противном случае неполное или длительное разделение эмульсии приведет к нарушению технологического режима работы сепарационных установок и может вызвать потери углеводородного конденсата.

Диспергируемость является одним из наиболее важных свойств ингибитора. Так как растворимость ингибитора может быть полной или частичной, то для практики имеют значение как качественные и количественные показатели. Это свойство зависит от объекта использования, условий эксплуатации, экономических факторов и предполагаемой технологии ингибирования. В наиболее распространенный перечень растворителей входят: вода, углеводороды, спирты и гликоли. В целях эффективной защиты оборудования ингибитор должен равномерно доставляться ко всей его поверхности. Основным подводящим агентом при непрерывном ингибировании объектов является сама среда.

Испытания для определения и растворимости, и диспергируемости проводили в стеклянной прозрачной химической посуде с пробкой при комнатной температуре. В нем готовили смеси ингибитора с водой в концентрации 100 мг/л (0,0005 моль). Смесь интенсивно перемешивали встряхиванием с помощью магнитной мешалке. При этом ингибитор МАД-20 в течении 1 часа образовалось дисперсную систему и после одного часа полностью растворялся с образованием прозрачную раствор ингибитора с водой. Испытуемый ингибитор МАД-20 в выбранном растворителе (в воде) в течение 7 суток более сохраняет свою прозрачность и оставалось неизменным.

Исследование влияния ингибитора коррозии МАД-20 на эмульсообразование в системе жидкие углеводороды - вода. Исследование влияния ингибитора коррозии МАД-20 полученных на основе N,N'-α-циан(изопропил)этилендиамина на эмульсообразование в системе жидкие углеводороды-вода определяли в лабораторных условиях. Испытания влияния ингибитора на эмульсообразование проводили комнатной температуры в прозрачном плоскодонную колбу емкостью диаметром 100 мм и постоянно перемешиванием механической мешалкой. Метод состоит в сравнении времени разделения модельной эмульсии, не содержащей и содержащей рекомендованную защитную концентрацию ингибитора. В качестве составляющих эмульсии в лабораторных испытаниях нами использована в соотношениях 1:1 керосин и вода (3% раствор NaCl подкисленный уксусной кислотой, 250 мг/л). В течение 10 минут смесь подкисленный солевой раствор-углеводород интенсивно перемешивалась, после чего фиксировалась время до полного расслаивания смеси в разделителе. Разделение эмульсии подкисленный солевой раствор-углеводород из времени отстоя составляет в интервале 7-10 минут. Отечественная и зарубежная практика проектирования аппаратов разделения исходит из времени отстоя в них в интервале 10-30 минут. Исследуемый новый ингибитор МАД-20 удовлетворяет указанному выше требованию в представленном диапазоне концентраций.

Исследование ингибитора МАД-20 на вспенивание абсорбентов. Склонность к пенообразованию имеет существенное значение при выборе ингибитора для защиты трубопроводов, подводящих газ к перерабатывающему заводу, с которым ингибитор может попасть на установки очистки. И хотя ингибитор, обладающий, повышенным пенными характеристиками не следует рекомендовать для защиты указанных газопроводов, однако повышенные пенные характеристики не являются поводом для отбраковки всех ингибиторов по данному показателю. Такие ингибиторы весьма успешно могут быть использованы, в частности, для защиты скважинного и другого добывающего оборудования. В то же время при оценке пенных свойств большое значение имеет концентрация ингибитора. Для пенообразующих ингибиторов с увеличением концентрации ПАВ вероятность пенообразования возрастает. И так как на практике

ингибитор может накапливаться в системах подготовки газа, то исследование вспенивающих свойств ингибиторов допускается проводить при концентрациях, превышающих защитную в два раза. Испытания более высокой концентрации ингибитора являются неоправданными, так как это может приводить к отбраковке высокоэффективных ингибиторов коррозии.

Заключение. Для очистки природных газов от сероводорода и двуокиси углерода используются растворы диэтанолamina или метилдиэтанолamina. Ингибитор коррозии, как и любой другой ПАВ, попадая в рабочие растворы установки сероочистки, может вызывать их вспенивание, что нарушает режим работы установки и снижает ее производительность по газу. Исследование влияния ингибитора МАД-20 на вспенивание абсорбентов осуществлена в соответствии с методическим руководством ВНИИГАЗ Р51-00158623-11-95 «Абсорбенты для очистки природных газов от сероводорода и двуокиси углерода. Определение пенных характеристик». Испытание проводили на колонке барботажного типа, в которую заливали 500 мл рабочий раствор и продували азот в течение 10 минут с различной линейной скоростью. После окончания срока продувания азота рабочий раствор отстоял под наблюдением в течение 20 минут. Нам известно, что к пенным характеристикам относят высоту пены, и стабильность пены. В течение времени отстоя пенообразование рабочего раствора значительном характере не наблюдалось.

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РАЗРАБОТКА ОРОСИТЕЛЬНОГО ЛОТКА ИЗ КОМПОЗИЦИОННЫХ МАТЕРИАЛОВ ДЛЯ ВОДОСБЕРЕЖЕНИЯ

Аннотация: В данной работе предлагается создание оросительного лотка из полимерно - композиционного материала (ПКМ), через которого производится полив хлопчатника, обеспечивая снижения оросительной нормы и роста урожайности.

Ключевые слова: орошение, водосбережение, полимерно-композиционные материалы, оросительный лоток, хлопчатник, фильтрационные потери воды, карбоксиметилцеллюлоза, мочевиноформальдегидная смола.

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DEVELOPMENT OF AN IRRIGATION TRAY MADE OF COMPOSITE MATERIALS FOR WATER CONSERVATION

Abstract: In this paper, we propose the creation of an irrigation tray polymer composite material (PCM), which is produced through the irrigation of cotton, providing a reduction of irrigation norms and increase productivity.

Key words: irrigation, water conservation, polymer composite materials, irrigation tray, cotton, water seepage losses, carboxymethyl cellulose, urea-formaldehyde resin.

Введение. Оросительные каналы традиционно снабжают водой сельхозугодья региона, однако без специальных мер большая часть воды при орошении теряется впустую. [1] По данным ФАО, Узбекистан расходует до 90% всей доступной пресной воды на сельское хозяйство, и при этом потери в орошаемых системах могут достигать 30–50% и более. Особенно ощутимы эти потери на лёгких (песчаных) почвах Ташкентской области, где фильтрация воды в грунт идёт очень активно (по оценкам, до 50–60% расхода канала может уходить в почву) [2].

Такая неэффективность ирригации при дефиците водных ресурсов требует новых водосберегающих решений. Исследования и разработка

полимерных материалов в комплексе, представляют особый интерес для решения задач, как совершенствование техники и технологии, а также улучшения эксплуатационных характеристик полива хлопчатника [3].

Цель и методика исследований. Целью данной работы является, разработка и создание оросительного лотка, изготовленного из полимерного композиционного материала (ПКМ) и, с его применением при поливах хлопчатника, достичь экономию воды.

Для установления и уточнения оптимальных технологических параметров получения ПКМ проведены эксперименты на «опытной установке» в составе мочевиноформальдегидной смолы (МФС) с добавлением ИПК на основе карбоксиметилцеллюлозы (КМЦ) и мочевиноформальдегидной смолы (МФС), а также добавляется фосфогипс очищенный из отходов фосфогипса (ФГ) и песок.

Эксперимент выполняется в следующем порядке: синтез ИПК; формование синтезированного продукта – полимерного материала и его сушка [2]. Основной аппаратурой «опытной установки» при синтезе является плоскодонная цилиндрическая ёмкость с диаметром 0,9-1,0м, высотой 0,5-0,6м, которая снабжена механической мешалкой и приспособлением подачи МФС, полиэлектролита, фосфогипса и песка. В нижней части цилиндрической ёмкости установлен кран для слива сырой продукции и подачи её в формовочную часть. Формовочная и сушильная части опытной установки состоят из формовки и печи, предназначенные для получения полимерного материала в определенной необходимой форме и его высушивания.

Продуктами ПКМ являлись Na-КМЦ и 60-70%ный раствор мочевиноформальдегидных олигомеров марки КФЖ. В качестве дисперсных наполнителей использовали песок с размером частиц 0,20-0,25мм и очищенный фосфогипс, а в качестве газообразователя – карбонат аммония [4].

Изготовление оросительного лотка - с размером 0,10х0,12х0,5м из ПКМ, производилось следующим образом: приготавливается 2%ный раствор Na-КМЦ и 65%ный раствор КФЖ, которые постоянным перемешиванием смешиваются в цилиндрическом сосуде с массовым соотношением 0,2:0,8 поддерживая температуру реакционной массы при 25°C, куда добавляется предварительно высушенный при 150°C фосфогипс при массовых соотношениях 0,645:0,162 и перемешивается в течении 10-15минут; - добавляя в реакционную массу необходимое количество песка и карбоната аммония перемешивается их в течении 40-50 минут при той же температуре; - образованная однородная, вязкая и слегка текучая масса продукты ПКМ, подается в формовочную установку, т.е. на формовку «лотка – оросителя» и в печь для его сушки, где поддерживается в течение 30-35 минут при температуре 120-130°C.

Результаты исследований. Проведены исследования по определению физико -химических свойств полученных полимерно - композиционных материалов (таблица).

Из данных таблицы видно, что оросительный лоток, изготовленный из полимерного материала, по физико-химическим свойствам вполне пригоден к применению для орошения хлопчатника.

Нужно отметить то, что несомненный интерес представляет исследование набухаемости образцов продукта ПКМ, т.е. структурные исследования. Набухаемость непосредственно зависит как от структуры исходных компонентов (МФС и Na-КМЦ), так и от структуры материала, в значительной степени определяя области его использования.

Таблица

Физико-химические свойства ПКМ

№	Состав ПКМ (ИПК:ФГ:песок) %	Прочность, МПа	Водопоглощение, %	Водостойкость, отн.ед.	Общая пористость (по бензолу) %
1	10:15:30+МФС	95	2,5	0,80	40
2	10:20:30+МФС	98	2,1	0,95	39
3	20:20:30+МФС	110	2	0,9	40
4	25:25:30+МФС	97	2,2	0,85	23
5	30:30:30+МФС	95	2,4	0,71	19

Нами были исследованы образцы ПКМ различного состава, равновесно набухшие в бессолевых водных средах при $\text{pH}=6$. Данные зависимости степени набухания (q) от соотношения исходных компонентов (z) представлены на рис.1, где $z=\text{Na-КМЦ}+\text{МФС}$

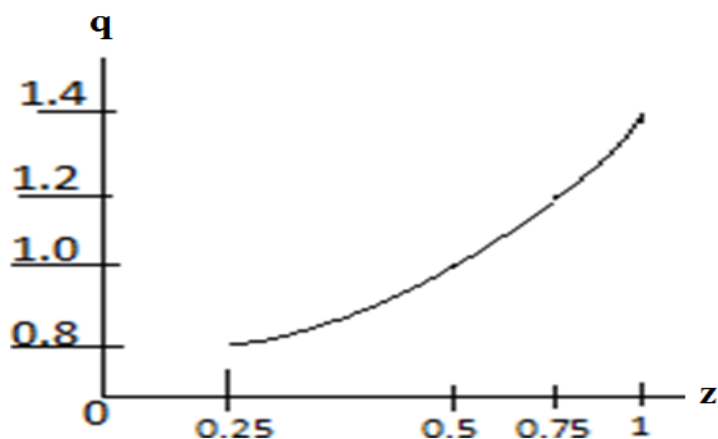


Рис.1. Зависимость степени набухания (q) ПКМ от соотношения компонентов (z). ($t^{\circ}=25^{\circ}\text{C}$ и время набухания 40 мин.)

Из рис.1 видно, что состав образцов ПКМ варьировался в пределах $0,25 \div 0,67$, и включение в состав избыточного количества Na-КМЦ ($z > 0,5$) приводит к повышению набухаемости образца, обеспечивая использования продукт ПКМ для изготовления оросительного лотка (рис 2.).

Предлагается применения оросительного лотка (1) для полива хлопчатника, расставляя вслед друг за другом по длине борозды, устанавливая на гребнях рядом с хлопчатником, исключая нарушения проведения агротехнических мероприятий на весь вегетационный период.

Вода поступает в оросительный лоток (1) из распределителей (2) через фильтр (3), изготовленного из полимерного материала исключая засорения пор лотка.

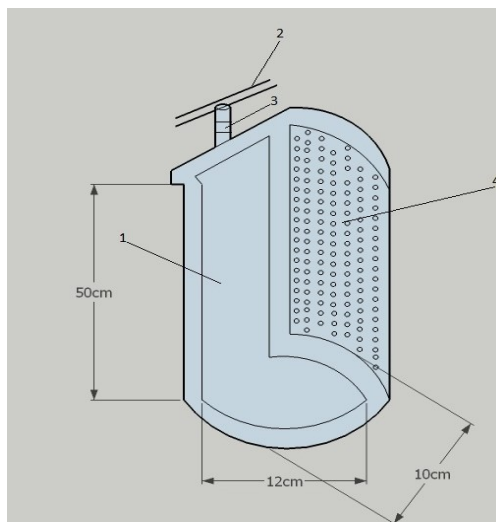


Рис.2. Общий вид оросительного лотка из полимерного материала на основе ИПК-МФС с добавлением фосфогипса и песка.

Полив хлопчатника производится капельками воды (4) поступающие через поры лотка, обеспечивая равномерности увлажнения почв, исключая концевой сброс воды, приводя к получению весомой экономии оросительной воды и росту урожайности хлопчатника [5].

Выводы

1. Изучено, взаимодействие водорастворимых полимерных комплексов с дисперсными наполнителями - фосфогипса и песком, что дали основания созданию оросительного лотка.

2. Оценено химическая стойкость ПКМ и показана возможность улучшения физико-механических свойств, путем введения активных наполнителей.

3. Установлено то, что оросительный лоток изготовленный продуктом ПКМ, применим в водном хозяйстве в целях орошения хлопчатника, обеспечивая весомую экономию воды и роста урожайности хлопчатника.

Разработка оросительного лотка из ИПК на основе КМЦ-МФС показала себя перспективной для водосбережения в регионе. Предложенная конструкция способна значительно сократить потери орошаемой воды за счёт надёжной герметичности канала и улучшения водоудерживающих свойств ирригационной системы. Это особенно актуально для Ташкентской области, где дефицит воды усиливается и 90% ресурсов расходуется на сельское хозяйство. Использование доступных полимерных материалов и

сравнительно простой технологии изготовления делает эту технологию практически реализуемой. В целом, внедрение таких композитных лотков может существенно повысить эффективность орошения и устойчивость земледелия региона.

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ПОНЯТИЕ И ПРИНЦИПЫ «ЗЕЛЁНОГО ГОРОДА» В МЕЖДУНАРОДНОЙ ПРАКТИКЕ

Аннотация: Статья анализирует понятие и принципы «зелёного города» в международной практике как модель устойчивого городского развития, объединяющую экологические, социальные и экономические аспекты. На основе опыта Копенгагена, Фрайбурга, Сингапура, Ванкувера и Масдара выделены ключевые принципы: экологическая устойчивость, рациональное использование ресурсов, экологически ориентированное градостроительство, устойчивый транспорт и участие населения. Подчеркивается универсальность этих принципов и их применимость в различных природно-климатических и социально-экономических условиях, что делает концепцию важной основой для региональных стратегий устойчивого развития.

Ключевые слова: зелёный город, устойчивое развитие, экологическая устойчивость, градостроительство, социально-экологическая система.

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THE CONCEPT AND PRINCIPLES OF A "GREEN CITY" IN INTERNATIONAL PRACTICE

Abstract: The article analyzes the concept and principles of the "green city" in international practice as a model of sustainable urban development that integrates ecological, social, and economic aspects. Based on the experiences of Copenhagen, Freiburg, Singapore, Vancouver, and Masdar, the key principles are identified: ecological sustainability, rational resource use, environmentally

oriented urban planning, sustainable transport, and public participation. The universality of these principles and their applicability in various natural-climatic and socio-economic conditions are emphasized, making the concept an important basis for regional sustainable development strategies.

Key words: *green city, sustainable development, ecological sustainability, urban planning, socio-ecological system.*

Введение

Современные города характеризуются высокой урбанизацией, ростом экологических рисков и усложнением социально-экономических процессов. Они аккумулируют основную долю потребления ресурсов, отходов и выбросов, что усиливает нагрузку на окружающую среду и влияет на здоровье населения. В условиях изменения климата и дефицита ресурсов традиционные модели развития оказываются недостаточно эффективными. В этом контексте концепция «зелёного города» (green city) получает всё большее распространение как инструмент устойчивого развития, поддерживаемый ООН, UNEP, Всемирным банком и другими международными институтами. Несмотря на широкое использование термина, его содержание остаётся многозначным, что обуславливает актуальность исследования и необходимость систематизации ключевых принципов международной практики.

Материалы и методы

Методологическая основа исследования опирается на междисциплинарный подход, объединяющий экологию, градостроительство, экономику и социальную географию. Применялись системный и структурно-функциональный анализ для изучения города как социально-экологической системы, а также сравнительный и аналитический методы для сопоставления международных подходов к понятию «зелёного города». Теоретической и эмпирической базой послужили материалы UNEP, Всемирного банка, ОЭСР и труды зарубежных исследователей. Обобщение данных позволило выделить универсальные принципы формирования «зелёных городов».

Результаты и обсуждение

Проведённый анализ показал, что «зелёный город» в международной практике рассматривается как комплексная модель устойчивого развития, объединяющая экологическую устойчивость, социальное благополучие и экономическую эффективность. В отличие от упрощённого подхода, современная концепция охватывает экологически ориентированное планирование, устойчивое потребление и управление ресурсами.

Одним из ключевых принципов «зелёного города» является экологическая устойчивость, обеспечивающая сохранение и восстановление природных экосистем. Международный опыт показывает, что создание экологического каркаса города — включая парки, зелёные коридоры, водно-защитные и санитарно-защитные зоны — снижает загрязнение воздуха, улучшает микроклимат и поддерживает биологическое разнообразие,

выступая основой экологической безопасности городов. Неотъемлемым элементом «зелёного города» является рациональное использование ресурсов, включая повышение энерго- и водоеффективности, внедрение возобновляемой энергии и принципов циркулярной экономики. Международный опыт показывает, что это снижает нагрузку на ресурсы, сокращает отходы и уменьшает экологический след городов.

Важным элементом «зелёного города» является экологически ориентированное градостроительство, включающее интеграцию экологических требований на всех этапах планирования. Компактная застройка, функциональное зонирование и приоритет зелёных и общественных пространств снижают транспортные потоки и создают комфортную городскую среду. Международная практика подчёркивает также адаптацию архитектуры и планировки к местным природно-климатическим условиям. Важным принципом «зелёного города» является развитие устойчивого транспорта, направленного на минимизацию негативного воздействия на окружающую среду. Приоритет отдаётся общественному транспорту, пешеходной и велосипедной инфраструктуре, а также экологически чистым видам транспорта, что улучшает качество воздуха и снижает шумовое загрязнение.

Социальная составляющая «зелёного города» проявляется в активном участии населения и повышении экологической культуры, что делает город ориентированным на человека. Экономическая целесообразность обеспечивается инвестициями в «зелёные» технологии, которые снижают расходы, улучшают здоровье населения и повышают инвестиционную привлекательность.

Международная практика реализации концепции «зелёного города» наглядно демонстрирует эффективность интеграции экологических, социальных и экономических принципов в систему городского развития. Так, опыт Копенгагена (Дания) подтверждает ключевую роль устойчивых транспортных систем и энергосбережения, тогда как Фрайбург (Германия) рассматривается как модель экологически ориентированного градостроительства, основанного на компактной застройке и использовании возобновляемых источников энергии.

Особое место занимает Сингапур, где концепция «города-сада» успешно реализуется в условиях высокой плотности застройки и ограниченности природных ресурсов, что подтверждает универсальность принципов «зелёного города». Ванкувер (Канада) демонстрирует социально-экономическую эффективность «зелёных» стратегий, а проект Масдара (ОАЭ) иллюстрирует возможность адаптации данной концепции к аридным климатическим условиям. В целом анализ международных примеров свидетельствует о применимости принципов «зелёного города» в различных природно-климатических и социально-экономических условиях.

Обобщение результатов исследования позволяет сделать вывод о том, что концепция «зелёного города» представляет собой комплексную систему

устойчивого развития, основанную на балансе экологических, социальных и экономических интересов. Универсальность принципов обеспечивает методологическую основу для региональных стратегий и подчёркивает необходимость комплексного подхода, институциональной поддержки и участия общества.

Заключение

Таким образом, концепция «зелёного города» в международной практике представляет собой комплексную модель устойчивого развития, объединяющую экологические, социальные и экономические принципы. Опыт Копенгагена, Фрайбурга, Сингапура, Ванкувера и Масдара подтверждает универсальность этих принципов и их применимость в разных природно-климатических и социально-экономических условиях. «Зелёный город» рассматривается как целостная социально-экологическая система, ориентированная на рациональное использование ресурсов, устойчивое градостроительство и участие населения, что делает концепцию важной основой для региональных стратегий устойчивого развития.

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ДОЛЖНОСТНАЯ ИНСТРУКЦИЯ КАК СПОСОБ ОПРЕДЕЛЕНИЯ ТРУДОВЫХ ОБЯЗАННОСТЕЙ РАБОТНИКА

Аннотация: Современное трудовое законодательство и практика предприятий подчёркивают важность эффективной организации работы коллектива, где ключевую роль играет чёткое определение трудовых обязанностей каждого сотрудника. Должностная инструкция выступает основным инструментом формализации границ ответственности и задач, что обеспечивает правовую защиту сторон трудового договора, способствует снижению конфликтов, улучшению контроля и повышению производительности труда.

Ключевые слова: должностная инструкция, трудовые обязанности, работники предприятий, юридическая деятельность.

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JOB DESCRIPTION AS A WAY TO DEFINE AN EMPLOYEE'S WORK RESPONSIBILITIES

Abstract: Modern labor legislation and practice of enterprises emphasize the importance of effective organization of team work, where a clear definition of the work responsibilities of each employee plays a key role. The job description is the

main tool for formalizing the boundaries of responsibilities and tasks, which provides legal protection for the parties to an employment contract, helps reduce conflicts, improve control and increase productivity.

Keywords: *job description, labor duties, employees of enterprises, legal activity.*

Современное трудовое законодательство и реальная рабочая практика всех предприятий остро ставят вопрос об эффективной организации работы коллектива. Одной из центральных задач, как для современных компаний, так и для государственных учреждений, остается определение трудовых обязанностей каждого работника. Для достижения этой цели используется должностная инструкция - документ, который призван оформить и упорядочить границы ответственности и задач. Важно отметить, что формализация обязанностей не только обеспечивает правовую защищённость обеих сторон трудового договора, но и способствует формированию здорового климата внутри коллектива, снижению числа конфликтов, обеспечению более чёткого контроля над выполнением задач и, как следствие, более высокой производительности труда.

На практике, несмотря на наличие многочисленных рекомендаций, нормативно-правовой базы и инструкций по составлению должностных регламентов, проблема остаётся весьма актуальной. По итогам анализа публикаций в сфере трудового права, а также по результатам социологических опросов, можно утверждать, что значительная часть трудовых конфликтов возникает именно из-за недостаточно чётко оформленных обязанностей, невозможности соотнести ожидания работодателя и исполнителя. Следовательно, вопрос о том, насколько эффективно реализуется этот инструмент - должностная инструкция, требует тщательного рассмотрения.

Так, основными проблемами являются: отсутствие единой базы для создания текста, перегрузка или, наоборот, излишняя краткость документа, несовпадение фактически выполняемых работ сотрудником с тем, что указано в инструкции. Как следствие, возникают не только внутренние конфликты, но и судебные споры, которые зачастую затрагивают вопросы выплат, начисления премий, увольнения, а иногда даже перевод работников на другие должности без их согласия. Эта проблема осложняется и постоянно меняющейся экономической конъюнктурой, когда каждая компания вынуждена пересматривать организацию труда, иногда вводить новые должности и перераспределять обязанности между специалистами.

Еще один актуальный аспект связан с тем, что в современном мире условия работы меняются стремительно, работники осваивают дополнительные функции и техники, организации - новые формы управления и распределения труда. Должностные инструкции, составленные несколько лет назад, быстро устаревают и не отвечают реальным требованиям, что

приводит к их неэффективности. Все эти вопросы требуют подробного рассмотрения, чтобы выработать оптимальные методы решения.

Должностная инструкция играет ключевую роль в трудовой деятельности каждого работника и является тем опорным документом, который регулирует не только перечень его обязанностей, но и права, ответственность, условия работы и порядок подчинения. Согласно опросам, проведённым Федеральной службой по труду и занятости, почти 75% сотрудников считают наличие чёткой должностной инструкции необходимым условием для эффективной работы. Это подтверждается практикой: там, где обязанности описаны конкретно и подробно, отмечается более высокая дисциплина труда, растёт удовлетворённость работников.

Однако вся система построения должностных инструкций сталкивается с рядом трудностей. Прежде всего, проблема неструктурированности — документы совершенно разных компаний отличаются по объёму, детализации, перечню задач. Отчасти это связано с отсутствием единого общепринятого стандарта, в то время как в ряде стран существуют утверждённые формы и шаблоны в зависимости от сферы деятельности. Российская практика предполагает довольно свободный стиль изложения, что приводит к появлению слишком общих или, что хуже, противоречивых формулировок[1]. Часто встречаются инструкции «копировать - вставить», где описания обязанностей взяты из других организаций или из старых документов, что не отражает реальных условий труда конкретного сотрудника.

Примером может служить юридическая или бухгалтерская служба: в инструкции могут быть перечислены не только конкретные задачи, но и дополнительные, не вполне определённые обязанности «по распоряжению руководства», которые дают слишком широкие возможности для субъективного толкования. Согласно статистике, около 30% судебных разбирательств, касающихся споров между работниками и руководителями, связаны с неоднозначной формулировкой обязанностей. Это приводит не только к непредвиденным финансовым издержкам для организаций, но и снижает мотивацию работников.

Другая значительная проблема заключается в нерегулярной актуализации должностных инструкций. Если организация меняет структуру, вводит новые процессы или требования, а соответствующие документы не пересматриваются, возникает расхождение между тем, что сотрудник на самом деле делает, и тем, что официально закреплено. Работник, осваивающий новые знания и выполняющий сложные задачи, формально не может претендовать на повышение зарплаты или премию, так как эти обязанности в инструкцию не включены. Аналогичные трудности возникают при сокращениях или смене профиля должности - инструкции остаются прежними, работник ощущает несправедливость и безысходность, что негативно влияет на общую атмосферу в коллективе.

Задача составления инструкции требует поиска баланса между подробным перечислением всех служебных функций и сохранением гибкости. В больших компаниях нередко встречается гиперболизация: инструкции расписывают до мельчайших деталей, указывают не только основные задачи, но и каждый небольшой шаг, что делает их неудобными и излишне громоздкими [3]. В небольших компаниях, напротив, могут ограничиваться парой абзацев, что не даёт полной картины служебных обязанностей. Опрошенные сотрудники отмечают, что в таких условиях часто меняется восприятие своей работы, возникают разногласия с руководством и невозможность карьерного роста [2].

В поисках решения этих вопросов компании разрабатывают собственные локальные нормы, а некоторые прибегают к опыту западных стран, где акцентируют внимание на описании ключевых зон ответственности («core responsibilities»), что упрощает адаптацию работника на новом месте, а также облегчает пересмотр документов при изменении структуры работы. Хорошим примером служит практика регулярного обновления (раз в год или чаще) официальных инструкций, что позволяет учитывать и отражать все актуальные изменения.

Система составления должностных инструкций может быть организована следующим образом. Во-первых, формирование рабочей группы, в которую входят как представители отдела кадров, так и работники, непосредственно исполняющие функции по конкретной должности. Такая «двусторонняя» проработка помогает создать максимально реалистичный и применимый документ. Во-вторых, внедрение постоянной системы обратной связи, в которой работники могут вносить свои предложения и замечания по корректировке своих инструкций. В ряде организаций подобная практика приводит к снижению оборота кадров и увеличению удовлетворенности персонала на 15-20%, что подтверждается внутренними оценками.

Кроме того, одним из эффективных способов стала практика введения «описания компетенций», где акцент делается не только на задачах, но и на необходимых качествах, умениях сотрудника для выполнения того или иного объема работы. Это существенно облегчает процесс поиска и подбора, а также последующую адаптацию на рабочем месте нового сотрудника.

Отдельно стоит сказать о необходимости обсуждения документа с потенциальным кандидатом еще до его подписания [4]. Часто в компаниях инструкцию выдают только после выхода на работу, что делает невозможным осознанное согласие со всеми пунктами. Если провести с кандидатом подробное обсуждение всех нюансов еще на этапе собеседования, снижается приверженность формализму и существенно уменьшается риск возникновения трудовых споров.

Наряду с этим, существуют и автоматизированные системы учета должностей и обязанностей, которые позволяют не только хранить и актуализировать инструкции в электронном виде, но и автоматически уведомлять исполнителей о внесённых изменениях, автоматизировать

процесс ознакомления с новыми версиями документов[5]. Такая практика позволяет снизить риск возникновения устаревшей информации, обеспечивает прозрачность и облегчает работу кадровой службы.

Сравнительный анализ этих способов показывает, что наиболее результативными становятся те системы, где работодатель и работник активно взаимодействуют на всех этапах составления и корректировки инструкций, а документы отражают реальные функции, выполняемые в конкретный момент [6]. Такая практика в среднем снижает уровень жалоб и конфликтов на 30% по сравнению с теми компаниями, где инструкции пересматриваются нерегулярно и составляются только руководством.

Проблема доказательства выполненных обязанностей в случае трудового конфликта также во многом решается при наличии грамотно оформленного документа. Для суда должностная инструкция выступает одним из главных источников сведений о позиции сторон, а потому её содержание должно быть тщательно продумано и согласовано с реальными условиями [7]. В ряде случаев именно этот документ помогает работнику отстоять свои права или получить заслуженную компенсацию в случае необходимости.

Так, должностная инструкция, оставаясь сравнительно простым и понятным инструментом управления, оказывает значимое влияние практически на все аспекты трудовых отношений — от чёткости работы и мотивации, до решения конфликтных ситуаций и вопросов материального стимулирования.

Таким образом, в результате изучения и анализа проблемы выделяется главное: должностная инструкция не просто формальный документ, а реальный инструмент эффективного управления персоналом и обеспечения правовой защищенности всех участников трудовых отношений. Она позволяет структурировать рабочие процессы, чётко обозначить служебные задачи, требования к квалификации и уровню ответственности. Современные проблемы — это ускоряющиеся темпы изменений в бизнес-процессах. Новые технологии и профессии делают роль этого документа ещё более значимой.

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**МУНИЦИПАЛЬНАЯ НЕОДНОРОДНОСТЬ И АНТРОПОГЕННЫЕ
ФАКТОРЫ ПОЖАРОВ КАК ПРОБЛЕМА СТРАТЕГИЧЕСКОГО
УПРАВЛЕНИЯ ПОЖАРНОЙ БЕЗОПАСНОСТЬЮ (НА ПРИМЕРЕ
СВЕРДЛОВСКОЙ ОБЛАСТИ)**

Аннотация. В статье на основе анализа статистических данных и обобщения научных публикаций рассматриваются управленческие проблемы обеспечения пожарной безопасности в Свердловской области. Акцент сделан на муниципальной неоднородности пожарных рисков, структуре причин возгораний и социальных факторах гибели людей. Показано, что снижение общего количества пожаров не сопровождается устранением системных рисков, связанных с человеческим фактором, жилым сектором и открытыми территориями, что обуславливает необходимость перехода к адресным управленческим решениям на муниципальном уровне.

Ключевые слова: пожарная безопасность, Свердловская область, муниципальное управление, ландшафтные пожары, человеческий фактор, стратегическое планирование.

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**MUNICIPAL HETEROGENEITY AND ANTHROPOGENIC FIRE
FACTORS AS A PROBLEM OF STRATEGIC FIRE SAFETY
MANAGEMENT (CASE STUDY OF THE SVERDLOVSK REGION)**

Abstract. The article examines managerial problems of ensuring fire safety in the Sverdlovsk Region based on the analysis of statistical data and the generalization of recent scientific publications. Particular attention is paid to municipal heterogeneity of fire risks, the structure of fire causes, and social factors of fatalities. It is shown that a reduction in the overall number of fires is not

accompanied by the elimination of systemic risks associated with the human factor, the residential sector, and open areas, which substantiates the need to shift from a formal, averaged approach to targeted managerial decisions at the municipal level.

Keywords: *fire safety, Sverdlovsk Region, municipal management, landscape fires, human factor, strategic planning.*

В научных исследованиях последних лет подчёркивается, что результативность управления пожарной безопасностью определяется не столько объёмом привлекаемых сил и средств, сколько качеством управленческих решений, принимаемых на ранних стадиях развития угрозы [1]. Для территориально протяжённых и лесистых регионов, к числу которых относится Свердловская область, ключевое значение приобретают своевременность реагирования, адресность профилактики и способность учитывать муниципальные особенности пожарных рисков.

По итогам 2024 года в Свердловской области зарегистрировано 6564 пожара, что на 22,6 % меньше, чем в предыдущем году. Число погибших сократилось на 3,8 %, травмированных – на 15,6 %, материальный ущерб снизился более чем в четыре раза [3]. Формально данные показатели могут свидетельствовать о стабилизации обстановки. Однако агрегированная региональная статистика скрывает существенную дифференциацию рисков и последствий на муниципальном уровне. В научной литературе данная проблема связывается с недостаточной развитостью механизмов оперативного учёта ландшафтных (природных) пожаров. Так, И.М. Антонов указывает, что при нормативной урегулированности вопросов тушения природных пожаров система оперативного сбора и учёта информации о ландшафтных пожарах (за исключением лесных) длительное время оставалась фрагментарной и не обеспечивала формирования целостной картины пожароопасной обстановки. По мнению автора, отсутствие единого оперативного учёта существенно ограничивает возможности анализа территориальной дифференциации пожаров, затрудняет выявление наиболее «горимых» муниципальных образований и снижает обоснованность управленческих решений по заблаговременному распределению сил и средств [1].

Указанные выводы позволяют объяснить, почему агрегированные региональные показатели пожарной статистики не отражают реального уровня муниципальных рисков и затрудняют переход от формального контроля к адресному, риск-ориентированному управлению пожарной безопасностью.

Анализ распределения пожаров по причинам показывает, что человеческий фактор остаётся доминирующим источником пожарной опасности. В 2024 году неосторожное обращение с огнём стало причиной:

- 2518 пожаров в городской местности, из них 1667 – при курении;
- 757 пожаров в сельской местности;

– 1869 пожаров на открытых территориях [3].

Несмотря на общее снижение числа возгораний на открытых территориях, их абсолютное количество остаётся высоким – 2589 пожаров за год. Существенную долю составляют пожары, связанные с горением бытовых отходов (1668 случаев) и сухой растительности (352 случая). Нарушения правил эксплуатации транспортных средств обусловили 307 пожаров на открытых территориях и 205 – в городской застройке, что указывает на устойчивое сочетание природных и техногенных рисков [3].

Таким образом, снижение общего числа пожаров не сопровождается трансформацией структуры причин. Это свидетельствует о преобладании реактивного управления, ориентированного на ликвидацию последствий, а не на предотвращение рисков.

Особое управленческое значение имеет анализ муниципальной динамики. В 2024 году рост количества пожаров зафиксирован в ряде территорий, включая:

- Таборинский муниципальный район (с 4 до 10 пожаров);
- городской округ Дегтярск (с 48 до 108);
- городской округ Красноуфимск (с 26 до 44);
- Туринский городской округ (с 76 до 89);
- городские округа Верхнее Дуброво, Краснотурьинск, Сухой Лог и Полевской [3].

Одновременно в 27 муниципальных образованиях зарегистрирован рост числа погибших на пожарах. Наиболее выраженная негативная динамика отмечена в городских округах Кушва (с 1 до 6 погибших), Берёзовский (с 4 до 13), Первоуральск (с 11 до 17), Ревда (с 4 до 6), а также в Нижнем Тагиле (с 9 до 10). В ряде территорий рост смертности совпадает с увеличением пожаров в жилом секторе, что указывает на недостаточную адресность профилактической работы [3].

Недостаточная результативность превентивного управления в научных исследованиях также связывается с ограниченными возможностями информационно-аналитической поддержки принятия решений на муниципальном уровне. Так, С.В. Ражников подчёркивает, что существующая практика управления оповещением населения при ландшафтных (природных) пожарах ориентирована преимущественно на формальную проверку работоспособности систем, тогда как ключевыми параметрами эффективности являются своевременность оповещения, адресность доведения информации и реальная достаточность сил и средств для эвакуации населения. Отметим, что отсутствие прогнозирования развития пожара и объективной оценки ресурсных возможностей муниципальных образований существенно снижает качество управленческих решений и увеличивает риск тяжёлых социальных последствий [2]. Выводы С.В. Ражникова позволяют интерпретировать выявленные в Свердловской области случаи роста смертности на пожарах как следствие не только поведенческих факторов, но

и недостаточной информационно-аналитической обеспеченности управления, особенно на ранних стадиях развития пожароопасной ситуации [2].

Полученные в ходе анализа статистические данные подтверждают выводы, представленные в научных исследованиях, о том, что фрагментарность оперативного учёта пожаров и формальный характер управленческих процедур существенно снижают обоснованность принимаемых решений и ограничивают возможности раннего реагирования на пожароопасные ситуации на муниципальном уровне.

Социальный анализ последствий пожаров показывает, что наибольшую долю погибших составляют пенсионеры и лица с неустановленным социальным статусом. 39 % смертельных случаев приходится на ночное время, а основной причиной гибели остаётся отравление токсичными продуктами горения. Эти данные свидетельствуют о низкой эффективности раннего оповещения, ограниченной оснащённости жилья средствами обнаружения пожара и недостаточном учёте социальной уязвимости населения при планировании профилактических мероприятий [3].

В совокупности выявленные тенденции указывают на ряд системных управленческих проблем:

- формальный характер оценки эффективности пожарной безопасности, ориентированный на итоговые показатели, а не на процессы управления;
- выраженная муниципальная неоднородность рисков при использовании унифицированных мер реагирования;
- недостаточная своевременность принятия решений и распределения ресурсов на ранних стадиях пожароопасных ситуаций;
- ограниченное использование статистических данных как инструмента стратегического и превентивного планирования.

Проведённый анализ показывает, что снижение общего количества пожаров в Свердловской области в 2024 году не означает устранения ключевых управленческих проблем в сфере пожарной безопасности [4]. Доминирование человеческого фактора, концентрация пожаров в жилом секторе и на открытых территориях, а также муниципальная неоднородность последствий требуют перехода от формального подхода к адресной, риск-ориентированной модели управления.

Приоритетное значение должны приобрести меры, направленные на повышение своевременности управленческих решений, оценку реальной достаточности ресурсов и усиление роли муниципального уровня в системе стратегического планирования пожарной безопасности. Практическая значимость полученных выводов заключается в возможности их использования органами местного самоуправления при корректировке муниципальных программ пожарной безопасности, планировании профилактических мероприятий и распределении ресурсов с учётом территориальной дифференциации пожарных рисков.

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ОСНОВЫ ФОРМИРОВАНИЯ АРХЕОЛОГИЧЕСКОГО ФОНДА ГОСУДАРСТВЕННОГО МУЗЕЯ ИСТОРИИ УЗБЕКИСТАНА

Аннотация: В данной статье рассматривается формирование археологического фонда Государственного музея истории Узбекистана. Находки археологических раскопок в городе Ташкенте и области, а также в разных уголках страны, коллекции археологических артефактов местных коллекционеров в музее, археологических экспедиций, организованных сотрудниками музея, основаны на фондовых коллекциях и вводных книгах. Некоторые редкие музейные находки, в частности двуглавая змея, рассказывают об истории поступления в музей остадона.

Ключевые слова: Музей, фонд, предмет, коллекционер, остадон, двуглавая змея, терракота, керамическая посуда, металл, украшения, ртуть, М. Э. Массон, Т. Миргийёзов.

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FUNDAMENTALS OF THE FORMATION OF THE ARCHAEOLOGICAL COLLECTION OF THE STATE MUSEUM OF THE HISTORY OF UZBEKISTAN

Abstract: This article discusses the formation of the archeological fund of the State Museum of History of Uzbekistan. The findings of archeological excavations in Tashkent city and region, as well as in different parts of the country, the collection of archeological artifacts of local collectors in the museum, archeological expeditions organized by the museum staff are based on fund collections and introductory books. Some of the museum's rare finds, particularly the two-headed snake, dwell on the history of the ostadon being brought to the museum.

Key words: Museum, fund, item, collector, ostadon, double-headed snake, terracotta, ceramic pottery, metal, jewelry, mercury, M. E. Masson, T. Mirgiyozov.

Введение. Государственный музей истории Узбекистана в своих фондах хранит сотни тысяч археологических, нумизматических, этнографических предметов, а также архивных документов, происходящих из материальных и духовных памятников Средней Азии, обладающих первостепенной научной ценностью и получивших мировую известность.

Существенную часть данного культурного наследия составляют археологические находки, сосредоточенные в Археологическом фонде музея, который в настоящее время насчитывает свыше 75 тысяч единиц хранения.

Формирование Археологического фонда музея началось в 70–90-е годы XIX века. Значительную роль в его создании сыграли местные жители — самаркандский купец Мирза Абдулла Бухорий, краеведы и археологи-любители, в том числе торговец древностями из Тойтепы Султан Примкулов, а также ташкентский купец, первый узбекский археолог-любитель Акром Аскарлов, являвшиеся одними из наиболее активных собирателей редких предметов [1.1]. В 1887 году Русское археологическое общество наградило А. Аскарлова малой серебряной медалью «За вклад в развитие археологии» [2.36]. После его смерти в 1891 году, в соответствии с завещанием, 14 тысяч монет и 200 предметов по распоряжению туркестанского генерал-губернатора А.Б. Вревского были отправлены в Санкт-Петербург [3.26].

К указанному периоду относится и поступление в музей первого оссуария. Он был обнаружен в 1886 году во дворе отставного солдата в Ниезбоши — бывшей почтовой станции, расположенной в 22 км от Ташкента по направлению к Самарканду. В том же году еще один оссуарий был найден в двух километрах к юго-востоку от Ташкента (Никольский). На нем имелось изображение человека, при этом сохранились лишь отдельные фрагменты. Сведения о находке были опубликованы в газете «Туркестанские ведомости» [4.17].

11 декабря 1895 года в Ташкенте был создан Туркестанский кружок любителей археологии (ТКЛА), объединивший инициативных исследователей, интересовавшихся изучением истории края [5]. 4 ноября 1899 года члены кружка передали свои коллекции в археологический отдел Ташкентского народного музея. Среди переданных предметов находилась амулет-статуэтка в виде двух (сдвоенных) змей, обнаруженная в 1893 или 1894 году жителями села Сох Кокандского уезда во время сельскохозяйственных работ и переданная музею Г.С. Батыровым. Исследователи установили, что данный редкий артефакт относится к эпохе бронзы и датируется II тысячелетием до н.э. В настоящее время находка внесена в инвентарную книгу и экспонируется. По мнению М.Э. Воронца, данный предмет следует датировать концом бронзового века — второй половиной II тысячелетия до н.э. [6.141–142].

Четыре обработанные каменные статуэтки, переданные в музей и известные под названием «каменные идолы», послужили основой для формирования небольшой коллекции тюркской скульптуры, которая в настоящее время хранится под инвентарным номером 68 [7.37].

В конце 1890-х годов ТКЛА передал в музей пять оссуариев. В 1896 году член кружка Бакихон Абдукосимов доставил овальный оссуарий, найденный во дворе Ишонхона Подшохонова, проживавшего в местности Чилдўхтарон, расположенной вблизи кладбища Солор [8.25].

К концу 1920 года фонды Туркестанского народного музея насчитывали около 10 тысяч экспонатов, из которых 895 относились к этнографическому отделу, 798 — к зоологическому, 2464 — к нумизматическому, 3550 — к археологическому, 66 — к ботаническому, 31 — к военно-техническому и 250 — к геологическому отделу [9.35].

В 1921 году в музее работали известные исследователи Средней Азии — М.С. Андреев, А.Л. Бродский, Д.И. Кашкаров, Э.М. Коровин, М.Э. Массон. В 1920–1925 годах Турккомстарисом было организовано 46 экспедиций, в большинстве которых принимали участие сотрудники музея, а собранные материалы поступали в музейные фонды [10.30].

С 1923 года в Турккомстарисе начал активную научную деятельность выдающийся археолог М.Е. Массон, переведенный из Самарканда в Ташкент на должность заведующего археологическим отделом Центрального музея Средней Азии. Он работал в музее до 1929 года. Его вклад в организацию работы археологического отдела, пополнение и систематизацию археологических и нумизматических коллекций был значительным.

Особую роль в формировании и сохранении Археологического фонда сыграл Турды Миргиясович Миргиясов (1896–1951) — самостоятельно сформировавшийся археолог, краевед и музейный сотрудник, владевший несколькими языками и диалектами. С 6 февраля 1926 года он проработал в музее более 25 лет. В 1924–1929 годах Т.М. Миргиясов активно участвовал в экспедиционной и коллекционной деятельности археологического отдела под руководством М.Е. Массона, являясь его помощником и постоянным спутником в экспедициях [11.19]. Он стал свидетелем и участником ряда археологических открытий мирового значения, а также сотрудничал с Я.Г. Гулямовым, А.Ю. Якубовским, В.А. Шишкиным, А.И. Тереножкиным.

28 марта 1928 года М.Е. Массон совместно с Т.М. Миргиясовым провел обследование оссуарийного некрополя в Тойтепе [12.52–65]. В 1929 году А.Н. Соколов осуществил исследования памятников Хорезма. В 1930 году А.А. Потапов представил проект аэрофотоархеологической экспедиции с целью наблюдения и фотосъемки древних памятников с воздуха на территории от Чарджоу до района Нового Ургенча и вдоль реки Вахш [13.36].

Заключение.

Первую четверть XX века правомерно рассматривать как первый этап «ренессанса» археологической науки в регионе, поскольку именно в этот период территория края впервые стала объектом широкого и комплексного археологического изучения. В этом процессе значительную роль сыграли как российские, так и местные исследователи. Среди уникальных находок Археологического фонда следует отметить статуэтку двуглавой змеи, оссуарии, керамическую посуду, бронзовый котел сакского времени, находки из Варахши, терракотовые статуэтки и другие артефакты. В первой половине XX века М.Э. Массон заложил основы собственной археологической школы, что создало прочную базу для дальнейшего развития археологии в Узбекистане.

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ПРИМЕНЕНИЕ ЭПИДУРАЛЬНОЙ АНЕСТЕЗИИ У НОВорожденных ПРИ ХИРУРГИЧЕСКОЙ ПАТОЛОГИИ

Резюме: Известно, что новорожденные и дети грудного возраста чувствуют боль и требуют должной аналгезии при любых хирургических манипуляциях. В пролонгированной регионарной аналгезии у новорожденных за последние несколько лет произошли существенные изменения. Основные проблемы, с которыми приходится встречаться при назначении аналгезии, нехватка объективных методов измерения боли, отсутствие речевого контакта с ребенком, возрастные ограничения для применения некоторых анальгетиков. В настоящее время доказано, что эпидуральная аналгезия у новорожденных и детей грудного возраста зарекомендовала себя как безопасный и эффективный способ. Препаратом выбора для эпидуральной аналгезии у данной возрастной группы является ропивакаин (2 мг/мл). Продолжается обсуждение выбора оптимального эпидурального пространства, способа введения ропивакаина, а также его сочетания с наркотическими анальгетиками.

Ключевые слова: новорожденные, аналгезии, эпидуральной аналгезии.

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USE OF EPIDURAL ANESTHESIA IN NEWBORNS WITH SURGICAL PATHOLOGY

Abstract: It is known that newborns and infants feel the pain and require the proper analgesia in any surgical manipulations. Significant changes in the prolonged regional analgesia have occurred in newborns within the last several years. The main problems observed during analgesia are the lack of objective methods of pain measurement, lack of speech contact with a child and age restrictions to use some analgesics. It is currently established that epidural anesthesia in newborns and infants is recommended as a safe and effective method of anesthesia. The drug of choice for epidural anesthesia in this age group is

Ropivacainum 2 mg/ml. Discussion of the most suitable method of epidural administration of Ropivacainum in combination with narcotic analgesics is being continued.

Keywords: *newborns, analgesia, epidural analgesia.*

Проблема обезболивания в интенсивной терапии новорожденных и грудных детей с хирургическими заболеваниями актуальна в настоящее время. Одним из методов, который все шире внедряется в клиническую практику обезболивания у детей, становится эпидуральная аналгезия (ЭА), которая активно используется для интра и послеоперационного обезболивания с конца 1970-х гг.

Ноцицептивная система новорожденного высокочувствительна к болевым раздражителям [5, 6]. Ее онтогенез начинается на ранних этапах внутриутробного развития. К 3-му месяцу внутриутробного развития у плода уже можно выделить основные части центральной нервной системы (ЦНС): полушария головного мозга, ствол, мозговые желудочки и спинной мозг. Известно, что уже к 20-й неделе внутриутробного развития нейроны иннервируют поверхность кожи и слизистых оболочек. Миелинизация ноцицептивных путей полностью завершается в более поздний период развития ребенка, однако это не означает, что нервные пути функционально неполноценны [5]. Большой вклад в развитии ЭА у новорожденных детей принадлежит А. Безенбергу, представившему опыт использования этой аналгезии у 240 новорожденных с весом от 900 г до 5 кг в возрасте от нескольких часов жизни до 1 мес с атрезией пищевода и тонкой кишки, трахеопищеводным свищом, омфалоцеле и гастрошизисом, диафрагмальной грыжей и врожденными пороками сердца. Была детально описана техника проведения пункции и катетеризации эпидурального пространства (ЭП), оценены эффективность и безопасность данного вида обезболивания у новорожденных и грудных детей [22, 23].

Механизм действия анестетика при ЭА связан преимущественно с проникновением препарата через дуральные муфты в субарахноидальное пространство и последующей блокадой прохождения нервных импульсов (в том числе болевых) по корешковым нервам в спинной мозг. ЭА является альтернативой многим видам обезболивания именно у новорожденных и грудных детей ввиду своих существенных преимуществ [22, 24, 35].

Основным преимуществом данного вида аналгезии является отсутствие депрессии дыхания, что позволяет быстро восстанавливать спонтанное дыхание после оперативного вмешательства и создает условия для экстубации ребенка непосредственно в операционной. К тому же местный анестетик не подавляет кашлевой рефлекс, что положительно сказывается на респираторном статусе пациента. Влияние на гемодинамику у детей раннего возраста менее выражено, чем у детей старшего возраста [1,3]. Артериальная гипотензия (результат симпатической блокады) после технически правильно выполненного центрального регионарного блока относится к очень редким

осложнениям у новорожденных (каудальная, люмбальная и нижне торакальная эпидуральные блокады не требуют предварительного увеличения преднагрузки с помощью инфузионной терапии). К числу факторов, объясняющих высокую гемодинамическую стабильность, относят незрелость автономной симпатической системы, более низкий уровень периферического сосудистого сопротивления и меньшую фракцию от общего объема крови, секвестрирующуюся в нижних конечностях, так как объем нижних конечностей у младенцев по отношению к верхней половине туловища меньше [12,14]. ЭА улучшает моторику желудочно-кишечного тракта за счет угнетения симпатической нервной системы. Улучшается периферическое кровообращение, отмечается более гладкий эндокринный и метаболический ответ на операционный стресс [11, 22]. Немаловажным положительным моментом является отсутствие длительного заполнения большого количества официальных документов для назначения обезболивания.

Новорожденные обладают определенными анатомическими особенностями, которые необходимо учитывать при проведении ЭА. При рождении позвоночник ребенка представляет длинную трубку, обращенную вогнутой поверхностью кпереди, по этому остистые позвонки расположены под меньшим углом по отношению друг к другу, что облегчает эпидуральную пункцию на всех уровнях. Длина позвоночного канала около 20 см. Форма крестцовой кости у новорожденного более узкая и плоская, чем у взрослых. Доступ к субарахноидальному пространству из каудального эпидурального канала более прямой. Нижний край дурального мешка проецируется на уровень S3-S4 [3, 13, 14]. ЭП выглядит относительно большим, благодаря меньшему количеству жировой ткани расстояние от поверхности кожи до ЭП варьирует от 3 до 10 мм и не зависит от веса ребенка [11, 22]. Дужки позвонков в этом возрасте состоят из хрящевой ткани. Вены ЭП не имеют клапанной системы: таким образом, случайная инъекция раствора анестетика в эпидуральные вены приводит почти к мгновенному развитию системных токсических реакций [14].

ЭА у новорожденных и грудных детей может применяться:

- 1) при оперативных вмешательствах на органах грудной клетки, брюшной полости, при урологических и проктологических вмешательствах;
- 2) как компонент мультимодального обезболивания;
- 3) для монотерапии послеоперационного обезболивания.

При проведении ЭА следует быть готовыми к устранению возможных осложнений: перегибу или миграции эпидурального катетера, проявлению токсических свойств препарата (судороги, нейропатия и нарушение функции спинного мозга), полному спинальному блоку, нарушению мочеиспускания, парестезии. Острые системные токсические реакции (снижение артериального давления, брадикардия, аритмия, остановка дыхания и сердечной деятельности) могут проявляться при использовании высоких доз местного анестетика (особенно в условиях относительной гиповолемии), при быстром повышении концентрации препарата в крови, но в основном при

случайном внутрисосудистом введении [19, 26, 36, 43]. Могут встречаться и технические сложности: непреднамеренная пункция твердой мозговой оболочки, непреднамеренное внутрисосудистое введение препарата, инфекционные проявления (гнойный эпидурит, менингит, абсцесс). Артериальная гипотензия как результат симпатической блокады после технически правильно выполненного центрального регионарного блока относится к очень редким осложнениям [18, 22, 26, 27, 37].

В нашей стране для применения у новорожденных и детей грудного возраста при проведении ЭА во время хирургических вмешательств разрешен 0,2%-ный раствор ропивакаина (ропивакаин, 2 мг/кг). В послеоперационном периоде продленная эпидуральная инфузия у детей, в возрасте от 0 до 6 мес рекомендуется в виде болюса - 0,5-1 мл/кг (объем раствора), доза 1-2 мг/кг и последующей инфузии до 72 ч - 0,1 мл/кг/ч (объем раствора), доза 0,2 мг/кг/ч.

Ропивакаин относится к группе местных анестетиков амидного типа действия. Высокие дозы препарата применяются для местной анестезии при хирургических вмешательствах, низкие дозы препарата обеспечивают анальгезию (сенсорный блок) с минимальным и непрогрессирующим моторным блоком. Обратимо блокируя вольтажзависимые натриевые каналы, ропивакаин препятствует генерации импульсов в окончаниях чувствительных нервов и проведению импульсов по нервным волокнам. Ропивакаин может оказывать влияние на другие возбудимые клеточные мембраны (в головном мозге и миокарде). Если избыточное количество местного анестетика достигает системного кровотока за короткий промежуток времени, могут проявляться признаки системной токсичности со стороны ЦНС, которые предшествуют признакам токсичности со стороны сердечно-сосудистой системы, так как они наблюдаются при более низких концентрациях препарата в плазме крови [39].

Изначально ропивакаин считали равносильным бупивакаину в отношении развития сенсорного блока и менее эффективным в отношении моторного блока. Эта теория была основана на исследовании в 1989 г., в котором было показано, что в равных дозах эффект бупивакаина на А-волокна был на 15% больше, чем у ропивакаина, но только на 3% больше для С-волокон [31]. Позднее это сенсорное равновесие было оспорено [16].

Многие исследователи, в том числе наши соотечественники [8, 10], изучали действие ропивакаина и бупивакаина в сочетании с наркотическими анальгетиками. Кроме того, проводили исследования ропивакаина в различных концентрациях, а также сравнивали его с плацебо, что подтвердило эффективность ропивакаина, и определяли его рекомендуемые дозировки.

Проведено достаточно исследований со сравнением местных анестетиков, используемых в различных дозах и в сочетании с наркотическими анальгетиками, доказывающих преимущества ропивакаина [29].

Эффективность ропивакаина непосредственно для послеоперационного эпидурального обезболивания была определена в ряде исследований [25].

Некоторые из них, сравнивающие различные дозы и объемы ропивакаина, определили, что 0,2%- ный раствор ропивакаина обеспечивает лучший баланс между обезболиванием и побочными эффектами [38]. При сравнении с бупивакаином ропивакаин обладает более дифференцированной блокадой и более низкой системной токсичностью [31, 38, 39].

Исследования по использованию ропивакаина и бупивакаина в равных объемах и концентрациях (0,2%) у детей при каудальной аналгезии определили заметно большую эффективность и длительность аналгезии ропивакаином [34, 35].

Ропивакаин обладает менее выраженным кардиодепрессивным эффектом. Блокада натриевых каналов может нарушать проведение сердечного импульса и вызывать сердечные аритмии. В исследованиях прямой кардиотоксичности доказано, что изомеры ропивакаина меньше влияют на атриовентрикулярную проводимость (не удлиняют ее) по сравнению с другими местными анестетиками и что его кумулятивная доза, необходимая для провокации сердечного коллапса, значительно больше [34]. Кардиотоксичности местных анестетиков также способствует их способность вмешиваться в митохондриальное дыхание, здесь ропивакаин проявил себя с лучшей стороны - он в меньшей степени влияет на эти процессы. И восстановление сердца после интоксикации ропивакаином протекает легче. Все это свидетельствует о том, что применение ропивакаина безопасно и не менее эффективно по сравнению с другими местными анестетиками [39].

Следует отметить, что комбинация местных анестетиков и наркотических анальгетиков при ЭА значительно повышают качество анестезии во время операции и в послеоперационном периоде. В настоящее время введение в ЭП наркотических анальгетиков в сочетании с местным анестетиком у новорожденных применяется очень широко, спектр препаратов, разрешенных к применению у данной группы больных в нашей стране, включает фентанил, морфин и промедол. Морфин применяется в дозах до 0,1 мг/кг, при этом продолжительность действия обезболивания удлиняется до 24 ч, промедол в дозе до 0,2 мг/кг с продолжительностью действия до 12 ч, фентанил в дозе до 1-2 мкг/кг с продолжительностью действия до 2-3 ч. Наркотические анальгетики, введенные в ЭП, быстро адсорбируются венозными сплетениями, а оставшаяся часть через твердую мозговую оболочку достаточно медленно проникает в спинномозговую жидкость. Пик концентрации морфина в ликворе достигается через 20-120 мин, причем его концентрация в спинномозговой жидкости в 25 раз превышает концентрацию в плазме крови [1, 14]. Наркотические анальгетики диффузно проникают в желатинозную субстанцию задних рогов спинного мозга, где связываются с опиатными рецепторами и вызывают блокаду болевой чувствительности. Время наступления и продолжительность аналгезии зависят от средства наркотического анальгетика к опиатным рецепторам спинного мозга и дозы используемого препарата [1, 5, 14, 20, 29].

Побочные эффекты эпидурального введения опиатов (тошнота, рвота, кожный зуд и задержка мочи) у новорожденных и грудных детей встречаются намного реже, чем у взрослых и детей старшего возраста [1, 5, 14].

Существует множество мнений по поводу того, какой способ введения местного анестетика более предпочтителен, дискуссии продолжаются до сих пор. Мнение по поводу струйного введения сводится к тому, что это облегчает труд персонала и задействуется меньше дополнительной техники, но с точки зрения механизма воздействия более приемлем метод непрерывного капельного введения с поддержанием постоянной концентрации препарата в ЭП [36]. Безусловно, применение большего объема местных анестетиков с низкой концентрацией раствора более предпочтительно, чем малых объемов с высокой концентрацией [1, 22]. Довольно много работ посвящено оценке использования сочетания местного анестетика и опиоида при введении в ЭП [1, 29, 36]. Несмотря на расширяющееся использование ЭА у новорожденных и грудных детей, существует еще ряд вопросов по поводу выбора приемлемого способа аналгезии в послеоперационном периоде непосредственно с помощью эпидурального введения, и прежде всего это касается дозировок и сочетаний препаратов. Для поддержания анестезии наиболее часто используется севофлюран. Наркотические анальгетики и миорелаксанты вводятся только перед интубацией, в дальнейшем устанавливается эпидуральный катетер и вводится 0,2%-ный раствор ропивакаина в дозировке 2 мг/кг. Это обеспечивает достаточный уровень аналгезии на протяжении всего времени операции. Если операция продолжалась более 6 ч, при необходимости в эпидуральный катетер вводят дополнительный болюс до 1 мг/кг ропивакаина, что пролонгирует аналгезию. Большинство детей после окончания операции и отключения ингаляционного анестетика при применении ЭА быстро восстанавливают адекватное самостоятельное дыхание и могут быть экстубированы уже в условиях операционной. Мониторинг, необходимый при применении ЭА, в условиях операционной или в реанимационном отделении, включает контроль неинвазивного систолического, среднего и диастолического давления, частоты сердечных сокращений, сатурации кислорода, лабораторные исследования (показатели напряжения кислорода и углекислого газа в крови).

Оценка боли у новорожденных и грудных детей, по мнению многих авторов, может быть затруднена прежде всего ввиду отсутствия речевого контакта с ребенком. Для измерения уровня стресса используются показатели уровня кортизола в сыворотке крови. Однако достоверно судить о выраженности болевого синдрома по данному гормону нельзя, потому что его уровень может повышаться в ответ на различные стрессовые процессы в организме. Также дополнительным методом является определение уровня глюкозы в крови. По мнению некоторых авторов, показателями уровня послеоперационного стресса могут быть повышение уровней печеночных ферментов и билирубина в сыворотке крови в ближайший послеоперационный период [1, 3, 5, 7].

Оценка боли у новорожденных и детей грудного возраста проводится с помощью Шкалы CRIES (от англ. плачет). Критерии оценки включают выражение лица ребенка, отсутствие сна, характеристику плача, потребности в дополнительной дотации кислорода, повышение витальных показателей. Общая оценка по данной шкале рассчитывается как сумма баллов по всем 5 критериям. Максимальное количество баллов-10, минимальное -0. Соответственно, чем больше балл, тем сильнее выражен болевой синдром [2].

Для успешного выполнения регионарной анестезии у педиатрического пациента каждый анестезиолог должен обладать подробным знанием анатомии, физиологии, фармакологии местных анестетиков, иметь необходимое оборудование [14]. Применение ЭА обеспечивает адекватный уровень обезболивания в интра- и послеоперационном периоде, что позволяет значительно снизить потребление наркотических анальгетиков. Продленная ЭА является методом выбора послеоперационного обезболивания у новорожденных с хирургическими заболеваниями органов грудной и брюшной полости. Применение ЭА способствует более раннему переводу пациентов в хирургическое отделение и сокращению времени пребывания в ОРИТ.

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ОСНОВЫ ПОСТРОЕНИЯ ИНТЕЛЛЕКТУАЛЬНОЙ СИСТЕМЫ ЗАЩИТЫ ИНФОРМАЦИИ

Аннотация: Современные организации сталкиваются с постоянно растущими угрозами информационной безопасности. Для защиты корпоративных данных требуется внедрение интеллектуальных систем, способных автоматически выявлять аномалии, предсказывать потенциальные угрозы и принимать решения для минимизации рисков. В статье рассматриваются основные принципы построения таких систем, архитектура интеллектуальных средств защиты, методы анализа данных и алгоритмы предсказания инцидентов. Особое внимание уделено интеграции технических, организационных и программных компонентов для создания комплексной системы безопасности.

Ключевые слова: интеллектуальная система, информационная безопасность, защита информации, искусственный интеллект, анализ данных, предсказание угроз.

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FUNDAMENTALS OF CONSTRUCTING AN INTELLIGENT INFORMATION SECURITY SYSTEM

Abstract: Modern organizations face ever-growing information security threats. Protecting corporate data requires the implementation of intelligent systems capable of automatically detecting anomalies, predicting potential threats, and making decisions to minimize risks. This article examines the fundamental principles of building such systems, the architecture of intelligent security tools, data analysis methods, and incident prediction algorithms. Particular attention is paid to the integration of technical, organizational, and software components to create a comprehensive security system.

Keywords: intelligent system, information security, information protection, artificial intelligence, data analysis, threat prediction.

Введение

Современные организации активно внедряют информационные технологии для повышения эффективности бизнес-процессов, оптимизации работы сотрудников и улучшения взаимодействия с клиентами. Однако с

ростом цифровизации увеличивается и число угроз, способных нарушить конфиденциальность, целостность и доступность корпоративной информации. Традиционные системы защиты информации, такие как антивирусное программное обеспечение, межсетевые экраны и средства контроля доступа, часто оказываются недостаточно эффективными в условиях динамически меняющейся среды и появления новых видов кибератак [1].

На сегодняшний день наблюдается тенденция к автоматизации процессов защиты информации с использованием интеллектуальных систем, которые способны не только обнаруживать уже произошедшие инциденты, но и прогнозировать потенциальные угрозы. Интеллектуальные системы безопасности применяют алгоритмы машинного обучения, искусственные нейронные сети и методы анализа больших данных для выявления аномалий в поведении пользователей и сетевого трафика. Такой подход позволяет значительно снизить риск утечек данных и минимизировать последствия кибератак [2].

Особое внимание уделяется интеграции различных компонентов защиты: технических, организационных и программных. Технические меры включают шифрование данных, системы обнаружения вторжений и мониторинг сетевого трафика. Организационные меры включают разработку корпоративной политики безопасности, обучение персонала и контроль прав доступа. Программные решения позволяют автоматизировать анализ данных и принимать решения о блокировке потенциально опасных действий.

Цель настоящей работы — рассмотреть основные принципы построения интеллектуальной системы защиты информации, выявить ключевые компоненты, оценить их эффективность и предложить рекомендации по интеграции различных средств защиты в единую систему. Актуальность исследования обусловлена ростом числа кибератак, развитием технологий и необходимостью повышения устойчивости корпоративной информационной инфраструктуры.

Таким образом, введение в тему интеллектуальных систем защиты информации позволяет осознать необходимость комплексного подхода к обеспечению безопасности, прогнозирования угроз и постоянного совершенствования методов защиты. Эффективная система безопасности становится неотъемлемой частью устойчивого функционирования современных организаций, минимизации рисков и защиты конфиденциальной информации.

Обзор литературы

В последние годы вопросы информационной безопасности приобрели особую актуальность в связи с ростом числа кибератак и увеличением объема обрабатываемых данных. Современные организации сталкиваются с необходимостью защиты корпоративной информации, что требует внедрения интеллектуальных систем, способных адаптироваться к динамически меняющейся среде угроз. Бабаев А.В. [1] в своей работе подробно

рассматривает теорию и практику построения интеллектуальных систем защиты информации. Автор выделяет ключевые компоненты таких систем: сбор и мониторинг данных, анализ и прогнозирование угроз, автоматическое принятие решений и интеграция с корпоративными политиками безопасности. Смирнов Д.С. [2] анализирует применение методов машинного обучения в кибербезопасности, подчеркивая эффективность алгоритмов классификации, кластеризации и нейронных сетей для обнаружения аномалий. Фролов И.И. [3] рассматривает методы прогнозирования угроз в корпоративных сетях и показывает, что использование интеллектуальных систем позволяет заранее выявлять потенциальные атаки и снижать риск утечек информации. Козлов А.А. [4] акцентирует внимание на архитектуре интеллектуальных систем, включающей три уровня: сбор данных, анализ и прогнозирование, управление и реагирование. Джеймс С. и Робертс М. [5] рассматривают международный опыт применения искусственного интеллекта в информационной безопасности, подтверждая преимущества автоматизации процессов выявления угроз. Гарсиа М. [6] и Чен Л., Сунь Х. [7] подчеркивают значимость анализа больших данных и алгоритмов предсказания атак для повышения надежности защиты корпоративной информации.

Методология исследования

Для изучения принципов построения интеллектуальной системы защиты информации использовался комплексный подход. Проводился анализ научной литературы и современных исследований по информационной безопасности и интеллектуальным системам. Применялся сравнительный метод для оценки различных архитектур и алгоритмов прогнозирования угроз. Использовался системный подход, рассматривающий сеть как совокупность взаимосвязанных элементов: серверы, пользователи, программное обеспечение и политики безопасности.

Анализ и результаты

Современные корпоративные сети состоят из множества взаимосвязанных устройств и программных решений, что создаёт сложную инфраструктуру для защиты информации. Анализ литературы и практических данных выявил основные проблемы: устаревшее оборудование, сложность управления, недостаточную масштабируемость и человеческий фактор.

Сбор и мониторинг данных, использование машинного обучения и алгоритмов прогнозирования позволяют интеллектуальным системам выявлять аномалии в поведении пользователей, сетевом трафике и событиях безопасности. Применение нейронных сетей и методов кластеризации позволяет прогнозировать потенциальные угрозы и автоматически реагировать на инциденты.

Комплексный подход, сочетающий технические, организационные и программные меры, повышает эффективность защиты. Технические средства включают шифрование данных, VPN, системы IDS/IPS и антивирусное ПО. Организационные меры — разработка корпоративной политики безопасности, обучение сотрудников, контроль прав доступа. Программные

решения позволяют автоматизировать обработку данных, выявление аномалий и принятие решений по блокировке потенциально опасных действий.

Анализ статистики показывает, что использование интеллектуальных систем позволяет снизить количество инцидентов на 35–50%, минимизировать последствия атак и повысить устойчивость корпоративной инфраструктуры. Интеграция облачных сервисов и виртуализации требует применения многофакторной аутентификации, шифрования трафика и постоянного мониторинга действий пользователей.

Основные выводы анализа:

1. Сложная инфраструктура требует централизованного контроля.
2. Устаревшее оборудование повышает уязвимость системы.
3. Человеческий фактор является источником до 60% инцидентов.
4. Интеллектуальные системы позволяют прогнозировать угрозы и реагировать автоматически.

Заключение

Интеллектуальные системы защиты информации являются необходимым элементом корпоративной безопасности. Они позволяют выявлять аномалии, прогнозировать угрозы и минимизировать риски. Основные принципы построения включают сбор и анализ данных, использование алгоритмов машинного обучения и интеграцию всех компонентов защиты в единую архитектуру. Внедрение таких систем повышает эффективность безопасности, снижает вероятность утечек данных и обеспечивает устойчивость инфраструктуры перед современными киберугрозами. Регулярный аудит, обновление ПО, обучение персонала и формирование культуры информационной безопасности являются важными элементами комплексного подхода. В будущем интеграция облачных сервисов и расширение удаленных рабочих мест потребует постоянного пересмотра стратегий безопасности и адаптации методов защиты. Исследование подтверждает актуальность разработки интеллектуальных систем и их важность для современных организаций.

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ТЕХНОЛОГИЯ ПРОИЗВОДСТВА СЖИЖЕННОГО ТОПЛИВА ИЗ НЕФТЯНЫХ ГАЗОВ

Аннотация: Стремительное развитие нефтегазовой промышленности и внедрение различных технологий и технологий повышают потребность в нефтепродуктах. В статье изучены данные о масштабных строительных работах, проводимых в республике по производству уникальных продуктов из попутных газов и природного газа, а также о перспективах получения сжиженного топлива.

Ключевые слова: стабильный бензин, сжиженное, синтетическое топливо, технология GTL, попутные газы, фракционирование, конденсация, крекинг.

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TECHNOLOGY OF EXTRACTION OF FLUID FROM OIL AND GAS

Annotation: The rapid development of the oil and gas industry and the introduction of various techniques and technologies are increasing the demand for petroleum products. The article reviews the huge construction works carried out in

the country on the production of oil-containing associated gases and rare products from natural gas and the prospects for the production of liquefied fuel.

Key words: *sustainable gasoline, liquefied, synthetic fuel, GTL technology, associated gases, fractionation of gas, condensation, and cracking of gas.*

В настоящее время в стране ведется работа по реализации новых этапов развития нефтегазовой отрасли, применению передовых технологий на основе глубокой переработки сырья, их комплексному освоению, развитию альтернативных источников энергии, локализации производства и разработке экспортной продукции с учетом требований мирового рынка. Основным перспективным направлением является возможность запуска факелов с использованием малогабаритных устройств, утилизация спутниковых нефтяных газов и непосредственное получение газообразного метанового топлива, стабильного бензина и жидкой смеси пропан-бутановой фракции.

Проведен ряд научных и практических разработок с технологией производства сжиженного природного газа в США, России, Германии, Китае, в том числе в Республике Узбекистан. В том числе по разработке ряда технологий и установок получения сжиженных природных газов Гриценко А.И., Закиров С.Н., Земенков Ю.Д., Маркова Л.М., Прохоров А.Д., Дудин С.М., Лутошкин Г.С., Климова Г.Н., Литтов В.В., Яворский М.И., Кисленко Н.Н., Ненахов В.С., Рачевский Б.С., Рябцев Н.И., Степанов О.А. и Чириков К.Ю. В частности, ряд ученых, таких как Гриценко А.И., Закиров С.Н., Земенков Я.Д., Маркова Л.М., Прохоров А.Д., Дудин С.М., Лутошкин Г.С., Климова Г.Н., Литвак В.В., Яворский Разработкой технологии и оборудования для производства сжиженных природных газов занимались М.И., Кисленко Н.Н., Ненахов В., Рачевский Б.С., Рябцев Н.И., Степанов О.А. и Чириков К.Ю. Нефтегазовая отрасль в Республике Узбекистан является многоотраслевой отраслью, формирующей в своем составе вертикально-интеграционную систему, контролирующую сеть от забоя скважины до заказчика. Обеспечение стабильности такой крупнотоннажной системы требует подготовки и обучения высококвалифицированных специалистов. Производство синтетического жидкого топлива из природного газа очень рентабельно, и его дешевле транспортировать, чем природный газ: это стоит от 30% до 50% стоимости готового продукта для его транспортировки. Когда газ непосредственно превращается в жидкие компоненты в самой шахте, капитальные затраты на его обработку резко снижаются. При современных технологиях переработки природного газа возможно получение качественного бензина и дизельного топлива на стадии производства метанола [1].

Коммерческое использование топлив на основе GTL зависит от двух основных факторов: цены на нефть, необходимой для строительства НПЗ, и размера инвестиций. Первый фактор цены формируется на мировом рынке, второй фактор является предметом анализа инвестиций на строительство завода GTL, технико-экономических расчетов и риска.

Следует отметить, что рынок продукции завода GTL не ограничен, цена на жидкое топливо постоянно растет. Не может быть конкуренции или угрозы со стороны нефтеперерабатывающей промышленности для роста проекта GTL.

Производство высококачественных компонентов моторного топлива на заводах GTL создает проблему для нефтеперерабатывающих заводов, производящих топливо более высокого качества. Объект GTL может быть построен на территории нефтеперерабатывающего завода или рядом с заводом, который очищает газ каждого компонента, и потребность в переработке не заканчивается. При этом синтетическое жидкое топливо может передаваться на мобильную технологическую установку АЭС для переработки [2].

Условием Республики Узбекистан является наличие эффективного производства синтетических жидких топлив на основе утилизации больших объемов выбрасываемых в атмосферу газов, во-вторых, поддержание чистоты атмосферного воздуха. В настоящее время обработка подаваемого на факел газа низкого давления в больших масштабах осуществляется в «Шортанском нефтегазодобывающем управлении» и «Мубаракском нефтегазодобывающем управлении».

Помимо поглощения сжиженного газа из попутного газа, он также изолируется по низкотемпературной технологии. При переработке попутных газов на газоперерабатывающих заводах метан, этан и частично пропан получают из сухого газа и его состава, этансодержащих фракций и сжиженных газов: пропан, бутан, изобутан и автобензол содержат компоненты стабильного газового бензина [3].

Сопоставление содержания попутного газа на нефтяных месторождениях с природным газом газовых и газоконденсатных месторождений приведено ниже (Таблица 1). Из информации видно, что содержание попутного газа в разрезе месторождений сильно отличается друг от друга и зависит от типа месторождений и условий добычи, сжиженные газы получают не только из попутных газов, но и из газоконденсатных месторождений. При работе газов на газоконденсатных месторождениях под высоким давлением (100-600 кгс/см²) нефть проходит жидкость к некоторым компонентам. При снижении давления на 40-80 кгс/см² из него в результате конденсации газа выделяется конденсат. Конденсат содержит компоненты тяжелых углеводородов бензина и сжиженных газов. Как известно из процесса переработки, при подъеме нефти по трубопроводам часть попутного газа остается в ней в жидком состоянии. Количество растворенного газа и его состав зависят от режима работы, давления и температуры баланса.

Газы, содержащиеся в нефти, возвращаются на нефтепромысловые установки для стабилизации, а оставшиеся фракции метана и бутана дополнительно получают. Более половины сжиженного нефтяного газа производится при переработке на НПЗ. Содержание нефтяного газа для

каждого технологического процесса имеет следующую классификацию (Таблица 1).

Таблица 1

Среднее содержание попутных газов на нескольких нефтяных месторождениях сопоставимо с данными газовых и газоконденсатных месторождений.

Но ме р	Располож ение месторож дений	Глубина скважин	Глубина компонента								Количество конденсата в газе	Относительная
			CH ₄	C ₂ H ₆	C ₃ H ₈	C ₄ H ₁₀	C ₅ + от Навер х	CO ₂	H ₂ + уникал ьные газы	H ₂ S		
I. газоконденсатные месторождения												
1.	Уртабулак	2185	88,0	1,4	0,37	0,15	0,21	4,7	0,1	4,9	11,6	
2	Зеварда	2610	90	4,5						0,0 9	78,8	
5	Газли	97,2	0,32	0,9	0,47	0,13	2,3279	-	-	-	-	
II. Месторождения нефти и газа												
6	Южный Кемачи	2600	81,5	10,31	3,26	0,73	16	3,25	0,56	0,0 4	43	
7	Умид	2600	90,87	3,62	0,85	0,32	0,52	3,2	0,55	0,0 7	56	
III. Нефтяные месторождения												
8	Северный Уртабулак	4300	88,0	3,910,	0,91	0,6	2,327	3,38	0,7	0,0 4	78	-
10	Кукдумала к	2950	78,31	5,0	1,97	0,73	9,48	3,7	0,37	0,0 8	600	
11	Крук	2160	84,58	5,96	1.18	0,24	0,396	2.48	0,17	0,1 3	73	

Процесс термического крекинга дает большое количество олифенов. Каталитический процесс производит большое количество изобутанов, а процесс пиролиза производит большое количество этилена и водорода. Газовая, пропан-пропиленовая, бутан-бутиленовая фракции классифицируются как компоненты газа, извлекаемого из нефти на заводах.

Поэтому состав сжиженного нефтяного газа зависит от способа производства. Сопутствующие газы являются граничными углеводородами (пропан-бутан) при переработке на газоперерабатывающих заводах, и в последнем случае имеют небольшое количество граничных углеводородов (пропан-бутан). На нефтеперерабатывающих заводах концентрация пропилена и бутилена в сжиженном нефтяном газе резко возрастает.

Установка по производству пропана и высших углеводородов:

Схема использования эффекта Джоуля-Томсона для получения сжиженных углеводородных газов приведена ниже. Для предотвращения образования гидратов в газовом потоке 80% метанола вводится в газовый поток перед охлаждением. После прохождения газа через входной сепаратор рекуперативный теплообменник входит в Т1 и охлаждается обратным потоком газа [5]. В этом процессе газ нагнетается и охлаждается до необходимого давления для подачи потребителям, а затем поступает в трехфазный сепаратор С1 для отделения попавшей в него жидкости. Газ накапливается в котле после подачи хладагента в рекуперативный теплообменник.

таблица 2

Описание нефти и газа-спутника месторождения Северный Ортабулок.

№	Наименование и массовая доля компонентов, %	Value
1	Сероводород	3,89
2	Углекислый газ ($H_2S + CO_2$)	3,16
3	Азот (N_2)	1,03
4	Метан (CH_4)	51,59
5	Этан (C_2H_6)	14,78
6	Пропан (C_3H_8)	16,40
7	Изобутан (iC_4H_{10})	1,94
8	Нормал бутан (nC_4H_{10})	4,93
9	Изопентан (iC_5H_{12})	1,09
10	Нормал пентан (nC_5H_{12})	1,19
11	Плотность газа (по отношению к воздуху)	0,997

Конденсированная фракция выходит из основной фракционной колонны до самой высокой температуры кипения и зависит от температуры кипения: легкого первичного дистиллята ($-100^{\circ}C$), первичного тяжелого дистиллята ($50-200^{\circ}C$), авиационного и бытового керосина ($150-360^{\circ}C$), содержащего железнодорожные и средние дистилляты судового дизельного

топлива (при промежуточной температуре), газойля (175-360°C) Некоторые из них являются поступающими продуктами и увеличивают выбросы СУГ [6].

Это связано с экономическим кризисом в мире, сокращением добычи нефти на Ближнем Востоке, ее высокой ценой, экономической депрессией и снижением спроса на нефть. Одновременно вырос спрос на транспортное топливо: автомобильный бензин, авиационный керосин и дизельное топливо. В связи с возросшим спросом на «легкую нефть» сейчас ставится вопрос о сокращении производства легких фракций за счет увеличения производства дистилляторов и увеличения производства синтетического жидкого топлива вместо топлива. Для этого в технологическую цепочку НПЗ были добавлены дополнительные ступени легкого крекинга. При этом «тяжелое» топливо, выходящее из установки разделения основной фракции, нагревается до давления 450°C.gacha около 9800 кПа нефти, в остаточную нефть закачиваются дистилляты, то есть получается легкая фракция крекинг-смолы. Процесс легкого крекинга является другим типом термического крекинга. Это повышает выход олефиновых серий углеводородов с высоким содержанием крекинга. Исходя из точки образования сжиженного газа, он увеличивает выброс низкокипящих газов (пропана и бутана) при легком крекинге, является малонасыщенным продуктом, содержит большое количество пропилена и бутилена.

В соответствии с принятием одной или двух конверсий очистки в качестве основного крекинга на большинстве нефтеперерабатывающих заводов. Технологическая схема завода определяет выход сжиженного нефтяного газа в широком диапазоне Каталитический риформинг является простейшим процессом конверсии, и он обеспечивает выпуск сжиженного нефтяного газа. Основной целью здесь является получение ароматических углеводородов C6/C7 или промежуточных продуктов, или бензиновой смеси. Продуктом этого процесса является сырая нефть, полученная с помощью колонны фракционного сброса или специальной первичной фракции. Основным процессом конверсии углеводородов парафиновых и нефтяных рядов является мгновенное дегидрирование и кольцевание ароматических углеводородов в присутствии дистиллята Эти газы вместе с другими более легкими газами выделяются во время фазы восстановления быстрого испарения при низком давлении и поступают в реакторы в виде дистиллята, заполненного платиновым катализатором.

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ҲАР ХИЛ ЁШДАГИ КАЛАМУШЛАР ҚОНИ ВА ЖИГАР ТЎҚИМАСИДАГИ АСАТ АКТИВЛИГИГА ГИПОКИНЕЗИЯНИНГ ТАЪСИРИ

***Аннотация :**Бизнинг тажрибаларимизда турли ёшдаги (ёш, етук ва қари) каламушлар қони ва жигар гомогенатидаги АсАТ активлигига гипокинезиянинг таъсири ўрганилди.*

***Калим сўзлар:** Асат, каламуш, гипокинезия, корреляция, жигар тўқимаси, назорат.*

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INFLUENCE OF HYPOKINESIA ON ACAT ACTIVITY IN BLOOD AND LIVER TISSUE OF RATS OF DIFFERENT AGES

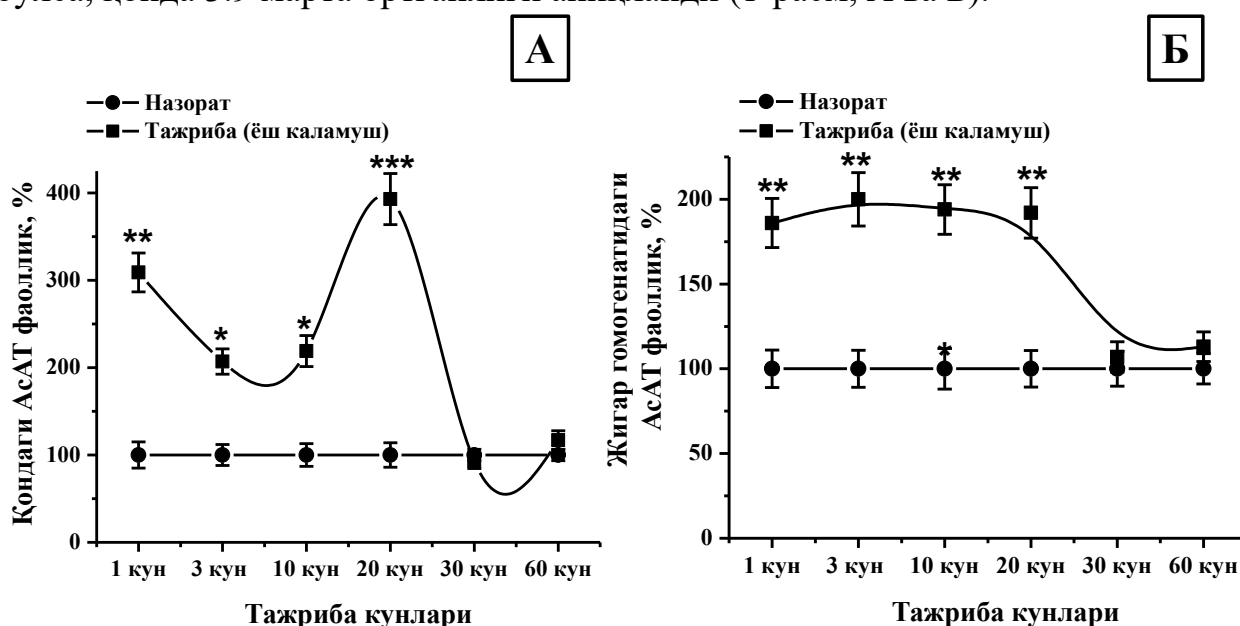
***Abstract:** In our experiments, the influence of hypokinesia on the activity of AcAT in the blood and liver homogenate of rats of different ages (young, mature, and elderly) was studied.*

***Keywords:** Asat, rat, hypokinesia, correlation, liver tissue, control.*

Аминотрансферазалар трансаминлаш жараёнини катализлайди ва барча аъзо ҳамда тўқималарда учрайди. Улар АсАТ ва АлАТ сифатида бўлиб, АсАТ изоферментлари цитозолда ва митохондрияларда жойлашган, АлАТ-асосан

цитоплазматик энзим бўлиб, митохондрияда учрайдигани турғун эмас ва хужайрада оз миқдорда бўлади. Қон зардобидagi ушбу ферментларнинг нормал миқдори - АсАТ 10-30 ме/л ва АлАт 7-40 ме/л га тенг [2, 3, 4]. Юрак мускуллари, жигар, буйрак, меъда ости беzi тўқималари ва эритроцитларда АсАТ фермент концентрацияси юқори бўлиб ушбу тўқималар жарохатланганда унинг қондаги миқдори кескин ортиши мумкин. АлАТ жигар хужайраларидаги концентрацияси юқори бўлиб, скелет мускуллари, буйрак ва юракдаги унинг концентрацияси кам. АсАТ ва АлАТ нисбати де Ритис коэффиценти деб аталади, нормада у 1.3 ± 0.4 га тенг, жигар касалликларида бу коэффицент камайиб кетади ва юрак касаллигида ортади [1, 5].

Ёш каламушлар қони ва жигар тўқимасига гипокинезиянинг 1; 3; 10 ва 20-кунлардаги таъсири натижасида уларнинг таркибидagi АсАТ активлиги ортганлиги аниқланди (1-расм, А ва Б). Гипокинезия таъсирида қон ва жигар тўқимасидаги ушбу фермент активлигининг ортиш даражаси ҳар хиллиги кузатилди. Гипокинезиянинг биринчи кунда жигар тўқимасида ушбу фермент активлиги назоратга нисбатан 1.9 маротаба ортган бўлса, қонда 3 маротаба ортди. Гипокинезиянинг 3 ва 10- кунларида ферментнинг активлиги ҳар иккала тўқимада назоратга нисбатан деярли бир хил 1.9-2.2 маротаба ортди. Гипокинезиянинг 20- кунда ушбу фермент активлигининг ортиши бир хил бўлмади, яъни жигар тўқимасида назоратга нисбатан 1.9 марта юқори бўлса, қонда 3.9 марта ортганлиги аниқланди (1-расм, А ва Б).

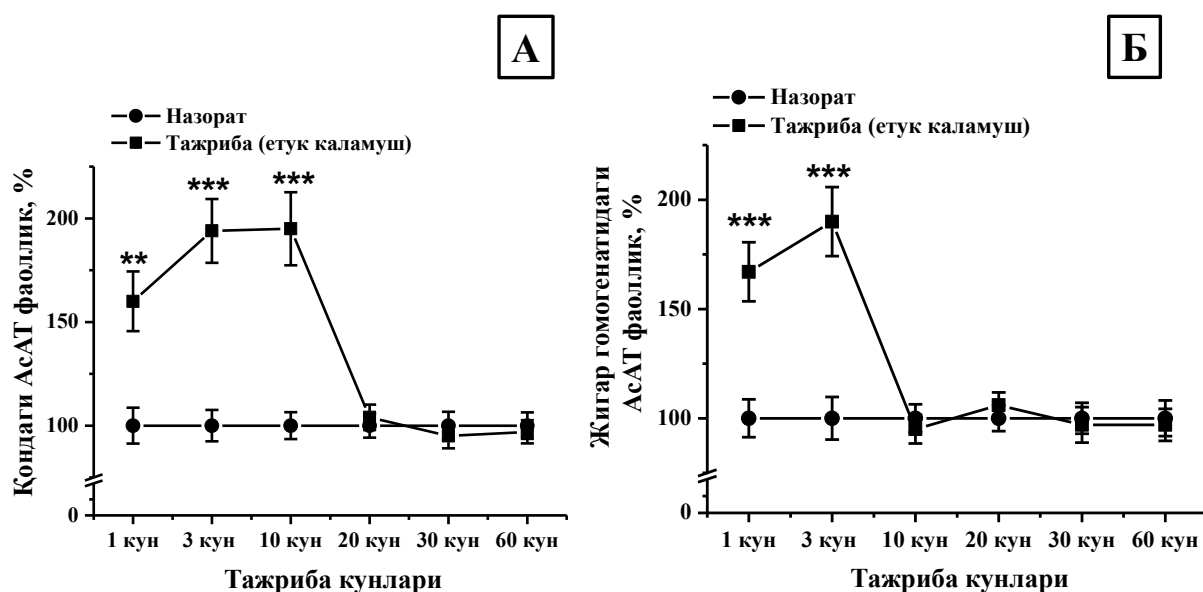


1-расм. Ёш каламушлар қонидаги (А) ва жигар гомогенатидаги (Б) АсАТ миқдорида гипокинезиянинг таъсири *Р < 0,05; **Р < 0,01; ***Р < 0,001; n=6.

Демак, АсАТнинг жигардаги активлигини маълум даражада ушлаб туриш учун унинг қонга «оқиб» кетиши кучаяр экан. Бундан ташқари ушбу ферментнинг активлиги жигардан бошқа тўқималарда ҳам юқори эканлиги маълум. Қондаги АсАТ активлиги ушбу ферментнинг асосан жигар

тўқимасидаги синтезланган қисми ҳисобига бўлиши қон ва жигар тўқимаси ўртасидаги АсАТ активлиги корреляцион боғлиқликнинг етарли даражада юқори эканлигидан кўриниб турибди($r=0.66\pm 0.13$).

Етук каламушларда гипокинезия таъсирида қон ва жигар тўқимасидаги АсАТ ферментининг активлиги ортди, лекин бу ортиш қонда узоқроқ давом этди. Гипокинезиянинг 1 ва 3-кунлари қондаги АсАТ активлиги назоратга нисбатан 1.7-1.9 марта ортган бўлса, қонда ушбу фермент активлиги гипокинезиянинг 1; 3 ва 10- кунлари 1.6 ва 1.9 маротаба ортди (2-расм, А ва Б).



2-расм. Етук каламушлар қонидаги (А) ва жигар гомогенатидаги (Б) АсАТ миқдорида гипокинезиянинг таъсири ** $P < 0,01$; *** $P < 0,001$; $n=6$.

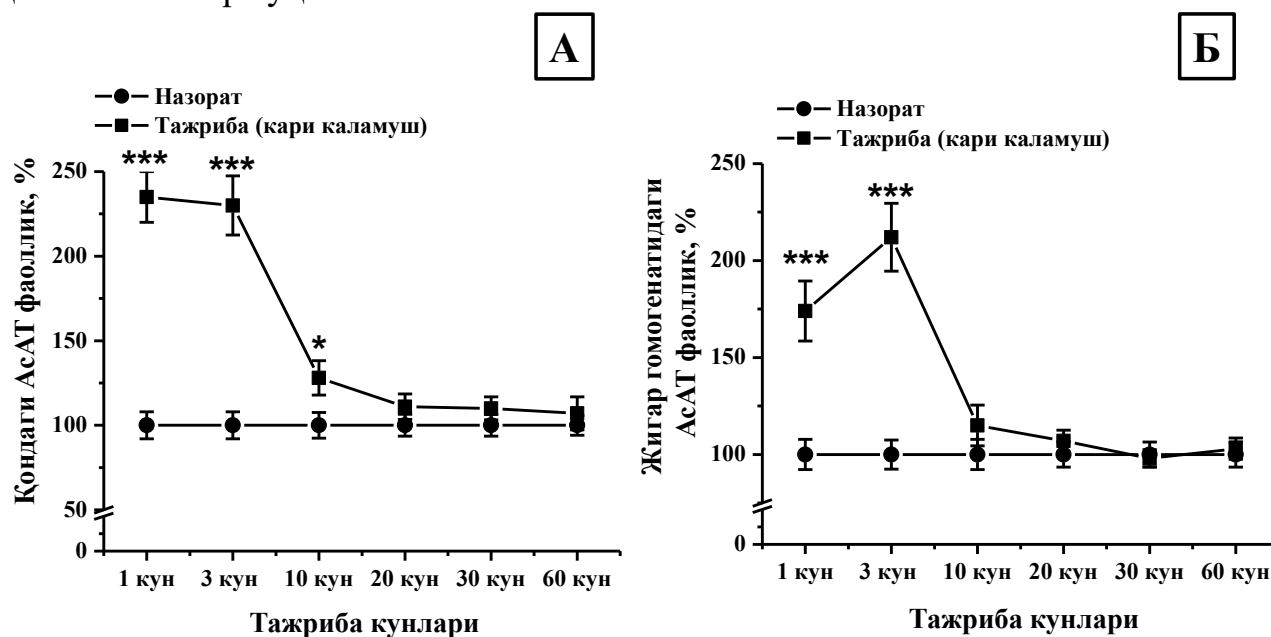
Қондаги АсАТ активлигини жигар тўқимасидаги ушбу активликка нисбатан узоқроқ ортганлигини икки ҳил тушунтириш мумкин:

Биринчидан АсАТ ферменти фақатгина жигардагина бўлмасдан бошқа тўқималарда (юрак ва скелет мускулларида, буйрак, меъда ости безида) ҳам мавжуд бўлиб [52; 64-б.] бу аъзоларнинг шикастланиши қондаги ушбу ферментнинг активлигини ортишига сабаб бўлиши мумкин.

Иккинчидан ушбу ферментнинг жигар тўқимасидан қонга кўпроқ «оғиб кетиши» қондаги АсАТ миқдорини ортишига сабаб бўлиши мумкин. Гипокинезия таъсирида етук каламушларда ёшларга нисбатан АсАТ ферменти активлигидаги ўзгаришлар тезроқ тикланди. Ёш каламушларда гипокинезиянинг 1; 3; 10 ва 20- кунларида ҳар иккала тўқимадаги ушбу ферментнинг активлиги ортган бўлса, етук каламушларда жигар тўқимасида фақатгина 1; 3 ва 10-кунларидагина ортганлиги аниқланди.

Етук каламушлар қони ва жигар тўқималаридаги АсАТ активлиги ўртасида корреляцион боғлиқлик ($r=0.38\pm 0.14$) назорат гуруҳида жуда оз бўлса гипокинезия таъсирида бу боғлиқлик ($r=0.68\pm 0.11$) кучайиб кетади.

Қари каламушлар қони ва жигар тўқимасидаги АсАТ активлигига гипокинезия худди ёш ва етук каламушларга ўхшаш таъсир кўрсатди, яъни уларнинг активлиги ортди, лекин бу ортиш даражаси ва давомлилиги билан улардан фарқ қилди. Тажрибадаги каламушлар қонидаги АсТ активлигининг гипокинезия таъсирида ўзгариш динамикаси ёшга оид ўзига ҳосликларга эга бўлди. Қари каламушлар қонидаги АсАТ активлигининг стресс омил гипокинезия таъсирида ўзгариш давомлилиги ёш каламушларникига ўхшаш яъни гипокинезиянинг 1; 3 ва 10 кунларида қондаги АсАТ назоратга нисбатан активлиги ортган. Аммо тажрибанинг 20; 30 ва 60 кунларида назоратга нисбатан АсАТ фаоллиги ортиши ишончли бўлмади (3-расм, А). Лекин бу ортиш даражаси билан бу икки ҳил ёшдаги каламушларда фарқ кузатилди. Ёш каламушлар қонида АсАТ активлиги назоратга нисбатан 2 - 3.9 маротаба ортган бўлса, қариларда бу кўрсаткич 1.3-2.4 маротаба ортди. Етук каламушларда эса қондаги ушбу ферментнинг активлиги гипокинезиянинг 1; 3 ва 10-кунларида назоратга нисбатан 1.6-1.9 маротаба ортди. Қари каламушлар жигар тўқимасидаги АсАТ активлиги гипокинезиянинг 1 ва 3- кунлари назоратга нисбатан 1.7 ва 2.1 маротаба ортди (3-расм, Б). Худди шунга ўхшаш эффект етук каламушларда ҳам кузатилган эди, лекин уларда АсАТ ферментининг жигар тўқимасидаги активлиги гипокинезиянинг 3-кунида назоратга нисбатан 1.9 маротаба юқори бўлди. Ёш каламушларнинг жигар тўқимасидаги АсАТ активлиги 1; 3; 10 ва 20-кунларида 1.9-2 маротаба назорат кўрсаткичдан юқори бўлди. Демак, гипокинезия таъсирида АсАТ ферментининг жигар ва қондаги активлигининг ўзгаришлари ёшга оид ўзига ҳосликларга эга экан. Қари каламушлар қони ва жигар тўқимаси АсАТ



3-расм. Қари каламушлар қонидаги (А) ва жигар гомогенатидаги (Б) АсАТ миқдорида гипокинезиянинг таъсири *P < 0,05; ***P < 0,001; n=6.

активлиги ўртасида корреляцион боғланиш мавжудлиги ($r=0.61\pm 0.12$) кўриниб турибди, бу кўрсаткичлар ўртача даражада ва мусбат. Бу кўрсаткичлар гипокинезия таъсирида деярли ўзгаришсиз қолмоқда.

Хулоса қилиб айтадиган бўлсак, тажрибаларда турли хил ёш давларидаги (ёш, вояга етган ва қари) каламушлар жигари тўқимаси ва қондаги айрим ферментлар фаоллигининг экспериментал гипокинезия шароитида ёшга боғлиқ адаптация механизмлари аниқланди.

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ВОЗМОЖНОСТИ ИНТЕГРАЦИИ ЦЕННОСТЕЙ НЕМАТЕРИАЛЬНОЙ КУЛЬТУРЫ В СИСТЕМУ ОБРАЗОВАНИЯ

***Аннотация:** Статья посвящена исследованию возможностей интеграции ценностей нематериальной культуры в систему образования. Нематериальная культура, включающая традиции, обычаи, фольклор и духовные ценности, способствует формированию национальной идентичности, творческого мышления и межкультурной компетентности у учащихся. Для анализа использовались методы изучения образовательных программ, нормативной базы, интервью с педагогами и анкетирование. Показано, что ценности нематериальной культуры могут быть эффективно включены в учебный процесс через проектную деятельность, создание музеев и экспозиций, культурные мероприятия и цифровые ресурсы. Эффективная интеграция требует подготовки педагогов и использования современных технологий, обеспечивая сохранение культурного наследия и воспитание гармонично развитой личности.*

***Ключевые слова:** нематериальная культура, интеграция, образование, культурное наследие, межкультурная компетентность.*

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POSSIBILITIES FOR INTEGRATION OF INTANGIBLE CULTURE VALUES INTO THE EDUCATION SYSTEM

***Abstract:** This article explores the potential for integrating intangible culture values into the education system. Intangible culture, which includes traditions, customs, folklore, and spiritual values, contributes to the development of national identity, creative thinking, and intercultural competence in students. The analysis utilized methods of studying educational programs, regulatory frameworks,*

interviews with teachers, and questionnaires. It is demonstrated that intangible culture values can be effectively integrated into the educational process through project-based activities, the creation of museums and exhibitions, cultural events, and digital resources. Effective integration requires teacher training and the use of modern technologies, ensuring the preservation of cultural heritage and the development of a harmoniously developed individual.

Key words: *intangible culture, integration, education, cultural heritage, intercultural competence.*

Введение

В условиях глобализации и стремительного развития информационных технологий образовательные системы сталкиваются с необходимостью не только передачи академических знаний, но и воспитания личности с устойчивыми культурными и нравственными ценностями. Одним из ключевых аспектов формирования такой личности является нематериальная культура, включающая традиции, обычаи, устное народное творчество, фольклор, ремесленные практики, обряды и духовные ценности. Сохранение и передача этих ценностей через систему образования позволяет не только формировать у учащихся чувство национальной идентичности и принадлежности к культурному сообществу, но и развивать социальные компетенции, творческое мышление и способность к межкультурной коммуникации. В последние годы международная практика демонстрирует, что интеграция нематериальной культуры в образовательный процесс способствует более глубокой вовлеченности учащихся, повышению их мотивации к обучению и укреплению культурной самобытности.

Материалы и методы

Для анализа возможностей интеграции нематериальной культуры в образование применялся комплекс методов, включающий анализ нормативно-правовой базы, изучение образовательных программ на национальном и международном уровнях, а также эмпирические методы: интервью с педагогами, анкетирование и наблюдение за учебными процессами. Особое внимание уделялось выявлению форм и методов, способствующих эффективной интеграции культурных ценностей, включая проектную деятельность, организацию тематических мастер-классов, учебные экскурсии, участие в национальных и региональных фестивалях, а также использование современных цифровых и мультимедийных ресурсов. Анализ проводился на основе системного подхода, что позволяло оценить не только образовательный эффект, но и социально-культурное воздействие на учащихся.

Результаты и обсуждение

Результаты анализа показали, что ценности нематериальной культуры могут быть интегрированы в образовательный процесс через различные предметные области, такие как история, литература, музыка, изобразительное искусство и социальные дисциплины. Наиболее эффективными формами

интеграции оказались проектно-исследовательские работы учащихся, создание школьных музеев и экспозиций, организация культурных мероприятий и фестивалей, а также использование цифровых платформ для фиксации и популяризации культурных практик. Исследование также выявило, что включение нематериальной культуры в учебный процесс способствует развитию у школьников критического мышления, навыков анализа и синтеза информации, формированию ответственности за сохранение культурного наследия и укреплению межличностных и межкультурных связей. Международный опыт подтверждает, что подобные практики повышают культурную компетентность, расширяют горизонты познания и формируют устойчивое чувство идентичности.

Интеграция ценностей нематериальной культуры в систему образования требует комплексного и системного подхода. Одним из ключевых аспектов является подготовка педагогов, способных адаптировать традиционные культурные практики к современным образовательным формам, создавать интерактивные и практикоориентированные учебные материалы, а также поддерживать активное вовлечение учащихся в культурно-познавательную деятельность. Не менее важным является создание учебно-методических комплексов, включающих элементы национального и мирового культурного наследия, с учетом возрастных особенностей учащихся и специфики образовательной среды. Использование современных технологий, таких как виртуальная и дополненная реальность, мультимедиа и цифровые архивы, позволяет визуализировать культурный контекст и создавать иммерсивные образовательные ситуации, способствующие более глубокому усвоению знаний и ценностей. Кроме того, активное взаимодействие с сообществами носителей традиций, участие в культурных проектах и волонтерских инициативах усиливает практическое и социальное воздействие образовательного процесса, делая обучение более осознанным и значимым для учащихся.

Заключение

Включение ценностей нематериальной культуры в систему образования представляет собой важное направление формирования гармонично развитой личности, обладающей культурной, нравственной и социальной компетентностью. Эффективная интеграция требует методической поддержки педагогов, разработки адаптированных учебных программ и активного использования интерактивных технологий, что обеспечивает сохранение культурного наследия и его трансляцию через образовательный процесс. Дальнейшие исследования могут быть направлены на разработку конкретных программ, учебных модулей и методик оценки эффективности интеграции нематериальной культуры в различные образовательные контексты, включая школы, колледжи и дополнительные образовательные платформы.

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ПРОБЛЕМЫ РАЦИОНАЛЬНОГО ИСПОЛЬЗОВАНИЯ И УКРЕПЛЕНИЕ КОРМОВЫХ РЕСУРСОВ В ОРОШАЕМЫХ ЗОНАХ РЕСПУБЛИКИ КАРАКАЛПАКСТАН

Аннотация: Данная статья посвящена проблемам рационального использования и закрепления кормовых ресурсов в орошаемых зонах Республики Каракалпакстан. Даны рекомендации по повышению урожайности орошаемых зон и их рациональному использованию.

Ключевые слова: сельское хозяйство, орошаемое земледелие, Кормовая база, специализация, рациональное использование, продуктивность, эффективность, освоение.

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PROBLEMS OF RATIONAL USE AND STRENGTHENING OF FEED RESOURCES IN IRRIGATED ZONES OF THE REPUBLIC OF KARAKALPAKSTAN

Abstract: *This article is dedicated to the problems of rational use and consolidation of fodder resources in the irrigated zones of the Republic of Karakalpakstan. Recommendations were given on increasing the yield of irrigated areas and their rational use.*

Keywords: *agriculture, irrigated agriculture, fodder base, specialization, rational use, productivity, efficiency, assimilation.*

В условиях рыночной экономики в ускоренном увеличении объемов производства продукции животноводства первостепенная роль принадлежит созданию прочной кормовой базы.

Однако в структуре посевных площадей Каракалпакстана в 2007 г. кормовыми культурами было занято около 34 тыс. га, т.е. 13% всех посевов, которых явно не хватает для организации кормового рациона наличного поголовья животноводческих хозяйств.

Проблема создания устойчивости кормовой базы может быть решена различными путями в зависимости от природных и экономических условий каждого хозяйства, района, зоны.

В районах орошаемого земледелия важным источником создания прочной кормовой базы является повышение урожайности кормовых культур. Следующее необходимое условие укрепления кормовой базы - значительное расширение площадей под кормовые культуры, прежде всего посевами люцерны.

По кормовому достоинству люцерны является одной из питательных кормовых культур. Поэтому широкое развитие люцерноводства как в специализированных люцерноводческих хозяйствах, так и в хлопково-зерноводческих севооборотах, увеличение производства животноводческой продукции, повышение эффективности отраслей продуктивного животноводства. Повышение удельного веса люцерны в общей посевной площади сельскохозяйственных культур в Каракалпакстане целесообразно также в отношении рационального использования воды. Сезоны потребности в поливной воде между хлопчатником и люцерной, а также между зерновыми и люцерной в весенний и осенний периоды не совпадают, что соответствует производительному использованию водных ресурсов. Поэтому вместе с расширением посевных площадей люцерны особое внимание должно быть уделено на расширение площадей кукурузы и других кормовых культур, что будет способствовать росту поголовья продуктивного животноводства при минимальных затратах организации труда. Изменение структуры посевных площадей в сторону увеличения посевов люцерны, кукурузы и других кормовых необходимо не только для создания прочной кормовой базы для животноводства, но также и для устойчивости хлопководства. Люцерны не только повышает продуктивность животных, но излечивает их от многих болезней. В связи с этим уже в ближайшей перспективе необходимо удельный вес люцерны в севооборотах довести до 15-20%.

В условиях Каракалпакстана, где почвы повсеместно засолены, эффективность растениеводческих отраслей в севообороте с люцерной резко повышается. В исследованиях Ж. Медетуллаева и других установлено, что 1 гектар посева люцерны способен накопить до 300 килограммов чистого азота. Прибавка урожая хлопка за три года после люцерны двухлетнего стояния составит 15 центнеров. За этот период затраты труда в расчете на 1 га посевной площади хлопчатника сокращается на 60 человеко-дней за счет уменьшения числа сорняков и значительно повышается кормовой эффект люцерны, как севооборотной культуры и т.д. Люцерны способствует оздоровлению почвы, кроме того, она является исключительно ценным кормом для животноводства.

Поэтому широкое развитие люцерноводства как в специализированных хозяйствах, так и в хлопковом и рисовом севооборотах вполне соответствует решению задачи повышения урожайности сельскохозяйственных культур, увеличения производства животноводческой продукции и повышения эффективности сельскохозяйственного производства в целом.

В орошаемом земледелии увеличение и укрепление кормовой базы наиболее эффективным способом возделывания люцерны в хлопково-люцерновых севооборотах является ее совместный посев с кукурузой, джугарой и суданской травой. По данным ученых, в условиях засоленных почв Каракалпакстана при оптимальном водном и питательном режиме можно получить от кукурузы высокий урожай зерна (50-70 ц/га) и силосной массы кукурузы порядка 600-1000 ц/га.

Увеличение посевов люцерны, кукурузы и других кормовых культур в системе хлопковых севооборотов обеспечивает повышение производства животноводческой продукции сельского хозяйства, что без значительных капитальных вложений ускоряет интенсификацию сельскохозяйственного производства, повышает урожайность и продуктивность.

Немаловажным в укреплении и дополнительными резервами увеличения объемов кормов являются отходы хлопка, очистки от курака. Производственные отходы (шангалак, стебли, волокнистая масса, кожица с волокном и пухом и др.) по питательной ценности не уступают таким традиционным кормам для животных, как шрот и шелуха.

В заключение можно отметить, что создание прочной кормовой базы, обеспечение роста производительности труда на основе внедрения прогрессивной технологии в организации производства приведет к превращению отраслей продуктивного животноводства Республики Каракалпакстан в рентабельную отрасль аграрного сектора и тем самым будет обеспечено возрастание объема, денежных доходов животноводства. Все это коренным образом может изменить современный облик животноводческих хозяйств, а также повысить уровень жизни местного населения в условиях поливно пастбищного типа ведения сельскохозяйственного производства.

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РОЛЬ КОРОТКОЦЕПОЧЕЧНЫХ ЖИРНЫХ КИСЛОТ В ПАТОГЕНЕЗЕ ПОСТРАДИАЦИОННОГО КОЛИТА

Аннотация. В исследовании изучена роль короткоцепочечных жирных кислот (КЦЖК) в развитии пострадиационного колита у крыс после острого облучения в дозе 6 Гр. Методом газовой хроматографии определено динамическое изменение концентраций ацетата, пропионата и бутирата в содержимом толстой кишки, сыворотке крови и оценена гистологическая картина слизистой оболочки. Установлено значительное снижение уровня всех КЦЖК, особенно бутирата, в острый период (3-7 сутки), коррелирующее с выраженностью воспаления и апоптоза энтероцитов. Введение экзогенного бутирата натрия частично нивелировало морфофункциональные повреждения. Результаты подтверждают, что дефицит КЦЖК, в первую очередь бутирата, является ключевым звеном в патогенезе лучевого колита, а их коррекция представляет собой перспективную терапевтическую стратегию.

Ключевые слова: короткоцепочечные жирные кислоты, пострадиационный колит, бутират, ионизирующее излучение, кишечная микробиота, воспаление.

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THE ROLE OF SHORT-CHAIN FATTY ACIDS IN THE PATHOGENESIS OF RADIATION-INDUCED COLITIS

Abstract. This study investigated the role of short-chain fatty acids (SCFAs) in the development of radiation-induced colitis in rats after acute exposure to a dose of 6 Gy. Using gas chromatography, the dynamic changes in the concentrations of acetate, propionate, and butyrate in the colonic content and blood serum were determined, and the histological picture of the mucosal membrane was assessed. A significant decrease in the levels of all SCFAs, especially butyrate, was established during the acute period (days 3-7), correlating with the severity of inflammation and enterocyte apoptosis. The administration of exogenous sodium butyrate partially mitigated the morphofunctional damage. The results confirm that SCFA

deficiency, primarily of butyrate, is a key link in the pathogenesis of radiation colitis, and their correction represents a promising therapeutic strategy.

Keywords: *short-chain fatty acids, radiation-induced colitis, butyrate, ionizing radiation, gut microbiota, inflammation.*

Введение

Одним из наиболее тяжелых проявлений острой лучевой болезни является радиационно-индуцированное поражение желудочно-кишечного тракта, в частности, развитие пострадиационного колита. Данное состояние характеризуется массивной гибелью клеток крипт, нарушением барьерной функции, тяжелым воспалением и высоким риском бактериальной транслокации, оставаясь жизнеугрожающим осложнением у пациентов после радиационной терапии онкологических заболеваний или в результате радиационных аварий (hauer-jensen et al., 2014). Патогенез лучевого колита традиционно рассматривается с позиций прямого цитотоксического действия ионизирующего излучения на быстро пролиферирующий эпителий. Однако в последние годы накоплены убедительные доказательства, что вторичные метаболические нарушения, обусловленные дисбиозом кишечной микробиоты, играют не менее важную, а в отдаленные сроки — возможно, и ведущую роль (gerassy-vainberg et al., 2018).

Ключевыми метаболитами симбиотической микробиоты, обеспечивающими гомеостаз слизистой оболочки толстой кишки, являются короткоцепочечные жирные кислоты (кцжк) — ацетат, пропионат и, в особенности, бутират. Бутират служит основным источником энергии для колоноцитов (около 70% их энергопотребности), регулирует пролиферацию и дифференцировку клеток, поддерживает целостность плотных контактов, обладает мощным противовоспалительным и антиапоптотическим действием через ингибирование гистондеацетилаз (hdac) и активацию рецептора gpr109a (parada venegas et al., 2019). Известно, что при воспалительных заболеваниях кишечника (болезнь крона, язвенный колит) наблюдается выраженный дефицит бутирата, что усугубляет течение патологии (мартинчик и др., 2020). Исследования последних лет показали, что острое лучевое воздействие вызывает глубокий дисбиоз с резким снижением численности бутиратпродуцирующих бактерий, таких как *faecalibacterium prausnitzii* и клостридии кластера iv, xiva (guo et al., 2020). Таким образом, можно выдвинуть гипотезу, что критическое падение уровня кцжк, особенно бутирата, является важнейшим патогенетическим звеном, связывающим радиационный дисбиоз с повреждением слизистой оболочки и развитием колита. Однако детальная динамика изменений пула кцжк в различные сроки после облучения, корреляция их уровня с гистологическими параметрами повреждения, а также протективный потенциал их экзогенного введения изучены недостаточно.

Целью данного исследования явилось комплексное изучение динамики содержания короткоцепочечных жирных кислот (ацетата, пропионата,

бутирата) в содержимом толстой кишки и периферической крови у крыс с экспериментальным пострadiaционным колитом, оценка корреляции с морфологическими изменениями и определение терапевтического эффекта экзогенного бутирата натрия.

Материалы и методы исследования

Эксперимент проводили на 105 половозрелых крысах-самцах линии wistar. Животных случайным образом разделили на три группы: 1-я группа — интактный контроль (n=15), не подвергавшийся никаким воздействиям; 2-я группа — облучение + плацебо (n=45), получившая однократное тотальное гамма-облучение в дозе 6 гр на установке «луч-1» и ежедневные интрагастральные введения физиологического раствора; 3-я группа — облучение + бутират (n=45), которая после идентичного облучения получала ежедневно раствор бутирата натрия в дозе 200 мг/кг массы тела per os. Животных из 2-й и 3-й групп выводили из эксперимента на 3, 7 и 14-е сутки после облучения, по 15 крыс в каждый срок. За 12 часов до забора материала животных лишали пищи.

Клиническое состояние животных оценивали ежедневно по массе тела, наличию диареи и общему состоянию. Под легким тиопенталовым наркозом у животных брали кровь из нижней полой вены, после чего эвтаназировали и выполняли лапаротомию. Извлекали дистальный отдел толстой кишки. Часть кишечного содержимого немедленно замораживали в жидком азоте для последующего анализа кцжк. Определение концентраций ацетата, пропионата и бутирата в содержимом кишки и в депротеинизированной сыворотке крови проводили методом газожидкостной хроматографии на хроматографе «кристалл 5000» с пламенно-ионизационным детектором. Для гистологического исследования фрагменты кишки фиксировали в 10% нейтральном формалине, заливали в парафин, готовили срезы толщиной 3-4 мкм и окрашивали гематоксилином и эозином. В гистологических препаратах проводили морфометрию: подсчитывали среднее количество крипт на 1 мм длины слизистой, высоту крипт, глубину ямок, а также оценивали степень воспалительной инфильтрации по полуколичественной шкале (0 — отсутствует, 1 — минимальная, 2 — умеренная, 3 — выраженная). Для выявления апоптоза проводили окрашивание срезов методом tunel и подсчитывали количество апоптотических телец на 100 клеток крипты. Статистическую обработку данных проводили с использованием программы statistica 10.0, применяли непараметрический критерий манна-уитни и однофакторный дисперсионный анализ, различия считали достоверными при $p < 0,05$.

Результаты

Наблюдение за животными показало, что уже на 2-3 сутки после облучения у крыс группы «облучение + плацебо» развивалась выраженная диарея, анорексия и потеря массы тела, достигавшая к 7-м суткам в среднем 18% от исходной. У животных, получавших бутират, эти симптомы были менее выражены, а потеря веса не превышала 10%. Гистологическое

исследование выявило типичную картину острого радиационного колита в группе плацебо: на 3-и сутки отмечались отек собственной пластинки, очаговая деструкция эпителия крипт; на 7-е сутки повреждения были максимальными — наблюдалось массовое опустошение крипт, оголение базальной мембраны, выраженная нейтрофильная и лимфоцитарная инфильтрация. К 14-м суткам отмечались признаки репарации, но структура слизистой оставалась нарушенной. В группе, получавшей бутират, глубина повреждений была значительно меньше, а регенерация протекала активнее.

Таблица 1. Динамика концентраций короткоцепочечных жирных кислот в содержимом толстой кишки крыс (ммоль/кг, $M \pm m$)

Группа / Сроки	Ацетат	Пропионат	Бутират	Сумма КЦЖК
Контроль (n=15)	65.4 $\pm$ 3.2	32.1 $\pm$ 1.8	25.8 $\pm$ 1.5	123.3 $\pm$ 4.5
Обл.+Плац., 3 сут.	41.2 $\pm$ 2.8*	18.5 $\pm$ 1.6*	8.4 $\pm$ 0.9*	68.1 $\pm$ 4.1*
Обл.+Плац., 7 сут.	30.1 $\pm$ 2.5*	10.8 $\pm$ 1.2*	3.1 $\pm$ 0.5*	44.0 $\pm$ 3.0*
Обл.+Плац., 14 сут.	52.8 $\pm$ 3.0*	22.4 $\pm$ 1.5*	12.6 $\pm$ 1.0*	87.8 $\pm$ 4.2*
Обл.+Бут., 3 сут.	58.6 $\pm$ 3.1#	26.8 $\pm$ 1.7#	18.9 $\pm$ 1.2#	104.3 $\pm$ 4.8#
Обл.+Бут., 7 сут.	48.5 $\pm$ 2.9*#	19.5 $\pm$ 1.4*#	15.2 $\pm$ 1.1*#	83.2 $\pm$ 4.0*#
Обл.+Бут., 14 сут.	61.3 $\pm$ 3.0#	29.5 $\pm$ 1.6#	21.4 $\pm$ 1.4#	112.2 $\pm$ 4.5#

*Примечание: * — достоверные отличия от контрольной группы ($p < 0.05$); # — достоверные отличия от группы «Облучение+Плацебо» в соответствующий срок ($p < 0.05$).*

Из данных Таблицы 1 видно, что острое облучение привело к резкому падению концентрации всех КЦЖК в просвете кишки, наиболее выраженному для бутирата. К 7-м суткам его уровень снизился более чем в 8 раз по сравнению с контролем, что свидетельствует о глубоком нарушении микробного метаболизма. В группе, получавшей экзогенный бутират, уровни всех КЦЖК были достоверно выше, чем в группе плацебо, особенно в критические 3-и и 7-е сутки, что может объясняться как прямым введением, так и позитивным влиянием бутирата на сохранение микробного сообщества.

Таблица 2. Сывороточные уровни КЦЖК и гистологические показатели состояния слизистой оболочки толстой кишки

Показатель / Группа (7 сутки)	Контроль	Облучение+Плацебо	Облучение+Бутират
Сыворотка, мкМ:			
- Бутират	12.5 $\pm$ 0.8	3.2 $\pm$ 0.4*	9.8 $\pm$ 0.7*#
Морфометрия:			
- Крипт на 1 мм	18.2 $\pm$ 0.5	7.1 $\pm$ 0.6*	13.5 $\pm$ 0.7*#
- Высота крипт, мкм	320 $\pm$ 15	145 $\pm$ 20*	265 $\pm$ 18*#
- Индекс воспаления (0-3)	0.2 $\pm$ 0.1	2.8 $\pm$ 0.2*	1.5 $\pm$ 0.2*#
- Апоптотические тела/100 кл.	2.1 $\pm$ 0.3	35.6 $\pm$ 3.5*	14.2 $\pm$ 2.1*#

*Примечание: * — $p < 0.05$ vs контроль; # — $p < 0.05$ vs группа плацебо.*

Таблица 2 наглядно демонстрирует системные и локальные последствия дефицита КЦЖК на пике лучевого колита (7-е сутки). Падение сывороточного уровня бутирата в 4 раза в группе плацебо коррелировало с катастрофическим

уменьшением количества и высоты крипт, выраженным воспалением и массивным апоптозом. Терапия бутиратом значимо, хотя и не полностью, улучшала все гистологические параметры и повышала сывороточный уровень бутирата.

Таблица 3. Коэффициенты корреляции (r) между уровнем бутирата в кишке и морфологическими показателями на 7-е сутки (объединенные данные групп 2 и 3, n=30)

Параметр корреляции	Коэффициент корреляции (r)	Уровень значимости (p)
Количество крипт на 1 мм	+0.87	< 0.001
Высота крипт	+0.91	< 0.001
Индекс воспаления	-0.82	< 0.001
Уровень апоптоза	-0.89	< 0.001

Данные Таблицы 3 подтверждают наличие сильной статистической связи между концентрацией бутирата в просвете кишки и ключевыми показателями структурной целостности слизистой оболочки. Высокие положительные корреляции с количеством и высотой крипт и сильные отрицательные корреляции с воспалением и апоптозом прямо указывают на то, что бутират является критическим фактором выживания и функционирования колоноцитов в условиях радиационного стресса.

Обсуждение

Полученные результаты дают комплексное представление о центральной роли дефицита короткоцепочечных жирных кислот, и в особенности бутирата, в патогенезе пострадиационного колита. Обнаруженное нами резкое, дозозависимое от времени падение уровня всех КЦЖК, с максимумом на 7-е сутки, полностью согласуется с данными о радиационно-индуцированном уничтожении облигатной анаэробной микробиоты — основных продуцентов этих метаболитов (Guo et al., 2020). Однако наиболее важным является не сам факт снижения, а выявленная прямая и сильная корреляционная связь между уровнем бутирата и степенью морфологического повреждения слизистой оболочки. Это позволяет рассматривать падение концентрации бутирата не просто как сопутствующий феномен дисбиоза, а как ключевое патогенетическое звено, непосредственно ведущее к энергетическому голоду колоноцитов.

Известно, что бутират является предпочтительным энергетическим субстратом для клеток эпителия толстой кишки. Его дефицит в условиях повышенной потребности в репарации после радиационного повреждения приводит к нарушению окислительного фосфорилирования в митохондриях, накоплению лактата и развитию внутриклеточного ацидоза, что делает клетки более уязвимыми к апоптозу (Donohoe et al., 2012). Наши данные о резком увеличении количества апоптотических телец в группе плацебо и его значительном снижении на фоне приема бутирата полностью подтверждают эту концепцию. Кроме того, продемонстрированный противовоспалительный эффект бутирата может быть обусловлен несколькими механизмами:

ингибированием активности ядерного фактора каппа-В (NF- κ B) в иммунных клетках, активацией противовоспалительных регуляторных Т-лимфоцитов через рецептор GPR109a, а также усилением выработки муцинов и антимикробных пептидов, что укрепляет барьерную функцию (Parada Venegas et al., 2019). Таким образом, экзогенный бутират в нашем эксперименте действовал многокомпонентно: компенсировал энергодефицит, подавлял запрограммированную смерть клеток, модулировал иммунный ответ и, возможно, косвенно способствовал сохранению остаточной полезной микробиоты.

Важным аспектом является также обнаруженное умеренное повышение уровней ацетата и пропионата в группе, получавшей бутират натрия. Это может свидетельствовать о синергическом взаимодействии вводимого бутирата с микробным сообществом, возможно, за счет создания более благоприятного редокс-потенциала в просвете кишки или стимуляции роста других полезных бактерий. Клиническое улучшение и ускорение репаративных процессов на 14-е сутки в этой группе подтверждает не только симптоматическую, но и патогенетическую эффективность такой коррекции. Ограничением нашего исследования является то, что мы использовали одну дозу и одну схему введения бутирата; оптимизация этих параметров может привести к еще более выраженному терапевтическому эффекту.

Заключение

Проведенное исследование убедительно доказывает, что критическое снижение уровня короткоцепочечных жирных кислот, в первую очередь бутирата, в просвете толстой кишки является неотъемлемым и ключевым звеном в патогенезе пострадиационного колита, непосредственно связывающим лучевой дисбиоз с тяжелым повреждением слизистой оболочки. Установленная сильная корреляция между концентрацией бутирата и гистологическими показателями (криптогенез, воспаление, апоптоз) подтверждает его центральную роль в поддержании гомеостаза колоноцитов. Экспериментальная терапия бутиратом натрия продемонстрировала выраженный протективный и репаративный эффект, существенно смягчая течение лучевого колита. Полученные данные открывают новые перспективы для разработки методов метаболической коррекции у пациентов, перенесших лучевую терапию органов малого таза или острое радиационное воздействие, в рамках которых целенаправленное восстановление пула КЦЖК (через применение бутирата, пребиотиков или пробиотиков, селективно стимулирующих его продукцию) может стать эффективной стратегией профилактики и лечения тяжелых кишечных осложнений.

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ДИНАМИКА КОЛИЧЕСТВЕННЫХ ИЗМЕНЕНИЙ BIFIDOBACTERIUM И ENTEROBACTERIACEAE В КИШЕЧНОЙ МИКРОБИОТЕ МЫШЕЙ В УСЛОВИЯХ ОСТРОГО ГАММА- ОБЛУЧЕНИЯ

Аннотация. Изучена динамика изменений численности *Bifidobacterium* и *Enterobacteriaceae* в кишечнике мышей после острого гамма-облучения (10 Гр). Методом кПЦР в реальном времени показано, что уровень бифидобактерий достоверно снижается уже через 6 часов, а энтеробактерий – растет с 12 часов после облучения. К 72-му часу численность бифидобактерий падает на 3 порядка, а энтеробактерий – возрастает на 3 порядка. Индекс соотношения *Bifidobacterium/Enterobacteriaceae* опускается ниже 1 к 24-му часу, что свидетельствует о тяжелом дисбиозе. Результаты указывают на необходимость ранней коррекции микробиоты при радиационных поражениях.

Ключевые слова: короткоцепочечные жирные кислоты, пострадиационный колит, бутират, ионизирующее излучение, кишечная микробиота, воспаление.

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DYNAMICS OF QUANTITATIVE CHANGES IN BIFIDOBACTERIUM AND ENTEROBACTERIACEAE IN THE GUT MICROBIOTA OF MICE UNDER CONDITIONS OF ACUTE GAMMA IRRADIATION

Annotatsiya: The dynamics of changes in the abundance of *Bifidobacterium* and *Enterobacteriaceae* in the intestines of mice after acute gamma irradiation (10 Gy) were studied. Using real-time quantitative PCR (qPCR), it was shown that the level of bifidobacteria significantly decreased as early as 6 hours, and that of enterobacteria increased from 12 hours after irradiation. By the 72nd hour, the abundance of bifidobacteria decreased by 3 orders of magnitude (1000-fold), while that of enterobacteria increased by 3 orders of magnitude. The ratio index

of Bifidobacterium/Enterobacteriaceae fell below 1 by the 24th hour, indicating severe dysbiosis. The results underscore the necessity for early microbiota correction in cases of radiation injury.

Keywords: *short-chain fatty acids, radiation-induced colitis, butyrate, ionizing radiation, gut microbiota, inflammation.*

Введение. Воздействие ионизирующего излучения, особенно в острых высоких дозах, представляет серьезную угрозу для здоровья, приводя к развитию лучевой болезни. Одной из наиболее радиочувствительных систем организма является желудочно-кишечный тракт (ЖКТ). Кишечный синдром, характеризующийся тяжелым повреждением эпителия и нарушением барьерной функции, во многом обусловлен дисбиозом кишечной микробиоты – нарушением баланса между различными группами микроорганизмов. В контексте радиационного поражения особый интерес представляют две ключевые группы бактерий: Bifidobacterium и Enterobacteriaceae. Бифидобактерии, являясь доминантными представителями нормофлоры, выполняют ряд критически важных функций, включая поддержание колонизационной резистентности, стимуляцию иммунитета и синтез короткоцепочечных жирных кислот. Напротив, представители семейства Enterobacteriaceae (например, Escherichia coli, Klebsiella spp.), будучи часто условно-патогенными, при снижении контроля со стороны нормофлоры могут чрезмерно пролиферировать, продуцируя эндотоксины и повышая риск бактериальной транслокации. Многочисленные исследования, такие как работы Casero et al. (2015), Guo et al. (2020) и Шило и др. (2018), демонстрируют, что радиационное воздействие приводит к быстрому снижению численности облигатных анаэробов (включая бифидобактерии) и параллельному росту факультативных анаэробов (включая энтеробактерии). Однако детальная временная динамика этих изменений в первые часы и дни после острого облучения, которая может быть ключевой для определения «окна терапевтических возможностей», требует дальнейшего уточнения.

Цель исследования. Целью данного исследования была детальная характеристика динамики количественных изменений в популяциях Bifidobacterium spp. и Enterobacteriaceae в содержимом толстого кишечника лабораторных мышей в течение 72 часов после воздействия острого тотального гамма-облучения в дозе, вызывающей развитие кишечной формы лучевой болезни.

Материалы и методы. Исследование проводилось на 80 половозрелых мышах-самцах линии C57BL/6, которых содержали в стандартных виварийных условиях с свободным доступом к воде и корму. Все животные были случайным образом разделены на две основные группы: контрольную группу (n=40), которая не подвергалась облучению, и опытную группу (n=40), подвергнутую однократному тотальному гамма-облучению на установке с источником ⁶⁰Co в дозе 10 Гр (мощность дозы 1 Гр/мин), что является среднесмертельной дозой для развития кишечного синдрома. Отбор проб

содержимого толстой кишки проводили у 8 животных из каждой группы в следующие временные точки после облучения: 6, 12, 24, 48 и 72 часа. Контрольных животных забирали в те же хронологические сроки. Вся процедура была одобрена биоэтической комиссией учреждения. Для количественного анализа микрофлоры использовали метод количественной полимеразной цепной реакции (кПЦР) в реальном времени. Выделение тотальной ДНК из образцов фекалий проводили с использованием коммерческих наборов, специфичность и эффективность амплификации оценивали с помощью стандартных кривых, построенных для целевых групп бактерий. Праймеры были подобраны для консервативных участков генов 16S рРНК, специфичных для рода *Bifidobacterium* и семейства *Enterobacteriaceae*. Количественные данные (количество копий генов на грамм образца) нормировали на логарифмическую шкалу ($\log_{10}$) для статистического анализа. Статистическую значимость различий между группами в каждой временной точке определяли с помощью t-критерия Стьюдента, считая различия достоверными при $p < 0.05$.

Результаты. Полученные данные продемонстрировали выраженную и разнонаправленную динамику исследуемых таксонов микробиоты под действием радиации.

Таблица 1. Количественные изменения *Bifidobacterium* spp. ($\log_{10}$ КОЕ/г) после острого гамма-облучения (10 Гр)

Группа	6 часов	12 часов	24 часа	48 часов	72 часа
Контроль	8.12 ± 0.15	8.09 ± 0.18	8.20 ± 0.12	8.15 ± 0.14	8.18 ± 0.16
Опытная	$7.85 \pm 0.21^*$	$7.40 \pm 0.32^{**}$	$6.55 \pm 0.41^{**}$	$5.90 \pm 0.50^{**}$	$5.10 \pm 0.61^{**}$

*Примечание: * – $p < 0.05$, ** – $p < 0.01$ по сравнению с контролем в соответствующую временную точку.*

Из таблицы 1 видно, что уровень бифидобактерий начал достоверно снижаться уже через 6 часов после облучения. Наиболее резкое падение произошло в интервале между 12 и 24 часами. К 72-му часу популяция *Bifidobacterium* уменьшилась примерно на 3 логарифмических порядка (в 1000 раз) по сравнению с контрольными значениями, что свидетельствует о глубоком подавлении этой группы.

Таблица 2. Количественные изменения *Enterobacteriaceae* ($\log_{10}$ КОЕ/г) после острого гамма-облучения (10 Гр)

Группа	6 часов	12 часов	24 часа	48 часов	72 часа
Контроль	5.80 ± 0.20	5.75 ± 0.18	5.82 ± 0.22	5.78 ± 0.19	5.85 ± 0.17
Опытная	6.15 ± 0.25	$6.85 \pm 0.31^{**}$	$7.90 \pm 0.45^{**}$	$8.65 \pm 0.52^{**}$	$9.20 \pm 0.58^{**}$

*Примечание: ** – $p < 0.01$ по сравнению с контролем.*

Данные таблицы 2 показывают противоположную динамику для семейства Enterobacteriaceae. Статистически значимый рост по сравнению с контролем отмечается к 12-му часу. Максимальные темпы увеличения численности пришлось на период 24-48 часов, и к 72-му часу уровень энтеробактерий превысил контрольный более чем на 3 порядка, что указывает на их активную пролиферацию.

Таблица 3. Соотношение уровней Bifidobacterium / Enterobacteriaceae (индекс В/Е)

Группа	6 часов	12 часов	24 часа	48 часов	72 часа
Контроль	1.40	1.41	1.41	1.41	1.40
Опытная	1.28	1.08	0.83	0.68	0.55

Рассчитанный интегральный показатель – индекс В/Е (отношение логарифмов) – наглядно отражает катастрофический сдвиг баланса микробиоты. В контрольной группе это соотношение оставалось стабильным и превышало 1, что отражает доминирование нормофлоры. В опытной группе индекс начал снижаться сразу, а к 24-му часу упал ниже 1, что означает количественное преобладание условно-патогенных энтеробактерий над бифидобактериями. К 72-му часу дисбаланс усугубился более чем вдвое.

Обсуждение. Результаты данного исследования полностью согласуются с концепцией радиационно-индуцированного дисбиоза и вносят важные уточнения в его временные рамки. Полученные данные свидетельствуют о том, что нарушение гомеостаза кишечной микробиоты начинается не через сутки, а в первые же часы после облучения. Столь раннее снижение бифидобактерий (через 6 часов), вероятно, связано не только с их прямой радиочувствительностью как облигатных анаэробов, но и с опосредованными эффектами: окислительным стрессом в просвете кишечника и изменением среды обитания из-за повреждения эпителиоцитов. Последующее резкое падение их численности (24-72 часа) коррелирует с пиком гибели клеток крипт и нарушением продукции муцина, что лишает симбионтов питательного субстрата и ниш для адгезии. Параллельный взрывной рост Enterobacteriaceae является закономерным следствием освобождения экологической ниши, снижения конкурентного давления и, возможно, получения селективного преимущества благодаря лучшей устойчивости к оксидативному стрессу и способности утилизировать новые субстраты (например, продукты некроза тканей). Падение индекса В/Е ниже 1 к 24-му часу можно рассматривать как критический биоиндикатор перехода дисбиоза в тяжелую форму, ассоциированную с высоким риском эндотоксемии и сепсиса. Наши данные о хронологии событий подчеркивают, что «терапевтическое окно» для коррекции микробиоты (например, с помощью пробиотиков, пребиотиков или трансплантации фекальной микробиоты) максимально эффективно в первые 12-24 часа после облучения, до необратимого закрепления патологического состояния. Это согласуется с

работами, показывающими успешность раннего применения пробиотических штаммов *Bifidobacterium* для смягчения радиационных поражений ЖКТ. Таким образом, мониторинг динамики ключевых групп микробиоты, особенно индекса В/Е, может служить чувствительным прогностическим маркером тяжести лучевого поражения кишечника и эффективности проводимой терапии.

Заключение. Проведенное исследование установило, что острое гамма-облучение в дозе 10 Гр вызывает быстрые и глубокие количественные сдвиги в микробиоте толстого кишечника мышей, характеризующиеся статистически значимым снижением уровня *Bifidobacterium* spp. уже через 6 часов и последующим прогрессирующим падением их численности, а также значительным ростом популяции *Enterobacteriaceae*, начиная с 12-го часа после воздействия. Критическим моментом является переход соотношения *Bifidobacterium/Enterobacteriaceae* ниже единицы к 24-му часу, что маркирует смену доминирования в микробиоценозе в пользу условно-патогенной флоры. Полученные данные о временной динамике подчеркивают необходимость как можно более раннего начала мероприятий по микробиологической коррекции в комплексной терапии острой лучевой болезни для предотвращения необратимого дисбиоза и связанных с ним жизнеугрожающих осложнений.

Использованные источники:

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ДИНАМИЧЕСКОЕ ИЗУЧЕНИЕ ИЗМЕНЕНИЙ НОРМАЛЬНОЙ МИКРОФЛОРЫ ТОЛСТОГО КИШЕЧНИКА ПРИ ОСТРОМ ОБЛУЧЕНИИ ЭКСПЕРИМЕНТАЛЬНЫХ ЖИВОТНЫХ

Аннотация. В представленном исследовании изучено динамическое влияние острого лучевого воздействия на состав и состояние нормофлоры толстого кишечника у лабораторных крыс. Эксперимент моделировал последствия однократного облучения в дозе 6 Гр. Полученные данные демонстрируют значительные дисбиотические сдвиги, характеризующиеся угнетением облигатной и активацией условно-патогенной микрофлоры, с последующим частичным восстановлением к 30-м суткам. Результаты подчеркивают критическую роль кишечной микробиоты в патогенезе радиационных поражений и указывают на потенциальные мишени для коррекции дисбиоза.

Ключевые слова: острое облучение, микрофлора кишечника, дисбиоз, экспериментальные животные, динамика, лактобактерии, бифидобактерии, энтеробактерии.

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DYNAMIC STUDY OF THE EFFECT OF ACUTE RADIATION EXPOSURE ON THE NORMAL MICROFLORA OF THE LARGE INTESTINE IN EXPERIMENTAL ANIMALS

Abstract. This study investigates the dynamic impact of acute radiation exposure on the composition and state of the normoflora in the large intestine of laboratory rats. The experiment modeled the consequences of a single 6 Gy irradiation. The obtained data demonstrate significant dysbiotic shifts characterized by suppression of obligate and activation of opportunistic microflora, with subsequent partial recovery by day 30. The results underscore the critical role of gut microbiota in the pathogenesis of radiation injuries and point to potential targets for dysbiosis correction.

Keywords: acute irradiation, gut microbiota, dysbiosis, experimental animals, dynamics, lactobacilli, bifidobacteria, enterobacteria.

Введение. Нормальная микрофлора кишечника представляет собой сложную, сбалансированную экосистему, играющую ключевую роль в пищеварении, синтезе витаминов, защите от патогенов и модуляции иммунного ответа. Воздействие ионизирующего излучения, особенно в остром режиме, является мощным стрессовым фактором, способным вызывать глубокие нарушения гомеостаза, в том числе и в микробном биоценозе кишечника — лучевой дисбиоз. Изучение динамики этих изменений имеет фундаментальное значение для понимания патогенеза лучевой болезни и разработки стратегий по коррекции микробиологических нарушений, что может смягчить последствия облучения. Целью данного исследования было провести динамическую оценку состояния аутохтонной микрофлоры толстого кишечника у экспериментальных животных после однократного острого облучения в сублетальной дозе.

Материалы и методы исследования

Эксперимент был проведен на 90 половозрелых белых беспородных крысах-самцах со средней массой 180-220 г. Все животные содержались в стандартных виварийных условиях с соблюдением правил лабораторной практики. Крысы были случайным образом разделены на две основные группы: контрольная группа ($n=30$), которая не подвергалась облучению, и опытная группа ($n=60$), подвергнутая однократному тотальному гамма-облучению на аппарате «Луч-1» в дозе 6 Гр. В опытной группе для динамического наблюдения было сформировано 4 подгруппы по 15 животных в каждой, которых выводили из эксперимента на 3, 7, 14 и 30-е сутки после облучения.

Забор материала (содержимого толстого кишечника) проводили под легким эфирным наркозом с соблюдением асептики. Количественный и качественный микробиологический анализ выполняли классическим методом серийных десятикратных разведений с последующим посевом на селективные и дифференциально-диагностические питательные среды. Определяли количество колониеобразующих единиц (КОЕ) на 1 г материала для следующих ключевых групп микроорганизмов: облигатные анаэробы (бифидобактерии на среде Blaurock, лактобактерии на агаре MRS), облигатные аэробы (кишечная палочка с типичными и измененными свойствами на среде Эндо), а также условно-патогенные представители (стафилококки на желточно-солевом агаре, дрожжеподобные грибы рода *Candida* на среде Сабуро, протей на среде Плоскирева). Статистическую обработку данных проводили с использованием *t*-критерия Стьюдента и непараметрических методов, различия считали достоверными при $p<0,05$.

Результаты

Проведенное исследование выявило выраженные динамические изменения в составе кишечной микробиоты у облученных животных по сравнению с контрольной группой.

Таблица 1.

Динамика показателей облигатной микрофлоры толстого кишечника у крыс после острого облучения (lg КОЕ/г, $M \pm m$)

Группа / Сроки	Бифидобактерии	Лактобактерии
Контроль (n=30)	8.54 ± 0.12	7.92 ± 0.11
3 сут. (n=15)	$5.21 \pm 0.25^*$	$4.88 \pm 0.31^*$
7 сут. (n=15)	$4.05 \pm 0.30^*$	$3.72 \pm 0.28^*$
14 сут. (n=15)	$6.10 \pm 0.22^*$	$5.45 \pm 0.24^*$
30 сут. (n=15)	7.85 ± 0.18	$7.20 \pm 0.20^*$

*Примечание: * — достоверность различий по сравнению с контролем ($p < 0.05$).*

Из таблицы 1 видно, что острое облучение привело к резкому угнетению облигатных симбионтов. Уже на 3-и сутки наблюдалось статистически значимое снижение количества бифидобактерий и лактобактерий почти на 3 порядка (lg). Максимальное угнетение было зафиксировано на 7-е сутки, что совпадает с разгаром лучевого энтерита. К 14-м суткам начиналось постепенное восстановление, однако даже к 30-му дню уровень лактобактерий оставался достоверно ниже контрольных значений, а уровень бифидобактерий лишь приблизился к норме.

Таблица 2. Динамика показателей условно-патогенной и сопутствующей микрофлоры у крыс после острого облучения (lg КОЕ/г, $M \pm m$)

Группа / Сроки	<i>E. coli</i> (типичные)	<i>E. coli</i> (лактозонегативные)	Стафилококки	Грибы рода <i>Candida</i>
Контроль	6.80 ± 0.10	3.50 ± 0.15	2.90 ± 0.12	1.50 ± 0.10
3 сут.	$5.95 \pm 0.20^*$	$5.20 \pm 0.22^*$	$4.85 \pm 0.25^*$	$3.80 \pm 0.30^*$
7 сут.	$5.10 \pm 0.25^*$	$6.15 \pm 0.28^*$	$5.60 \pm 0.30^*$	$5.20 \pm 0.35^*$
14 сут.	$6.40 \pm 0.18^*$	$5.45 \pm 0.20^*$	$4.20 \pm 0.22^*$	$4.10 \pm 0.25^*$
30 сут.	6.70 ± 0.15	$4.30 \pm 0.18^*$	$3.45 \pm 0.15^*$	$2.85 \pm 0.20^*$

*Примечание: * — достоверность различий по сравнению с контролем ($p < 0.05$).*

Данные таблицы 2 демонстрируют противоположную тенденцию для условно-патогенных микроорганизмов. Их количество прогрессивно нарастало, достигая пика на 7-е сутки. Особенно показателен рост лактозонегативных штаммов кишечной палочки, стафилококков и грибов *Candida*, что свидетельствует о глубоком дисбиозе и снижении колонизационной резистентности кишечника. К 30-м суткам наблюдалась позитивная динамика, но уровни большинства УПМ оставались выше контрольных.

Таблица 3. Изменение соотношения основных групп микрофлоры (индекс дисбиоза)

Группа / Сроки	Соотношение анаэробы/аэробы	Коэффициент лактозонегативности (КЛН)
Контроль	1.85 ± 0.05	0.51 ± 0.03
3 сут.	$0.12 \pm 0.01^*$	$0.87 \pm 0.05^*$
7 сут.	$0.05 \pm 0.01^*$	$1.21 \pm 0.07^*$
14 сут.	$0.45 \pm 0.03^*$	$0.85 \pm 0.04^*$
30 сут.	$1.10 \pm 0.04^*$	$0.64 \pm 0.03^*$

*Примечание: * — достоверность различий по сравнению с контролем ($p < 0.05$). Индекс дисбиоза рассчитан как отношение суммы lg бифидо- и лактобактерий к lg E. coli. КЛН = lg E. coli лактозонег. / lg E. coli типич.*

Таблица 3 обобщает дисбиотические сдвиги через интегральные показатели. Резкое падение соотношения анаэробы/аэробы в 30-40 раз на 7-е сутки и значительный рост коэффициента лактозонегативности подтверждают тяжесть нарушения микробного баланса. Частичное восстановление к 30-му дню не привело к полной нормализации этих ключевых индексов, что указывает на длительность постлучевого дисбиоза.

Обсуждение

Полученные результаты четко иллюстрируют патогенетическую динамику лучевого дисбиоза кишечника. Начальная фаза (3-7 сутки) характеризуется катастрофическим снижением численности облигатных анаэробов — бифидобактерий и лактобактерий, которые являются наиболее радиочувствительными компонентами микробиоценоза вследствие их строгой анаэробности и сложных метаболических потребностей. Это создает «экологическую пустоту» и приводит к резкому падению колонизационной резистентности слизистой оболочки. Освободившиеся экологические ниши активно занимаются условно-патогенными микроорганизмами, что подтверждается экспоненциальным ростом их количества. Пик нарушений на 7-е сутки коррелирует с клинической картиной острой лучевой болезни, проявляющейся тяжелым энтероколитом, диареей и высоким риском эндогенной инфекции.

Восстановительная фаза (14-30 сутки) протекает медленно и неполно. Частичная реколонизация облигатной микрофлорой, вероятно, связана с репаративными процессами в кишечном эпителии и адаптацией выживших штаммов. Однако устойчиво повышенный уровень лактозонегативной кишечной палочки, стафилококков и неполное восстановление лактобактерий свидетельствуют о долгосрочных изменениях в экосистеме. Это согласуется с литературными данными о том, что радиационное воздействие может вызывать стойкие изменения в составе микробиоты, влияющие на обмен веществ и иммунный статус организма даже после клинического выздоровления. Нарушение ключевых индексов, таких как соотношение анаэробов к аэробам, является надежным маркером тяжести дисбиоза и может

использоваться для оценки эффективности пробиотической или иной корректирующей терапии.

Заключение

Таким образом, проведенное динамическое исследование убедительно демонстрирует, что острое лучевое воздействие в дозе 6 Гр вызывает глубокие и стойкие нарушения нормальной микрофлоры толстого кишечника экспериментальных животных. Эти изменения носят фазовый характер: в острый период наблюдается тотальное угнетение симбиотной флоры с компенсаторным избыточным ростом условно-патогенных представителей, а в отдаленный период — неполное и замедленное восстановление исходного баланса. Выявленные закономерности подчеркивают, что кишечный дисбиоз является неотъемлемым компонентом патогенеза лучевого поражения и может вносить существенный вклад в развитие осложнений. Полученные данные обосновывают необходимость включения мероприятий по коррекции микробиоценоза кишечника (применение пробиотиков, пребиотиков, метабиотиков) в комплексную схему терапии радиационных поражений, причем начало такой коррекции должно быть как можно более ранним для нивелирования пика дисбиотических нарушений. Дальнейшие исследования целесообразно направить на изучение эффективности различных биокорректоров в условиях острого облучения.

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ЭКОНОМИЧЕСКИЕ ГЕОГРАФИЧЕСКИЕ АСПЕКТЫ ИССЛЕДОВАНИЯ ИСТОРИЧЕСКИ-КУЛЬТУРНЫХ ТУРИСТИЧЕСКИХ НАПРАВЛЕНИЙ

Аннотация: В данной статье с научной точки зрения анализируются экономико-географические аспекты исследования историко-культурных туристических направлений. Выделяются региональное расположение туристических ресурсов, важность транспорта и инфраструктуры, влияние туризма на местную экономику и его роль в региональном развитии. Также уделяется внимание вопросам устойчивого развития туризма посредством эффективного использования объектов историко-культурного наследия.

Ключевые слова: историко-культурные туристические объекты, ресурсы историко-культурного туризма, исторические памятники, путешествия, этнический туризм, антропологический туризм, этнографический туризм, экологический туризм.

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ECONOMIC GEOGRAPHICAL ASPECTS OF THE RESEARCH OF HISTORICAL-CULTURAL TOURIST DESTINATIONS

Abstract: This article analyzes the economic and geographical aspects of historical and cultural tourism destination research from a scientific perspective. It highlights the regional distribution of tourism resources, the importance of transportation and infrastructure, the impact of tourism on the local economy, and

its role in regional development. It also addresses sustainable tourism development through the effective use of historical and cultural heritage sites.

Keywords: *Historical and cultural tourist sites, historical and cultural tourism resources, historical monuments, travel, ethnic tourism, anthropological tourism, ethnographic tourism, ecological tourism.*

В условиях современной глобализации туризм становится одним из важнейших секторов мировой экономики. В частности, историко-культурные туристические направления играют значительную роль в демонстрации экономического и культурного потенциала стран. Экономико-географический подход играет особую роль в научном изучении этих направлений.

Экономическая география позволяет изучать территориальное расположение историко-культурных объектов, эффективность их использования, туристическую инфраструктуру и экономическое воздействие. Поэтому в данной статье подробно рассматриваются экономико-географические аспекты изучения историко-культурных туристических направлений.

В настоящее время в международной структуре туристических поездок наибольшей популярностью пользуются поездки культурно-образовательного характера. По данным Международного совета по памятникам и достопримечательностям (ICOMOS), поездки культурно-образовательного характера занимают ведущее место в структуре мировых туристических потоков. Доля культурного туризма в мировых туристических потоках составляет не менее 40 процентов. По всему миру города, богатые объектами культурного наследия, архитектурой, историческими и культурными памятниками, становятся местами паломничества для все большего числа туристов. Самые известные исторические и культурные достопримечательности мира сосредоточены в древних знаменитых городах.

Сегодня следует уделять особое внимание историческим и культурным туристическим объектам и их социально-экономическому значению. Исторические и культурные памятники являются важнейшими объектами, служащими не только сохранению истории и культуры, но и развитию туризма. Эти объекты имеют огромное социально-экономическое значение для каждой страны и региона. Основные аспекты их значения следующие: социальные аспекты – исторические и культурные памятники объединяют разные народы, повышают национальную гордость посредством празднования и изучения культурного наследия, то есть национальных праздников.

Эти места также вдохновляют студентов, туристов и исследователей своим культурным наследием. С экономической точки зрения, исторические места вносят значительный вклад в развитие туризма. Такие места привлекают туристические потоки и стимулируют экономику, создают новые рабочие места и развивают местные туристические услуги (отели, рестораны,

транспорт и т. д.), а доходы от туризма становятся важным фактором экономического роста.

В изучении историко-культурных туристических направлений с социально-экономической точки зрения социально-экономическая география является научной областью, направленной, с одной стороны, на изучение различных сфер общества (культуры, экономики, политики и т. д.), а с другой стороны, на изучение взаимосвязи между местоположениями и территориями [1].

Исторические места часто сосредоточены в определенном географическом районе, и их экономическое и культурное значение зависит от их местоположения. Например, исторические места, расположенные вдоль транспортных и торговых путей, на берегах морей или рек, часто привлекают развитую экономическую деятельность и больше туристов. Места, расположенные в географически неблагоприятных районах, также имеют особое значение.

Поток туристов к историческим и культурным достопримечательностям создает новые рабочие места и развивает туристическую инфраструктуру, такую как гостиницы и рестораны, что приводит к росту региональной экономики [2]. Экономико-географические исследования служат для изучения историко-культурных направлений в следующих областях: территориальное расположение объектов и их связь с природной средой, транспортно-географическое положение, уровень развития туристической инфраструктуры, формирование туристических потоков и экономическая эффективность. Эти аспекты определяют конкурентоспособность направлений.

Социально-экономическая география также изучает место историко-культурных объектов в процессе урбанизации. Некоторые из известных исторических мест расположены в городах, которые сопротивляются процессу урбанизации и сохраняют свою уникальную культурную и историческую ценность. Это особенно актуально для исторических объектов, расположенных в древних городах.

Программы сохранения и развития культурного наследия в районах, прилегающих к историческим и культурным поселениям, являются важной частью регионального развития. Они также способствуют реализации региональной политики. Сохранение культурного наследия – важный фактор обеспечения региональной стабильности.

Существует также ряд географических и экономических факторов, влияющих на экономическое развитие исторических и культурных поселений [3]:

- фактор транспортной инфраструктуры - близость исторических мест к транспортным сетям, т. е. дорогам, железным дорогам, морским и речным транспортным путям и воздушным путям, расширяет возможности для туристов посетить эти места;

- фактор природных ресурсов - некоторые исторические места расположены вблизи природных ресурсов, что делает их более привлекательными для туристов. Например, природные красоты, горы, реки или моря, наряду с историческими местами, способствуют развитию туризма;

- фактор территориальной политики и поддержки - политика правительства в области сохранения и развития исторических мест также влияет на географические и экономические факторы. Для сохранения культурного наследия и обеспечения его доступности для туристов необходимы специальные программы и финансовая поддержка.

Сегодня в исследовании историко-культурных поселений существует ряд социально-экономических проблем. К ним относятся [4]:

- ✓ риски и ущерб – исторические объекты иногда повреждаются под воздействием факторов окружающей среды или деятельности человека. Кроме того, чрезмерное развитие туризма, увеличение туристической нагрузки могут нанести вред некоторым объектам;

- ✓ проблемы регулирования и управления – в управлении и сохранении исторических объектов возникает множество проблем регулирования и управления. Например, необходимо обеспечить сотрудничество между местными жителями, туристической отраслью, правительством и общественными организациями;

- ✓ экономическая несправедливость – в некоторых регионах историческим и культурным объектам не уделяется должного внимания, они плохо содержатся, недостаточно развиты или существуют недостаточные экономические возможности для их сохранения. Это приводит к экономической отсталости регионов и снижению потока туристов.

Можно выделить несколько основных подходов, общих для всех стран с развитым историческим и культурным туризмом.

- признание важности и весьма широкого влияния историко-культурного туризма на экономику страны в целом и, в частности, на экономическое развитие отдельных регионов;

- приоритетное развитие социального туризма, обеспечивающее людям с низким уровнем дохода всех возрастов возможность путешествовать, чтобы познакомиться с историей и культурой своей страны;

- поощрение развития историко-культурного туризма в стране в межсезонье с целью выравнивания потока туристов и, соответственно, снижения нагрузки на инфраструктуру - аэропорты, авиакомпании, наземный транспорт, объекты размещения;

- ужесточение требований по обеспечению безопасности отдыхающих в связи с интенсификацией различных видов экстремистских «вторжений»;

- внедрение и использование новейших технологий как средства повышения конкурентоспособности туристического продукта и повышения удобства и эффективности использования ресурсов историко-культурного туризма;

- тесная связь между деятельностью по развитию туризма и мерами по защите окружающей среды, культурного и исторического наследия;
- тесная координация программ развития историко-культурного туризма с программами расширения занятости и подготовки кадров, необходимыми для надлежащего планирования рынка труда отдельных регионов;
- анализ и прогнозирование тенденций развития туристического рынка, систематические и масштабные исследования в области маркетинга и управления туристическими услугами.

Анализ мирового опыта в развитии туризма показал, что нехватка средств на развитие туризма в стране или регионе должна быть обусловлена развитием видов туризма, ориентированных на природные ресурсы региона, с учетом местных природных условий населения, что позволит минимизировать внешние инвестиции. Экономическое воздействие историко-культурного туризма на местную экономику проявляется следующим образом: создание новых рабочих мест, рост доходов населения, развитие сектора услуг, увеличение поступлений в государственный и местный бюджеты. Одновременно создается экономический ресурс для сохранения и реставрации историко-культурного наследия.

Исторически-культурный туризм занимает одно из ведущих мест среди основных видов туризма и отдыха. Интересные маршруты и разнообразные тематики экскурсий расширяют кругозор людей, развивают их интеллект, формируют эстетический вкус и помогают лучше понять истинную картину мира. Большинство туристических направлений с осторожностью относятся к своим историческим объектам как к фактору привлечения туристов, поскольку наличие уникальных исторических памятников предопределяет успешное развитие туризма в регионе. Знакомство с историей и историческими местами является наиболее мощным мотивом, побуждающим туристов к путешествиям.

Согласно Всемирной туристской организации (ВТО), к началу XXI века Узбекистан, как ожидается, станет ведущим туристическим регионом Центральной Азии, с увеличением количества туристических маршрутов на 15 процентов. Если посмотреть на динамику развития туристического сектора в республике, то видно, что он растет с каждым годом. Для обеспечения развития туризма необходимо научно и теоретически анализировать содержание и сущность каждого из его элементов, в частности, историко-культурных туристических ресурсов.

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ИННОВАЦИОННЫЕ МЕТОДЫ ОЦЕНКИ КРЕДИТОСПОСОБНОСТИ ПРЕДПРИЯТИЙ МАЛОГО И СРЕДНЕГО БИЗНЕСА В БАНКОВСКОМ КРЕДИТОВАНИИ

***Аннотация:** в данной статье рассматриваются вопросы касательно подходов оценки кредитоспособности в процессе кредитования предприятий малого и среднего бизнеса. Проанализированы известные методы оценки кредитоспособности и выявлены их достоинства и недостатки. Даны предложения по развитию процесса кредитования и совершенствованию методов оценки кредитоспособности заёмщиков-субъектов малого и среднего бизнеса.*

***Ключевые слова:** банковское кредитование, финансирование, предпринимательская деятельность, кредитоспособность заемщика, оценка кредитоспособности, денежные потоки*

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INNOVATIVE METHODS OF ASSESSING THE CREDITWORTHINESS OF SMALL AND MEDIUM BUSINESSES IN BANK LENDING

Abstract: *This article examines approaches to creditworthiness assessment in small and medium-sized business lending. Existing creditworthiness assessment methods are analyzed, and their advantages and disadvantages are identified. Proposals are made for developing the lending process and improving methods for assessing the creditworthiness of small and medium-sized business borrowers.*

Keywords: *bank lending, financing, entrepreneurial activity, borrower creditworthiness, credit assessment, cash flows*

Введение. На сегодняшний день в условиях нестабильной экономической ситуации со стороны предприятий все больше возрастает спрос на финансовые ресурсы для проведения хозяйственной деятельности. Особенно остро эта проблема стоит перед малым и средним бизнесом, доступ к финансовым ресурсам, у которых существенно затруднен в силу их небольших размеров, непрозрачности деятельности, повышенных процентных ставок и высоких рисков. В связи с этим для банков актуализируется вопрос оценки финансового состояния средних и малых предприятий для расширения объемов своих кредитных портфелей и повышения их качества.

Методология исследования. Данное исследование базируется на результатах анализа научных трудов в области банковского кредитования предпринимательской деятельности, а также трудов, посвященных финансированию и кредитованию предприятий сферы туристических услуг.

Степень изученности. Над вопросами, связанными с различными формами методов кредитования, занимались многие учёные-экономисты, в частности: А.Смит, Н.Бунге, Д.Кейнс, И.Е.Ададунова, М.О.Сахарова, Е.Б.Ширинская, О.И.Лаврушин, Н.П. Любушин и А.Д. Шеремет.

Основная часть. Углублённое исследование финансовых возможностей клиентов банков на регулярной основе, совершаемое в рамках обычных оценочных процедур кредитными отделами, способно повысить качество оценки кредитоспособности заёмщиков.

Вместе с тем, это кропотливая и длительная операция, если для её осуществления применяются традиционные методы,⁴⁰ которые включают коэффициентный и статистический методы, а также методы комплексного анализа кредитоспособности организации,⁴¹ широко распространённые в зарубежной банковской практике.

В рамках нашего исследования рассмотрим методы оценки кредитоспособности заёмщиков, широко используемые в практике банковского кредитования. (см.рис.:1)

⁴⁰ Тавасиев, А.М. Банковское дело: базовые операции для клиентов / А.М. Тавасиев, В.П. Бычков, В.А. Москвин. – М.: Финансы и статистика, 2005. – 304 с.

⁴¹ Просалова, В.С. Проблемы оценки кредитоспособности клиентов коммерческих банков: монография / В.С. Просалова. – Владивосток: Дальнаука, 2008. – 179 с.

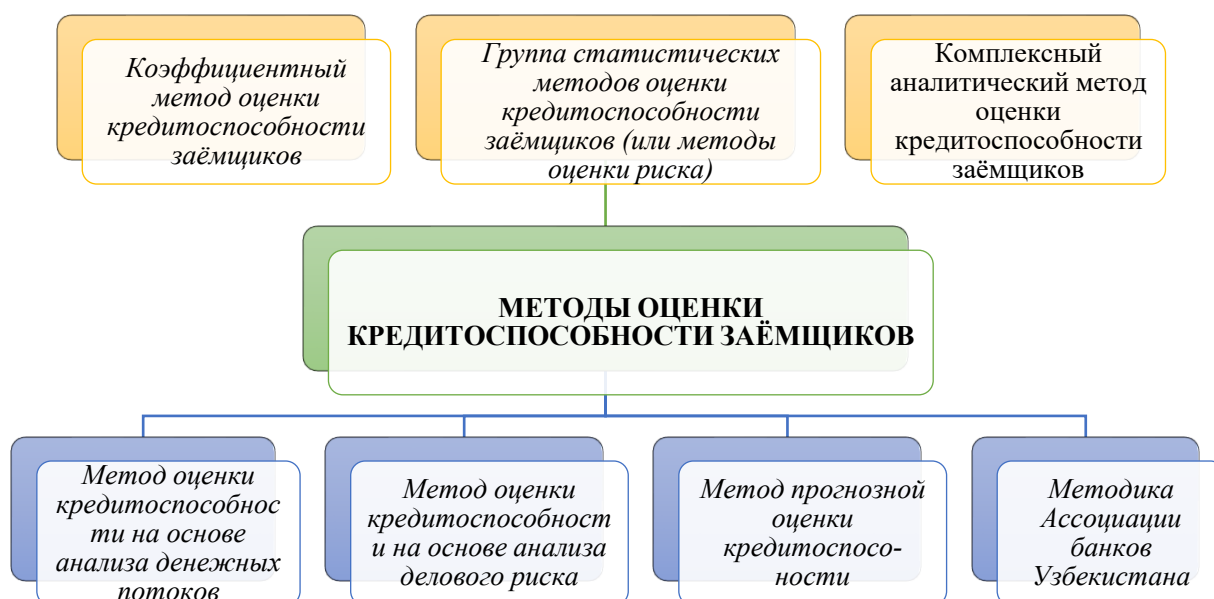


Рис.1. Методы оценки кредитоспособности заёмщиков

Далее проанализируем известные методы оценки кредитоспособности с целью определения их достоинств и недостатков.

Коэффициентный метод оценки кредитоспособности заёмщиков. Данный метод при расчётах использует коэффициенты ликвидности, оборачиваемости, рентабельности, финансового левериджа, финансовой устойчивости, обслуживания долга и другие. К достоинствам указанного метода можно отнести высокую скорость получения выводов о классе кредитоспособности заёмщиков благодаря использованию малого объёма исходных данных. Однако при практическом использовании указанного метода в крупных банках было выявлено отсутствие единого показателя, характеризующего клиентскую платёжеспособность, являющегося единственным и имеющим нормативное значение без учёта вида экономической деятельности.

Группа статистических методов оценки кредитоспособности заёмщиков (или методы оценки риска). При реализации статистических методов оценки кредитоспособности заёмщиков вырабатываются стандартные процедуры, позволяющие объективно охарактеризовать заёмщиков на основе числовых критериев по отнесению потенциальных клиентов к надёжным и ненадёжным на основе предоставляемой ими информации. Примером тому является математическая модель Зета (Zeta model), которая была предложена в 60-х годах XX века профессором Нью-Йоркского университета Эдвардом Альтманом (Edward Altman) для оценки вероятности банкротства. В данной модели ключевой параметр Z вычисляется на основе уравнения, где в качестве независимых переменных, отражающих финансовую деятельность компании, выступают следующие показатели: ликвидность, скорость оборота капитала и другие, что позволяет с

определённой вероятностью прогнозировать банкротство рассматриваемой компании по истечении двух лет от момента анализа.

К достоинствам рассматриваемых методов (и модели Зета) можно отнести высокую скорость получения заключения об уровне кредитоспособности заёмщиков ввиду использования небольшого набора (2-5) исходных данных из бухгалтерской (финансовой) отчётности компании.

К недостаткам статистических методов можно отнести их редкое использование ввиду отсутствия качественной статистической информации, учитывающей специфические особенности различных видов и масштабов экономической деятельности малого и среднего бизнеса, что приводит к низкому качеству такого анализа.

Комплексный аналитический метод оценки кредитоспособности заёмщиков. При оценке кредитоспособности потенциальных заёмщиков основными источниками информации для банков являются их бухгалтерская отчётность. Более того, кредитным экспертам могут потребоваться прогнозы доходов и расходов на предстоящие годы, данные о дебиторских и кредиторских задолженностях. Дополнительно рассчитывается рентабельность предприятий, прибыли и убытки, соотношения показателей финансовой устойчивости и другие.

К достоинствам аналитического метода можно отнести более качественное заключение о финансовом состоянии организации-заёмщика.

Основным же недостатком при использовании данного метода становится высокая трудоёмкость при проведении оценочных расчётов. Кроме того, в отношении малого и среднего бизнеса существует проблема, связанная с достоверностью информации, получаемой от подобных хозяйственных субъектов.

Метод оценки кредитоспособности на основе анализа денежных потоков. В рамках данного метода осуществляется расчёт коэффициентов финансовой деятельности на основе информации об оборотах ликвидных средств, товарных запасах и краткосрочных долговых обязательствах с учётом баланса денежных потоков.

Достоинство метода заключается в более достоверном анализе кредитоспособности компании на основе денежных потоков, которые показывают ее способность покрывать собственные затраты и погашать задолженности.

К недостаткам можно отнести высокую трудоёмкость метода и неопределённость информации, получаемой о денежных потоках субъектов малого и среднего бизнеса.

Метод оценки кредитоспособности на основе анализа делового риска. Деловые риски возникают вследствие неэффективного завершения имущественного кругооборота организации. Поэтому к базовому требованию ее устойчивого развития относится принцип непрерывности деятельности. В этой связи анализ деловых рисков обязаны проводить как организации, так и кредитные эксперты при оценке кредитоспособности таких организаций.

Достоинством метода является возможность прогноза достаточности источников для погашения ссуд, что позволяет расширить способы оценки кредитоспособности клиентов банков.

Недостатком метода является необходимость обеспечения доступа к внутренней закрытой информации заёмщиков малого и среднего бизнеса при оценке внутренних рисков в деятельности подобных организаций.

Метод прогнозной оценки кредитоспособности. С целью определения кредитоспособности заёмщиков банки нуждаются в определении не только текущей, но и будущей платёжеспособности организации, что предполагает:

- вычисление индекса кредитоспособности;
- привлечение генеральной совокупности формализованных и неформализованных показателей;
- расчёт прогнозных значений показателей платёжеспособности.

Достоинством метода является то, что в нём учитываются не только данные бухучёта и отчётности, но и дополнительная информация, к которой относятся, к примеру, значения коэффициентов ликвидности, качество отношений клиентов с учреждениями банковской сферы, уровень диверсификации деятельности или потеря ключевых контрактов и т.д.

К недостаткам метода относится субъективизм прогнозных решений, а рассчитанные значения критериев являются для банков, к сожалению, неосновной оценочной информацией. Указанные прогнозные модели широко распространены в зарубежной практике прогнозирования банкротства компаний. Однако в России их применение ограничено.

Методика Ассоциации банков Узбекистана. Данная методика анализирует кредитоспособность по следующим группам показателей:

- солидности, которая проявляется в ответственности высшего менеджмента компании по своевременным расчётам по полученным ссудам;
- способности, которая заключается в производстве и реализации продукции для обеспечения её конкурентоспособности;
- доходности, состоящей в предпочтении размещения кредитных средств у определённого заёмщика;
- реальности, заключающейся в достижении запланированных результатов проекта и обоснованности объёма запрашиваемой ссуды;
- возвратности, состоящей в возможности реализации материальных залогов заёмщика в случае невыполнения его проекта;
- обеспеченности заёмщиков юридическими правами для получения кредитной ссуды.

Достоинством данной методики является то, что в процессе работы по каждой из описанных групп показателей выбирается показатель, наиболее близкий к деятельности оцениваемой компании, что предполагает в дальнейшем организацию статистического сбора его значений. Поэтому

методика не нуждается в трудоёмких вычислениях, но при этом учитываются различные аспекты деятельности заёмщиков.

Недостатком методики является невозможность её использования для оценки кредитоспособности на длительный срок, поскольку не поддаются учёту многочисленные факторы риска, которые могут проявиться по прошествии времени. Практическая реализация методики оценки кредитоспособности включает в себя элементы нескольких методов, которые были обобщены и усовершенствованы в рамках авторской методики оценки кредитоспособности.

Таким образом, в результате проведённого анализа методов оценки кредитоспособности заёмщиков банками были определены следующие их недостатки:

- структура бизнесов заёмщиков малого и среднего бизнеса подвержена неполному анализу со стороны кредитных организаций;
- виды экономической деятельности заёмщиков малого и среднего бизнеса и их диверсификация банками не учитываются;
- использование субъектами малого и среднего бизнеса ресурсов не оценивается банками с позиции эффективности;
- учётная система организации-заёмщика малого и среднего бизнеса не предусматривает разработку планов по доходам и расходам, а также прогнозов движения денежных средств в подобных организациях;
- нормативный критерий текущей платёжеспособности субъектов малого и среднего бизнеса не рассматривается банками при оценке кредитоспособности потенциальных заёмщиков.

Заключение и предложения. В связи с изложенным можно предложить следующие рекомендации по развитию процесса кредитования и совершенствованию методов оценки кредитоспособности заёмщиков-субъектов малого и среднего бизнеса:

- проверка правового обеспечения деятельности заёмщиков малого и среднего бизнеса в части соответствия их патентов, лицензий, сертификатов наличию, подлинности и срокам действия;
- мониторинг деятельности системы внутреннего контроля, качества финансового менеджмента, организации бухучёта и формирования отчётной документации в субъектах малого и среднего бизнеса;
- оценка управления в субъектах малого и среднего бизнеса по показателям эффективности и с позиции добросовестности ведения дел;
- выявление совокупности экономических связей заёмщиков-субъектов малого и среднего бизнеса, а также сроков выполнения ими финансовых обязательств;
- анализ рисков, связанных с рыночной и предпринимательской активностью заёмщиков-субъектов малого и среднего бизнеса;
- репутационная оценка заёмщиков-субъектов малого и среднего бизнеса в юридическом поле (возможные или реальные судебные

разбирательства, а также иные меры правового или административного воздействия, проводимые в отношении данных заёмщиков);

- анализ видов кредитного обеспечения заёмщиков-субъектов МСБ и возможностей по покрытию ими ссудных задолженностей и процентов по кредитам;

- оценка состояния платёжно-расчётной дисциплины заёмщиков-субъектов малого и среднего бизнеса, особенно в части бюджетных обязательств перед государственными внебюджетными фондами, перед сотрудниками по своевременности выплат заработных плат и т.д.;

- прогнозирование денежных потоков заёмщиков-субъектов малого и среднего бизнеса с определением будущей платёжеспособности;

- распознавание экстенсивного или интенсивного характера экономического развития заёмщиков-субъектов малого и среднего бизнеса путём определения их эффективности ресурсного использования.

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РАЗВИТИЕ РИСК-ОРИЕНТИРОВАННОГО ПОДХОДА В АУДИТЕ И ЕГО ВЛИЯНИЕ НА КАЧЕСТВО АУДИТОРСКИХ ЗАКЛЮЧЕНИЙ

***Аннотация:** в условиях усложнения хозяйственной деятельности, роста финансовых рисков и усиления требований к прозрачности отчетности риск-ориентированный подход в аудите приобретает ключевое значение для обеспечения качества аудиторских заключений. В данной работе рассматриваются теоретические и методологические основы развития риск-ориентированного подхода в аудиторской практике, а также анализируется его влияние на обоснованность, достоверность и профессиональную надежность выводов аудитора. Особое внимание уделяется трансформации аудиторских процедур от формально-проверочного к аналитико-оценочному характеру, ориентированному на идентификацию и оценку существенных рисков искажений финансовой отчетности. В статье подчеркивается, что применение риск-ориентированного подхода способствует более рациональному распределению аудиторских ресурсов, повышению эффективности планирования и углублению профессионального суждения аудитора. Исследование опирается на современные международные стандарты аудита и обобщает практический опыт их внедрения в условиях развивающейся экономики. Полученные выводы свидетельствуют о том, что системное использование риск-ориентированного подхода положительно влияет на качество аудиторских заключений, усиливает доверие пользователей финансовой информации и повышает значимость аудита как инструмента экономической устойчивости организаций транспортной отрасли.*

***Ключевые слова:** аудит, риск-ориентированный подход, аудиторский риск, качество аудиторских заключений, профессиональное суждение, международные стандарты аудита, финансовая отчетность, система внутреннего контроля, планирование аудита, транспортная отрасль.*

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DEVELOPMENT OF A RISK-BASED APPROACH TO AUDITING AND ITS IMPACT ON THE QUALITY OF AUDIT REPORTS

Abstract: *In the context of increasingly complex economic activity, growing financial risks, and stricter requirements for financial reporting transparency, a risk-based approach to auditing is becoming crucial for ensuring the quality of audit reports. This paper examines the theoretical and methodological foundations for the development of a risk-based approach to auditing and analyzes its impact on the validity, reliability, and professional reliability of auditor conclusions. Particular attention is paid to the transformation of audit procedures from a formal verification approach to an analytical and evaluative approach focused on identifying and assessing the significant risks of financial statement misstatement. The article emphasizes that the use of a risk-based approach facilitates a more rational allocation of audit resources, improves planning efficiency, and enhances the auditor's professional judgment. The study draws on current international auditing standards and summarizes practical experience of their implementation in developing economies. The findings demonstrate that the systematic use of a risk-based approach positively impacts the quality of audit reports, enhances the confidence of users of financial information, and enhances the importance of auditing as a tool for the economic sustainability of transportation organizations.*

Keywords: *audit, risk-based approach, audit risk, quality of audit reports, professional judgment, international auditing standards, financial reporting, internal control system, audit planning, transportation industry.*

Введение

Современный этап развития экономики характеризуется высокой степенью неопределенности, усложнением финансово-хозяйственных операций и возрастанием требований к качеству управленческих и контрольных решений. В этих условиях аудит как институт независимого финансового контроля приобретает особую значимость, поскольку именно результаты аудиторской проверки служат важной информационной основой для инвесторов, кредиторов, государственных органов и иных пользователей финансовой отчетности. Для транспортной отрасли, отличающейся капиталоемкостью, сложной логистической структурой и высоким уровнем операционных рисков, надежность аудиторских заключений имеет принципиальное значение с точки зрения устойчивого развития и инвестиционной привлекательности.

Традиционные подходы к аудиту, основанные преимущественно на формальной проверке учетных процедур и сплошном контроле отдельных участков учета, в современных условиях все чаще демонстрируют ограниченную эффективность. Они не в полной мере учитывают специфику деятельности экономических субъектов, динамику внешней среды и разнообразие факторов риска, способных привести к существенным искажениям финансовой отчетности. В ответ на эти вызовы в международной

и национальной аудиторской практике сформировался риск-ориентированный подход, предполагающий концентрацию внимания аудитора на наиболее значимых рисках и областях повышенной вероятности ошибок.

Развитие риск-ориентированного подхода в аудите связано с эволюцией представлений о сущности аудиторского риска и роли профессионального суждения аудитора. В рамках данного подхода аудит рассматривается не как механическая проверка правильности отражения хозяйственных операций, а как комплексный аналитический процесс, включающий идентификацию, оценку и реагирование на риски существенного искажения отчетности. Это требует от аудитора глубокого понимания бизнес-модели проверяемой организации, особенностей отрасли, системы внутреннего контроля и внешних факторов, влияющих на финансовые результаты.

Для транспортных организаций риск-ориентированный подход особенно актуален, поскольку их деятельность подвержена влиянию макроэкономических колебаний, изменений тарифной политики, валютных рисков, а также технологических и инфраструктурных ограничений. Игнорирование данных факторов при планировании и проведении аудита может привести к формированию формально корректного, но экономически необоснованного аудиторского заключения, не отражающего реального финансового положения предприятия.

В условиях реформирования аудиторской деятельности и поэтапного внедрения международных стандартов аудита особое значение приобретает исследование влияния риск-ориентированного подхода на качество аудиторских заключений. Качество аудита в данном контексте рассматривается как степень обоснованности выводов аудитора, их соответствие фактическому финансовому состоянию организации и способность снижать информационную асимметрию между пользователями отчетности. Анализ данного влияния позволяет выявить как методологические преимущества риск-ориентированного подхода, так и практические проблемы его применения в образовательной и профессиональной среде.

Таким образом, изучение развития риск-ориентированного подхода в аудите и его воздействия на качество аудиторских заключений является актуальной научной и практической задачей, особенно для экономических специальностей транспортных вузов, ориентированных на подготовку специалистов, способных принимать обоснованные решения в условиях повышенного риска и неопределенности.

Методы

Методологическую основу исследования составляют общенаучные и специальные методы познания, позволяющие всесторонне раскрыть сущность риск-ориентированного подхода в аудите и оценить его влияние на качество аудиторских заключений. В процессе работы применялись методы анализа и синтеза, индукции и дедукции, а также системный подход, обеспечивающий

рассмотрение аудита как целостного процесса, включающего планирование, выполнение процедур и формирование итогового мнения аудитора. Использование данных методов позволило выявить взаимосвязи между элементами аудиторского риска и качественными характеристиками аудиторских заключений.

Важное место в исследовании занимает сравнительно-аналитический метод, на основе которого проведено сопоставление традиционного и риск-ориентированного подходов к организации аудиторской проверки. Данный метод позволил выявить различия в структуре аудиторских процедур, глубине аналитической работы и степени использования профессионального суждения аудитора. Особое внимание уделялось анализу практики применения международных стандартов аудита, регламентирующих идентификацию и оценку рисков существенного искажения финансовой отчетности, а также процедурам реагирования на выявленные риски.

Для обобщения теоретических положений и практических аспектов риск-ориентированного аудита использовался метод контент-анализа научных публикаций, нормативных документов и методических рекомендаций. В рамках данного метода были проанализированы труды отечественных и зарубежных ученых в области аудита, а также официальные материалы международных профессиональных организаций. Это позволило систематизировать подходы к трактовке аудиторского риска и определить ключевые факторы, влияющие на качество аудиторских заключений.

В исследовании также применялся логико-структурный анализ, направленный на выявление последовательности этапов риск-ориентированного аудита и их влияния на итоговое мнение аудитора. Данный метод способствовал формированию целостного представления о том, каким образом корректная идентификация рисков на стадии планирования отражается на выборе аудиторских процедур и, в конечном итоге, на достоверности выводов. При этом особое внимание уделялось оценке системы внутреннего контроля как одного из центральных элементов риск-ориентированного подхода.

Эмпирическая часть исследования базируется на анализе обобщенных данных аудиторской практики и типовых ситуаций, характерных для организаций транспортной отрасли. Применение аналитических и экспертных методов позволило выявить наиболее распространенные риски, присущие данной сфере, и оценить эффективность их учета в процессе аудита. В совокупности использованные методы обеспечили комплексный и объективный характер исследования, а также позволили сформулировать выводы, имеющие теоретическую и прикладную значимость для развития риск-ориентированного подхода в аудите.

Результаты

Проведенное исследование позволило выявить устойчивую взаимосвязь между уровнем развития риск-ориентированного подхода в аудите и качеством формируемых аудиторских заключений. Анализ теоретических

положений и обобщенной практики показал, что переход от формально-регламентированного аудита к риск-ориентированной модели способствует повышению обоснованности аудиторского мнения и снижению вероятности необнаружения существенных искажений финансовой отчетности. Это обусловлено тем, что внимание аудитора концентрируется на наиболее уязвимых участках учета и отчетности, имеющих ключевое значение для пользователей информации.

Одним из значимых результатов является установление того факта, что риск-ориентированный подход повышает качество этапа планирования аудита. Идентификация и оценка рисков на ранней стадии позволяют более точно определить объем, характер и временные рамки аудиторских процедур. В результате сокращается доля формальных проверок операций с низким уровнем риска и увеличивается глубина анализа экономически значимых процессов. Это особенно важно для транспортных организаций, где существенные искажения чаще всего связаны с учетом основных средств, затрат на эксплуатацию инфраструктуры, долгосрочных контрактов и обязательств.

Исследование также показало, что применение риск-ориентированного подхода усиливает роль профессионального суждения аудитора. Аудиторское заключение, сформированное на основе анализа рисков, отражает не только соответствие отчетности установленным стандартам, но и реальное финансовое положение организации. Такой подход снижает вероятность шаблонных и формализованных выводов и способствует формированию более информативного и аналитически обоснованного мнения, что повышает доверие пользователей к результатам аудита.

В ходе анализа установлено, что риск-ориентированный аудит способствует более эффективному использованию аудиторских ресурсов. Сосредоточение усилий на ключевых рисках позволяет оптимизировать трудозатраты и повысить экономическую эффективность аудиторской проверки без снижения ее качества. Для образовательных программ транспортных вузов данный результат имеет особую значимость, поскольку демонстрирует практическую ценность интеграции риск-ориентированного мышления в подготовку экономистов и будущих аудиторов.

Результаты исследования свидетельствуют также о том, что качество аудиторских заключений в условиях применения риск-ориентированного подхода характеризуется более высокой степенью прозрачности и аргументированности. Аудиторское мнение становится логическим итогом системного анализа рисков, системы внутреннего контроля и финансовых показателей, а не формальным подтверждением корректности учетных записей. Это особенно важно в условиях роста требований со стороны регуляторов и инвесторов к надежности финансовой информации.

В целом полученные результаты подтверждают, что развитие риск-ориентированного подхода является одним из ключевых факторов повышения качества аудиторских заключений. Его внедрение способствует

формированию более достоверной, аналитически выверенной и экономически значимой информации, что усиливает роль аудита как инструмента обеспечения устойчивости и прозрачности деятельности организаций транспортной отрасли.

Обсуждение

Полученные результаты позволяют рассматривать риск-ориентированный подход в аудите как качественно новую модель организации аудиторской деятельности, отвечающую современным требованиям к надежности и полезности аудиторских заключений. В отличие от традиционных методов, ориентированных преимущественно на формальное соблюдение нормативных процедур, риск-ориентированный аудит предполагает активное аналитическое участие аудитора в оценке финансово-хозяйственной деятельности организации. Это усиливает содержательную сторону аудиторского заключения и повышает его ценность для пользователей финансовой информации.

В ходе обсуждения следует отметить, что положительное влияние риск-ориентированного подхода на качество аудиторских заключений во многом определяется уровнем профессиональной подготовки аудиторов и их способностью применять профессиональное суждение. При недостаточном опыте или формальном подходе к оценке рисков существует вероятность подмены глубинного анализа поверхностной идентификацией стандартных рисков. В этом контексте особую роль играет экономическое образование в транспортных вузах, где формируются базовые компетенции будущих специалистов в области анализа рисков, финансового контроля и аудиторской методологии.

С точки зрения транспортной отрасли риск-ориентированный подход позволяет более адекватно учитывать отраслевую специфику, связанную с длительными инвестиционными циклами, высокой долей заемного капитала и значительными операционными затратами. Обсуждение результатов показывает, что именно учет отраслевых рисков способствует формированию аудиторских заключений, отражающих не только бухгалтерскую, но и экономическую реальность деятельности предприятий. Это особенно важно для управленческих решений, принимаемых на основе аудиторской информации.

Вместе с тем, развитие риск-ориентированного аудита сопровождается рядом методических и организационных проблем. К ним относятся сложность количественной оценки рисков, ограниченность доступной информации на стадии планирования и необходимость интеграции данных системы внутреннего контроля в аудиторский процесс. Обсуждение выявленных трудностей свидетельствует о том, что риск-ориентированный подход требует постоянного совершенствования методик, а также адаптации международных стандартов к национальным условиям и отраслевой специфике.

Особого внимания заслуживает вопрос влияния риск-ориентированного подхода на восприятие качества аудиторских заключений со стороны

пользователей. Обсуждение показывает, что более аналитически насыщенные и аргументированные заключения повышают уровень доверия к аудиту, однако одновременно требуют от пользователей более высокого уровня финансовой грамотности. Это обстоятельство подчеркивает необходимость развития образовательных программ, направленных на формирование навыков интерпретации аудиторской информации у специалистов транспортной сферы.

Таким образом, обсуждение результатов подтверждает, что риск-ориентированный подход в аудите является не только методическим инструментом, но и важным элементом институционального развития аудиторской профессии. Его дальнейшее совершенствование и интеграция в образовательный процесс транспортных вузов способны существенно повысить качество аудиторских заключений и их практическую значимость для экономики в целом.

Заключение

Проведенное исследование позволяет сделать вывод о том, что развитие риск-ориентированного подхода в аудите является закономерным и объективно необходимым этапом эволюции аудиторской деятельности в условиях усложнения экономических процессов и роста требований к качеству финансовой информации. Риск-ориентированный подход трансформирует аудит из формальной процедуры контроля в аналитически насыщенный процесс, ориентированный на выявление и оценку факторов, способных оказать существенное влияние на достоверность финансовой отчетности и экономические решения пользователей.

В работе обосновано, что применение риск-ориентированного подхода оказывает прямое и устойчивое влияние на качество аудиторских заключений. Это влияние проявляется в повышении обоснованности аудиторского мнения, его логической последовательности и соответствия реальному финансовому состоянию организации. Аудиторское заключение в данном случае становится результатом системного анализа рисков, системы внутреннего контроля и финансово-хозяйственной деятельности, а не итогом механической проверки учетных данных. Такая трансформация усиливает доверие к аудиту со стороны инвесторов, кредиторов и органов государственного регулирования.

Особое значение риск-ориентированный подход приобретает для организаций транспортной отрасли, деятельность которых характеризуется высокой капиталоемкостью, долгосрочными инвестициями и повышенной чувствительностью к внешним экономическим факторам. Учет отраслевых рисков при планировании и проведении аудита позволяет формировать более информативные и экономически значимые аудиторские заключения, способные служить надежной основой для стратегических и управленческих решений. Это подтверждает актуальность внедрения риск-ориентированного мышления в практику аудита именно в транспортной сфере.

Результаты исследования также свидетельствуют о том, что успешная реализация риск-ориентированного подхода во многом зависит от уровня профессиональной подготовки аудиторов и качества экономического образования. Формирование компетенций в области анализа рисков, оценки системы внутреннего контроля и применения профессионального суждения должно рассматриваться как приоритетная задача транспортных вузов, готовящих специалистов в области экономики и финансового контроля. Включение элементов риск-ориентированного аудита в образовательные программы способствует подготовке специалистов, способных эффективно работать в условиях неопределенности и повышенной ответственности.

Вместе с тем, развитие риск-ориентированного аудита требует дальнейшего методического и нормативного совершенствования. Необходима адаптация международных стандартов аудита к отраслевой специфике, а также разработка практических рекомендаций по оценке и документированию рисков в сложных экономических системах. Это позволит минимизировать субъективность профессионального суждения и повысить сопоставимость аудиторских заключений.

В целом можно утверждать, что риск-ориентированный подход выступает одним из ключевых факторов повышения качества аудиторских заключений и укрепления роли аудита в системе экономических отношений. Его дальнейшее развитие и интеграция в профессиональную и образовательную среду транспортной отрасли создают предпосылки для повышения прозрачности, устойчивости и эффективности функционирования хозяйствующих субъектов.

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ЭКОЛОГИЧЕСКИЕ И БИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ВЫСОХШИХ ТЕРРИТОРИЙ АРАЛЬСКОГО МОРЯ

Аннотация: Статья посвящается анализу экологических, почвенных и биологических особенностей высохших территорий Аральского моря, сформировавшихся в результате одного из крупнейших экологических кризисов XX–XXI веков. Установлено усиление процессов опустынивания и засоления, деградация почв, сокращение биологического разнообразия и доминирование галофитных и ксерофитных видов, что свидетельствует о высокой экологической уязвимости региона и необходимости комплексных природоохранных мероприятий.

Ключевые слова: Аральское море, высыхание, опустынивание, засоление, деградация почв, экосистемы.

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ECOLOGICAL AND BIOLOGICAL CHARACTERISTICS OF THE DRIED AREAS OF THE ARAL SEA

Abstract: The drying of the Aral Sea is one of the largest environmental crises of the 20th–21st centuries, which has led to profound transformations of natural complexes in The article is dedicated to the analysis of the ecological, soil, and biological characteristics of the dried areas of the Aral Sea, which have formed as a result of one of the largest environmental crises of the 20th–21st centuries. The study revealed intensified processes of desertification and salinization, soil degradation, a decline in biodiversity, and the dominance of halophytic and xerophytic species, indicating the high ecological vulnerability of the region and the need for comprehensive environmental protection measures.

Keywords: Aral Sea, drying, desertification, salinization, soil degradation, ecosystems.

Введение

Высыхание Аральского моря — один из крупнейших экологических кризисов XX–XXI веков, глубоко изменивший природные комплексы Центральной Азии. Сокращение водоёма привело к деградации экосистемы и формированию обширных территорий высохшего дна с экстремальными экологическими, геохимическими и биологическими условиями, где активизировались процессы опустынивания, засоления и деградации почв. Аральский бассейн как единая природно-географическая система включает горные районы Памира и Тянь-Шаня — источники гидрологических и геохимических потоков, а также Туркестанскую низменность, где накапливаются минералы и соли. Антропогенное регулирование стока Амударьи и Сырдарьи вызвало резкое падение уровня моря и дестабилизацию экосистем региона. Цель работы — комплексный анализ экологических, почвенных и биологических особенностей высохших территорий и прилегающих ландшафтов в условиях климатических и антропогенных изменений.

Материалы и методы

Исследование проведено с использованием комплексного эколого-географического подхода и методов экологии, физической географии, почвоведения и гидрологии. Основным методом был сравнительный эколого-географический анализ природных условий и степени антропогенной трансформации различных зон Аральского региона. Обобщены многолетние данные почвенно-мелиоративных и гидрологических наблюдений, а также результаты анализа публикаций и отчётов по деградации земель и опустыниванию. Для оценки изменений экосистем применялся системный подход к изучению биогеоценозов и адаптации организмов к засолению, дефициту влаги и климатическим экстремумам. Эмпирическая база включала материалы с высохшего дна Аральского моря, дельт Амударьи и Сырдарьи, орошаемых земель и прилегающих пастбищ.

Результаты исследования

Одним из ключевых последствий высыхания Аральского моря стало резкое усиление процессов опустынивания. На высохшем дне сформировались экстремальные условия, характеризующиеся высокой температурой поверхности, дефицитом влаги и значительной концентрацией солей. Эти факторы способствовали образованию эрозионно-неустойчивых ландшафтов и ускоренному разрушению почвенного покрова.

Изменение водной поверхности моря привело к трансформации регионального климата: снизилась относительная влажность воздуха, усилилась континентальность климата, увеличилась повторяемость пыльно-солевых бурь. Эти процессы негативно сказались на устойчивости формирующихся экосистем и условиях жизнедеятельности биоты.

Падение уровня моря сопровождалось аккумуляцией огромных масс солей и минеральных веществ на поверхности высохшего дна. Под воздействием ветровой эрозии миллионы тонн солепылевых аэрозолей

ежегодно переносятся на значительные расстояния, загрязняя почвы, водоёмы и сельскохозяйственные угодья.

Рост минерализации грунтовых и поверхностных вод привёл к деградации биогеоценозов, снижению биологической продуктивности и вытеснению чувствительных к засолению видов. В экосистемах доминируют галофитные растения и микроорганизмы, способные существовать при высоких концентрациях солей.

В Аральском бассейне широко распространены процессы почвенной деградации, особенно в зонах орошаемого земледелия. Нерациональное водопользование и чрезмерное орошение способствовали подъёму уровня грунтовых вод и развитию вторичного засоления и осолонцевания почв.

Установлено, что вторичное засоление является ведущим фактором снижения почвенного плодородия. В зависимости от степени засоления урожайность сельскохозяйственных культур снижается на 20–80 %, а в условиях сильного засоления и солонцеватости земледелие становится практически невозможным. Наряду с этим фиксируются процессы избыточного увлажнения, ирригационной и ветровой эрозии, а также агро- и техногенного загрязнения тяжёлыми металлами и пестицидами.

Высыхание Аральского моря привело к резкому сокращению численности и полному исчезновению многих гидробионтов и водоплавающих птиц. Нарушение водных экосистем вызвало фрагментацию биогеоценозов и упрощение их трофической структуры.

На смену исчезнувшим видам пришли ксерофитные и галофитные растения, а также животные, приспособленные к пустынным условиям. Формирующиеся сообщества отличаются низкой видовой насыщенностью, но высокой степенью экологической специализации. Существенную роль в функционировании новых экосистем играют микроорганизмы, обеспечивающие биогеохимический круговорот солей и минералов.

Полученные результаты свидетельствуют о том, что высохшие территории Аральского моря представляют собой крайне нестабильные и уязвимые экосистемы. Совокупное воздействие климатических изменений, антропогенной нагрузки и геохимических процессов приводит к формированию так называемой «экологически неблагополучной зоны», характеризующейся низкой восстановительной способностью природных комплексов.

Несмотря на адаптацию отдельных видов к экстремальным условиям, биологическое равновесие в регионе остаётся нарушенным. Без реализации комплексных природоохранных и мелиоративных мероприятий дальнейшая деградация земель и биоты неизбежна. Восстановление экологической устойчивости требует интеграции научных, управленческих и международных усилий.

Заключение

Высохшие территории Аральского моря являются примером масштабной антропогенно обусловленной трансформации природной среды.

Опустынивание, засоление, деградация почв и сокращение биологического разнообразия формируют долгосрочные экологические риски не только для стран Центральной Азии, но и для глобальной экологической безопасности. Решение данной проблемы возможно лишь при условии системного подхода, рационального управления водными ресурсами и восстановления природных экосистем Аральского региона.

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МОДЕЛЬ ЖИРОВОГО ГЕПАТОЗА КРЫС ПРИ ВЫСОКОЖИРОВОЙ И ВЫСОКОУГЛЕВОДНОЙ ДИЕТЫ

Аннотация: Целью исследования являлось изучение морфофункциональных изменений печени при воздействии высокожировой и высокоуглеводной (ВЖВУД) диеты в эксперименте. Работа выполнена на лабораторных животных, получавших ВЖВУД в течение определённого периода. Проведён комплекс гистологических исследований с использованием стандартных и специальных методов окраски (Гематоксилин-эозин, Ван – Гизон, Судан III). В результате выявлены характерные признаки жирового гепатоза (ЖГ): увеличение размеров гепатоцитов, наличие в цитоплазме множества липидных вакуолей, смещение ядер к периферии клеток, дезорганизация балочной структуры и умеренные сосудистые изменения. Полученные данные подтверждают возможность воспроизведения ЖГ с помощью ВЖВУД, что делает данную модель перспективной для изучения патогенеза жировой дистрофии печени.

Ключевые слова: экспериментальная модель, неалкогольная жировая болезнь печени, высокожировой и высокоуглеводной диета.

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A MODEL OF FATTY HEPATOSIS IN RATS WITH A HIGH-FAT AND HIGH-CARBOHYDRATE DIET

Abstract: The aim of this study was to investigate the morphofunctional changes in the liver experimentally induced by a high-fat, high-carbohydrate (HFHC) diet. The study was performed on laboratory animals given HFHC for a specific period. A series of histological examinations were performed using standard and specialized staining methods (hematoxylin and eosin, van Gieson, and

Sudan III). Characteristic features of fatty liver disease (FHD) were identified: enlarged hepatocytes, the presence of numerous lipid vacuoles in the cytoplasm, peripheral displacement of nuclei, disorganization of the trabecular structure, and moderate vascular changes. The obtained data confirm the feasibility of reproducing FHD using HFHC, making this model promising for studying the pathogenesis of fatty liver disease.

Keywords: *experimental model, non-alcoholic fatty liver disease, HFHC diet.*

Неалкогольная жировая болезнь печени (НАЖБП) является наиболее распространенной патологией печени в мире, а неалкогольный стеатогепатит является второй по частоте причиной для трансплантации печени среди взрослого населения [Maurice J, Manousou P. 2018]. По мнению авторов ЖГ — самое распространенное хроническое заболевание печени и увеличение распространенности ЖГ, малосимптомность клинической картины и недостаточное знание патогенеза этого заболевания, а также тяжесть его осложнений ставят эту проблему в ряд важнейших медико-социальных [Tanaka N., et al. 2019]. Экспериментальные модели ЖГ используются для изучения механизмов формирования, выяснения роли различных факторов внешней и внутренней среды в становлении патологических процессов в печени, а также позволяют детально изучить патогенез и изыскать средства для рациональной терапии и профилактики [Cai-Yu Lian., et al. 2020].

За последнее время многочисленными исследованиями выявлено, что у человека основным этиологическим фактором и предиктором НАЖБП является образ жизни: высококалорийное питание, избыточное потребление насыщенных жиров, рафинированных углеводов, подслащенных сахаром напитков и малоподвижный образ жизни [Лазебник Л.Б., 2021; Джабраилова Х.А. и Исмаилова А.А. 2021]. Избыточное поступление калорий приводит к нарушению липидного и углеводного обмена, увеличению поступления свободных жирных кислот в печень и их внутриклеточному накоплению. При этом развивается стеатоз гепатоцитов, сопровождающийся митохондриальной дисфункцией, окислительным стрессом и воспалительными реакциями, что может служить пусковым механизмом прогрессирования НАЖБП до стеатогепатита и фиброза печени [Трашков А.П., и др. 2017; Кузнецова И.В., и др. 2021].

Для изучения патогенеза ЖГ широко применяются экспериментальные модели, основанные на кормлении лабораторных животных высокожировым рационом. Такие модели позволяют воспроизводить ранние морфологические и метаболические изменения, характерные для НАЖБП у человека [Линецкая О.И., и др. 2018].

При ЖГ у животных наблюдаются увеличение массы тела, гипергликемия, гиперлипидемия, инсулинорезистентность и накопление жира в печени. Морфологически отмечается увеличение размеров гепатоцитов, появление жировых вакуолей в цитоплазме, смещение ядер к периферии клеток и дезорганизация балочной структуры [Бондаренко В.А. и

Черных И.В. 2020]. Использованный ВЖВУД обеспечивает высокую степень поедаемости корма животными и поддержание нормального водного баланса организма. Показатель воспроизводимости ЖГ при использовании данной модели в течение 12 нед достигает 100% **[Янко Р.В., и др. 2021].**

Экспериментальный рацион ВЖВУД в наибольшей степени соответствует рациону питания людей, страдающих ЖГ. Создание подобных животных моделей ВЖВУД остается по-прежнему актуальной задачей экспериментальной медицины **[Лещенко Д.В., и др. 2015; Лапшина Н.А., Климова И.А. 2021].**

Цель исследования – изучение влияния ВЖВУД на морфофункциональные характеристики ткани печени и биохимические показатели сыворотки крови крыс.

Материалы и методы исследования. Гистологическое исследование является ключевым методом оценки изменений печени при ВЖВУД. Применение стандартных и специальных методов окраски (*гематоксилин-эозин, Судан III/IV, ван Гизон*) позволяет визуализировать структурные нарушения, отложение липидов и изменения соединительнотканного каркаса **[Киреева Н. В., Громова С. А. 2020].** Эти методы дают возможность комплексно оценивать морфофункциональное состояние печени и динамику патологических процессов.

В эксперименте использовались белые беспородные крысы. Животные содержались в стандартных выварных условиях при свободном доступе к воде и пище, с соблюдением температурного режима и светового дня (12/12 ч). Все процедуры проводились в соответствии с этическими принципами обращения с животными и одобрены локальным этическим комитетом.

Контрольная группа $n = 10$ содержалась на стандартном лабораторном корме. Каждая крыса ежедневно съедала 20 г комбикорма: белки 24%, жиры 6%, углеводы 44% и чистую воду (*66,0 ккал в сутки на 1 крысу*) **[Бирулина Ю.Г., и др., 2020].** Для моделирования ЖГ печени животные основной группы ($n = 20$) в течение срока 12 недель получали высококалорийный рацион, (*ВЖВУД*) включавший. Каждая крыса получала 6 г специально приготовленного гранулированного корма «*ВЖВУД*» комбинированного (*жироуглеводного*) высококалорийного рациона (*70% стандартного комбикорма с добавлением 30% свиного смальца*); 6,8 г свиного сала, 3,6 г белых сухарей; 3,6 г семян подсолнечника. Через день вместо воды подопытные крысы получали 10% раствор фруктозы (*161,5 ккал в сутки на 1 крысу*) **[Янко Р.В., и др. 2021].**

По окончании эксперимента животных выводили из опыта гуманным способом. Печень извлекали, фиксировали в 10 % нейтральном формалине, после чего проводили стандартную гистологическую обработку. Для получения срезов использовали микротом, толщина срезов составляла 4–5 мкм.

Срезы окрашивали следующими методами: Гематоксилин-эозин — для общей оценки гистоархитектоники ткани; Судан III — для выявления

липидных включений (на замороженных срезах). Ван Гизон — для оценки соединительнотканного каркаса и состояния пучков коллагеновых волокон в печени.

Микроскопическое исследование проводили с использованием светового микроскопа с использованием цифровой камеры микропрепараты фотографировали на микроскопе Nikon Eclipse E100 (Япония), при увеличениях $\times 100$, $\times 200$ и $\times 400$. Документирование осуществляли с помощью цифровой камеры, подключённой к микроскопу.

Массу тела крыс еженедельно измеряли на весах SATURN (Китай). После выведения животных из эксперимента проводили диссекцию, взвешивание висцеральной жировой ткани и печени на лабораторных весах (Scout Pro, Китай). Массовые коэффициенты органов рассчитывали по формуле: $\text{массовый коэффициент} = (\text{масса органа} / \text{масса тела}) 100 \%$.

Биохимические показатели сыворотки крови крыс (общий холестерин (ОХ), триглицериды (ТГ), общий билирубин (ОБ), аланинаминотрансферазу (АЛТ), аспартатаминотрансферазу (АСТ), щелочную фосфатазу (ЩФ)) определяли общепринятыми методами на биохимическом автоматическом анализаторе BS-200 (Mindray, Китай) с программным обеспечением BS-330, используя коммерческие наборы «Диасенс» (Республика Беларусь).

Для оценки содержания липидов (ТГ) в тканях органа использовали окраску суданом III. Исследование микропрепаратов, морфометрию и изготовление микрофотографий проводили с помощью светового микроскопа «Альтами LUM-1», оснащенного цифровой фотокамерой.

Экспериментальные данные обрабатывали с помощью программы Statistica 10.0. Распределение исследуемых показателей проверяли по критерию Шапиро–Уилка. При условии нормальности распределения использовали параметрические методы статистики: данные представляли в виде среднего $\pm$ стандартная ошибка среднего ($M \pm SEM$), а статистическую значимость отличий оценивали на основании t -критерия Стьюдента. Данные считали достоверными при $p \leq 0,05$.

Результаты и обсуждение. В группе интактных животных патологических изменений выявлено не было. В группе контрольных животных у 62,5 % животных выявлены морфологические признаки ЖГ. Данные о летальности лабораторных животных в алиментарных моделях ЖГ немногочисленны. В основной массе источников она или не отмечалась, или такие результаты не были приведены.

У животных, получавших при ВЖВУД, к концу эксперимента отмечалось увеличение массы тела в среднем на 25–30% по сравнению с контрольной группой.

В исследовании, где животные, получали гиперкалорийную диету с примерно равным соотношением жиров и углеводов (25,5% и 20,1% соответственно) к концу первого месяца исследования значимо прибавляли 40,0% от первоначальной массы тела.

У крыс экспериментальной группы визуально печень имела увеличенные размеры, более светлый оттенок и рыхлую консистенцию.

Гистологическое исследование выявило выраженные морфологические изменения в печени экспериментальных животных. На срезах, окрашенных гематоксилином и эозином, наблюдалось увеличение размеров гепатоцитов, наличие жировых вакуолей различной величины, преимущественно в периферических отделах цитоплазмы, со смещением ядер к периферии клеток. Нарушалась балочная структура печени, расширялись синусоиды, местами выявлялись признаки начальных дистрофических изменений.

В эксперименте при окрашивании Суданом III - липидные включения в гепатоцитах отчетливо визуализировались в виде красно-желтых капель, располагающихся диффузно. При окрашиваниях по Ван - Гизону выявили умеренное увеличение пучков коллагеновых волокон в портальных трактах и перисинусоидальных зонах, что может указывать на начальные проявления фиброза печени. В таблице 1. показаны морфологические показатели печени в эксперименте.

Таблица 1.

Морфологические показатели печени в эксперименте

№	показатель	группа животных	
		контроль	эксперимент
1	средняя масса печени, г	7,2 ± 0,5	9,4 ± 0,7 *
2	наличие жировых вакуолей в гепатоцитах (%)	3,0 ± 1,0	42,0 ± 5,0 *
3	смещение ядер гепатоцитов (%)	1,0 ± 0,5	36,0 ± 4,0 *
4	нарушение балочной структур полей зрения (%)	0	28,0 ± 3,0*
5	коллаген в портальных трактах (оценка в баллы)	1,2 ± 0,1	2,3 ± 0,2 *

* — различия статистически значимы по сравнению с контролем (p < 0,05).

Анализ полученных данных эксперимента показывает, что ВЖВУД приводит к развитию типичных признаков ЖГ, аналогичных ранним стадиям ЖГ у человека. Накопление липидов в гепатоцитах сопровождается нарушением структуры ткани и активацией соединительнотканного компонента.

Помимо морфологических изменений печени, у животных опытной группы отмечались выраженные метаболические сдвиги, отражающие развитие ЖГ и нарушения обмена веществ. Наиболее существенные различия наблюдались в показателях липидного и углеводного обмена.

Анализ ключевых биохимических показателей сыворотки крови исследуемых групп животных выявил наличие нарушений липидного, углеводного, а также белкового обменов у контрольной группы. Нарушения липидного обмен проявлялись синдромом дислипидемии, а именно: гиперхолестеринемией и гипертриглицеридемией у контрольной группы животных, нарастающими на протяжении всего эксперимента. При этом в показателях интактной группы никаких значимых колебаний данных показателей не наблюдалось. Отмечено, что средний уровень триглицеридов

(ТГ) животных через 12 месяцев пребывания на ВЖВУД в 1,9 раза превышал уровень интактной группы соответственно ($p < 0,05$).

Аналогичная тенденция наблюдалась при анализе уровня общего холестерина (ОХ) сыворотки крови. Показатель группы животных с патологией через 12 месяцев эксперимента превышал показатель контрольной в 1,4 раза ($p < 0,05$).

По данным Буценко Н.С. и Костина О.А. (2020) накопление липидных вакуолей, смещение ядер к периферии клеток, дезорганизация балочной структуры, расширение синусоидов и умеренное увеличение количества коллагеновых волокон в портальных трактах сопровождаются значимыми сдвигами в биохимических показателях крови — гипергликемией, гиперлипидемией и повышением активности печёночных ферментов (АЛТ, АСТ), что свидетельствует о нарушении обмена веществ и повреждении гепатоцитов.

При исследовании уровня трансаминаз перед окончанием эксперимента выявлена тенденция к повышению концентраций АсАТ и АлАТ сыворотки крови по сравнению с контрольной группы животных. В таблица 2. показаны биохимические показатели крови в эксперименте.

Таблица 2.

Биохимические показатели крови в эксперименте

№	показатель	группа животных	
		контроль	эксперимент
1	Глюкоза, ммоль/л	5,1 ± 0,4	7,3 ± 0,5 *
2	Общий холестерин, ммоль/л	2,8 ± 0,3	4,6 ± 0,4 *
3	Триглицериды, ммоль/л	0,9 ± 0,1	2,1 ± 0,3 *
4	АЛТ, Ед/л	35,0 ± 5,0	78,0 ± 8,0 *
5	АСТ, Ед/л	42,0 ± 6,0	85,0 ± 10,0 *
6	Общий белок, г/л	70,0 ± 3,0	68,0 ± 4,0

* — различия статистически значимы по сравнению с контролем ($p < 0,05$).

Влияние НАЖБП на показатели липидного обмена различно и зависит от морфологической формы заболевания, возраста пациентов, а также наличия сопутствующих заболеваний и синдромов [Khalil F., 2018]. При исследования показывают прямую зависимость уровней ОХ и ТГ сыворотки крови от степени НАЖБП.

Также, изменения биохимических показателей крови могут быть связаны с преобладанием тех или иных веществ в диете. В исследованиях с выраженным преобладанием углеводов в диете у животных уровень ТГ и ОХ повышался, в исследованиях с преобладанием жирового компонента диеты наблюдалась тенденция к снижению их концентраций [Оковитый С.В., и др. 2018].

Многие исследования подчеркивают связь между ЖГ и несколькими факторами МС, включая абдоминальное ожирение, инсулинорезистентность (ИР) и дислипидемию (гиперхолестеринемия, гипертриглицеридемию, или их сочетание).

В эксперименте при ВЖВУД накопление ТГ в печени, вероятно, является следствием избыточного окисления жирных кислот и секреции ЛПОНП, поскольку оба этих пути активируются у пациентов с ЖГ. В таблица 3. показаны изменения липидного спектра в эксперименте.

По данными **Сидоров П.И. и Алексеева А.Н. (2020)** свободные жирные кислоты (СЖК) транспортируются в печень, где преобразуются в ТГ. Накопление триглицеридов в печени сопровождается нарушением энергетического обмена и способности инсулина подавлять продукцию глюкозы и ЛПОНП, что приводит к гипергликемии, гиперхолестеринемии и гипертриглицеридемии.

Таблица 3.

Изменения липидного спектра в эксперименте

№	показатель	контроль	эксперимент
1	ЛПВП (ммоль/л)	1,3 ± 0,2	0,9 ± 0,1 *
2	ЛПНП (ммоль/л)	1,1 ± 0,2	2,4 ± 0,3 *
3	Индекс атерогенности	1,2 ± 0,2	3,1 ± 0,4 *

* — различия статистически значимы по сравнению с контролем ($p < 0,05$).

По мнению авторов возрастание концентрации липидов, холестерина и триглицеридов в ткани печени подопытных крыс свидетельствует о развитии ЖГ, который в дальнейшем может привести к стеатогепатиту и циррозу печени. В печени часть свободных жирных кислот этерифицируется с образованием триглицеридов, а часть вступает в реакции β -окисления, затем в цикл Кребса с образованием аденозинтрифосфата. При большом количестве жирных кислот образуется избыток триглицеридов, холестерина и липопротеинов очень низкой плотности, увеличивается их содержание в крови, а также накопление в гепатоцитах [**Сидоров П.И. и Алексеева А.Н. 2020**].

Развитие гипергликемии описано во множестве моделей НАЖБП при использовании гиперкалорийной диеты, насыщенной фруктозой. Так, добавление 10 % фруктозы в питьевую воду в эксперименте на крысах линии Wistar, приводило к возникновению гипергликемии на фоне сопутствующего ожирения и нарушений липидного обмена [**Zhong F., 2020**].

Таким образом, модель ЖГ крыс характеризуется не только схожестью условий формирования (*гиперкалорийное питание и с развитие висцерального ожирения*), но и морфологическими (*признаки стеатогепатита*) и биохимическими (*дислипидемия, гипергликемия*) проявлениями. Однако, значимым недостатком модели ЖГ является высокая продолжительность формирования патологии, и как следствие — ее трудозатратность. Но данные результаты исследование дополняют морфофункциональные показатели и подтверждают формирование у животных экспериментальной модели МС и ЖГ, аналогичной НАЖБП у человека.

Выводы.

1. Длительное воздействие ВЖВУД приводит к развитию у животных выраженных морфологических и биохимических изменений, (*возрастание концентрации глюкозы, триглицеридов и холестерина*) отражающих развитием гипергликемии и дислипидемии.

2. Повышение активности АЛТ и АСТ указывает на цитолитический синдром, связанный с нарушением морфофункциональных структур гепатоцитов что приводит развитием МС в печени.

3. Модель ЖГ на основе комбинированного ВЖВУД у всех лабораторных крыс может быть использована для дальнейшего изучения патогенеза заболевания, а также для профилактических подходов к данной патологии.

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МОРФО - ФУНКЦИОНАЛЬНЫЕ ИЗМЕНЕНИЯ ПЕЧЕНИ И СЕЛЕЗЕНКИ КРЫС ПРИ ВОЗДЕЙСТВИИ ГИПЕРКАЛОРИЙНОГО РАЦИОНА

Аннотация: В работе представлены результаты экспериментального исследования морфо - функциональных изменений печени при воздействии калорийно-насыщенного рациона, обогащённого Высоко жировой и высоко углеводной (ВЖВУД) диеты. Целью исследования было моделирование метаболических нарушений, аналогичных жировой болезни печени (ЖБП), с последующим анализом структурных и функциональных изменений органа. В качестве модели использовались половозрелых крысах линии Вистар, получавшие ВЖВУД в течение установленного периода. Проведённые морфологические и биохимические исследования выявили признаки жирового гепатоза (ЖГ), нарушения архитектоники печеночной ткани, воспалительные изменения и функциональные отклонения, подтверждаемые изменением показателей печёночных ферментов. Полученные данные позволяют глубже понять механизмы патогенеза метаболически отклонения печени и подтверждают влияние ВЖВУД на структурно – функциональных состояние паренхимы органа.

Ключевые слова: экспериментальная модель, неалкогольная жировая болезнь печени, высокожировой и высокоуглеводной диета.

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MORPHO-FUNCTIONAL CHANGES IN THE LIVER AND SPLEEN OF RATS EXPOSED TO A HYPERCALORIC DIET

Abstract: *This paper presents the results of an experimental study of morpho-functional changes in the liver induced by a calorie-dense diet supplemented with a high-fat, high-carbohydrate (HFHC) diet. The aim of the study was to simulate metabolic disorders similar to fatty liver disease (FLD) and subsequently analyze the structural and functional changes in the organ. Mature Wistar rats fed HFHCD for a specified period were used as a model. Morphological and biochemical studies revealed signs of fatty hepatosis (FH), altered liver tissue architecture, inflammatory changes, and functional abnormalities confirmed by changes in liver enzyme levels. The data obtained provide a deeper understanding of the mechanisms underlying the pathogenesis of metabolic abnormalities in the liver and confirm the impact of HFHCD on the structural and functional state of the liver parenchyma.*

Keywords: *experimental model, non-alcoholic fatty liver disease, HFHCD.*

Введение

В последние десятилетия наблюдается стремительный рост распространённости метаболических нарушений, включая ожирение, инсулинорезистентность и неалкогольную жировую болезнь печени (НАЖБП), что во многом связано с изменением пищевых привычек населения [Федорова Н.Е., Григорьев А.И. 2020]. Увеличение потребления калорийной пищи, богатой жирами и простыми углеводами, оказывает существенное влияние на функциональное состояние внутренних органов, особенно печени, как центрального органа обмена веществ [Блинов Д.В., Сидорова Т.В. 2019].

Длительное потребление исключительно диспергированной (измельченной) пищи Кузнецова Т.И. (2020) оказывает воздействие на развития гепатоцитов в раннем постнатальном периоде эта выражается в увеличении объема гепатоцитов, а в позднем характеризуется стойкими гипотрофическими изменениями клеток печени.

Известно, что, печень играет ключевую роль в метаболизме липидов, углеводов и белков, а также в детоксикации и хранении энергии [Лапшина Ю.А., Климова Е.В. 2021]. Нарушения в рационе питания приводят к развитию морфологических изменений в гепатоцитах, нарушению внутрипечёночной микроциркуляции и ухудшению функциональных показателей, что может способствовать прогрессированию таких патологий, как стеатоз, стеатогепатит и фиброз [Чумаченко А.Г., Малышева Е.В. 2018; Емельянова Е.И., Корнеева Е.В. 2022].

Экспериментальное воздействие на крыс ВЖВУД продолжительностью 12 недель наряду с метаболическими нарушениями позволяет воспроизвести ранние признаки системного воспаления, характерные для МС и ожирения [Бирулина Ю.Г., и др. 2022]

По мнению Мичурина С.В., и др. (2014) алиментарное ожирение приводит, к развитию жировой дистрофии, а с другой – стимулирует функциональную активность гепатоцитов, что можно расценивать как компенсаторную реакцию в ответ на повышенное потребление животного

жира. По мнению авторов структурные изменения в паренхиматозных клетках сопровождаются функциональным напряжением капилляро-соединительнотканых структур, нарушением кровообращения в печени.

Высокожировая нагрузка приводит к развитию деструктивно-дистрофических изменений печени, это связано с тем, что макрофаги печени, захватывая липиды, не успевают их биотрансформироваться. В результате чего увеличивается как количество измененных макрофагов и жира в печени. Это приводит к реорганизации паренхимы печени на фоне гипертрофией гепатоцитов [Байматов В.Н., и др. 2018].

Исследование Янко Р.В., и др. (2021) посвящено Моделью жирового гепатоза (ЖГ) на основе комбинированного (*жироуглеводного*) высококалорийного рациона у крыс, приводящих к развитию выраженных морфологических, биохимических признаков данной патологии. Наиболее выраженные проявления ЖГ наблюдаются у молодых животных. Но по мнению Мустафина Л.Р., и др. (2023) ВУВЖД вызывает значительное повреждение стромы, так и паренхимы печени, способствуя развитию дистрофических, фиброзных и воспалительных изменений. Менее выраженные морфологические изменения печени после назначения ВУВЖД молодым крысам, вероятно, связаны с ее высокой регенераторной способностью.

Исследовании установлено, что использование предложенной высокожировой и высокоуглеводной диеты у крыс воспроизводит большинство типичных особенностей МС: ожирение, повышение АД, гипергликемию, снижение толерантности к глюкозе, инсулинорезистентность, дислипидемию с преобладанием триглицеридемии. Модель диет-индуцированного МС может быть полезна в изучении причин развития и прогрессирования метаболических и гемодинамических нарушений при МС, а также в исследовании потенциальных подходов к его профилактике и лечению [Бирулина Ю.Г., и др. 2020]. О способности развитию НАЖБП у крыс, получавших рацион с повышенным со содержанием фруктозы [Никитин Н.С. и Кузнецов С.Л. 2018].

В процессе изучения влияния фруктоз индуцированной диеты на развитие воспалительного процесса в печени крыс наблюдалось повышение активности специфических ферментов печени – биохимических маркеров цитолиза гепатоцитов – в результате возможного стеатоза и воспалительной инфильтрации печени как следствие деструктивно-дистрофических изменений в гепатоцитах на фоне нарушений в углеводном и липидном обмене [Гилева О.Г. 2020]. Применение фруктозобогащённой диеты в течение 35 дней способствовало развитию гипергликемии, инсулинорезистентности, дислипидемии и нарастанию нарушений липидного обмена [Терещенко М.В. и Бутолин Е.Г. 2023]. Об этом свидетельствует увеличение массы тела, массы жировой ткани, инсулинорезистентность и накопление триглицеридов в печени. крыс [Нарыжная Н.В., и др. 2021]. Свидетельство о развитии характерных для метаболического синдрома (МС) и дисфункции системы

гемостаза: гиперхолестеринемии, гипертриглицеридемии, гипергликемии, увеличении избыточной массы тела, снижает противосвертывающий потенциал крови и способствует развитию тромботических состояний [Оберган Т.Ю., и др. 2021].

Таким образом, ведущим фактором формирования деструктивных изменений в печени является избыточное потребление сахарозы, при этом сопутствующий алиментарный дефицит белка усугубляет функциональные изменения гепатоцитов [Волощук О.Н., и др. 2019].

С целью более глубокого понимания механизмов развития патологических изменений печени под воздействием калорийно-насыщенного рациона, в настоящем исследовании была использована экспериментальная модель на лабораторных животных. Это позволяет в контролируемых условиях изучить динамику морфофункциональных изменений, что имеет важное значение для разработки эффективных профилактических и терапевтических подходов к предотвращению метаболических изменений в печени.

Материалы и методы исследования. Исследование проводилось на базе в лаборатории Навоийского инновационного университета, с соблюдением этических норм и стандартов работы с лабораторными животными, в соответствии с рекомендациями Европейской конвенции по защите позвоночных животных, используемых для экспериментальных и иных научных целей.

Крысы являются оптимальной тест-системой для моделирования НАЖБП, причем, самцы более восприимчивы к алиментарным нарушениям, и у них легче и быстрее развивается данная патология по аналогии с людьми (*у мужчин чаще, чем у женщин*). Аутбредные животные были выбраны для простоты популяционной экстраполяции и трансляции данных. Контрольная группа включала 10 крыс, экспериментальная группа включала 20 животных получавших ВЖВУД. Общая продолжительность эксперимента составила 12 месяцев.

В исследовании использовано 30 половозрелых белых крыс линии Wistar, массой 180–220 г. Все животные методом случайных чисел были рандомизированы на две группы: Контрольная группа (n = 10) содержащихся в стандартных условиях вивария на обычном пищевом рационе со свободным доступом к воде; получала стандартный лабораторный рацион; Экспериментальная группа (n = 20) — в течение 12 недель получала ВУВЖД. ЖГ моделировали по методу с помощью гиперкалорийной диеты, создаваемой путем добавления к стандартному корму 20 % топленого говяжьего жира, 5% фруктозы, 5 % изолированного соевого белка, 2 % холина, 0,5 % холестерина. Животные содержались в стандартных условиях (температура 22–24°C, 12-часовой световой режим, свободный доступ к пище и воде). В ходе исследования всем животным ежемесячно измеряли массу тела с помощью электронных весов.

В результат моделирования при использовании ВУВЖД зависит от характера добавляемого в него жира. Животные жиры эффективнее растительных формируют МС, при этом, свиной жир – стеатогепатит, а говяжий – стеатоз. В связи с этим, в нашем исследовании мы отдали предпочтение говяжьему топленому жиру.

По завершении экспериментального периода все животные были эвтаназированы с последующим забором биологического материала. Исследование включало:

Биохимический анализ крови: определение уровня АЛТ, АСТ, общего билирубина, холестерина, триглицеридов и глюкозы в сыворотке крови измеряли портативными анализаторами [Accu-Chek Active (Roche) и Accutrend Plus (Cobas)] после предварительного 8-ми часового голодания животных, путем забора крови из латеральной хвостовой вены в контрольных точках. Для гистологического исследования органы с предварительно измеренной массой на 24 часа помещали в 10 % раствор формалина с последующим приготовлением срезов и их окраской гематоксилин и эозином. В печени оценивали следующие признаки – выраженность некроза, лобулярного воспаления и баллонной дистрофии.

Макроскопическое и гистологическое исследование печени: проводилось окрашивание гистологических срезов гематоксилин-эозином и по Судану III для выявления ЖГ;

Морфометрический анализ: определялись параметры клеточного состава печени, наличие жировой дистрофии, воспалительных инфильтратов и других морфологических изменений.

Статистическую обработку полученных данных проводили с помощью пакета программ GraphPad Prism 7. Осуществляли проверку на нормальность распределения количественных признаков при малом числе наблюдений с использованием W-критерия Шапиро – Уилка, оценивали значимость различий при нормальном распределении количественных признаков с помощью t-критерия Стьюдента (*для независимых выборок*), а при распределении, не удовлетворяющем критериям нормальности распределения – с помощью непараметрического U-критерия Манна – Уитни (*для сравнения двух попарно не связанных между собой вариационных рядов*).

Числовые данные, приводимые в таблицах, представлены в виде: средняя арифметическая (M) $\pm$ стандартная ошибка среднего (m). Критерием статистической достоверности получаемых выводов мы считали общепринятую в медицине величину $p < 0,05$.

Результаты исследования и их обсуждение.

Макроскопическое исследование печени крыс эксперименте показало, что, как и в контрольной группе, поверхность печени животных гладкая, однородной темно-красной окраски, капсула тонкая, прозрачная, ткань печени на разрезе полнокровная, умеренно плотная. Однако при ВЖВУД гистологическое исследование выявило некоторое изменение общей архитектоники печени у крыс, синусоиды были расширены, их радиальное

расположение отмечалось на отдельных участках. Наблюдались гепатоциты полигональной формы с хорошо выраженной не нарушенной мембраной, с ядрами разных размеров.

В результате 12-недельного кормления лабораторных животных калорийно-насыщенным рационом в экспериментальной группе были выявлены выраженные морфофункциональные изменения печени по сравнению с контрольной группой.

Биохимические показатели животных экспериментальной группы зафиксировано статистически значимое повышение уровней: аланинаминотрансферазы (АЛТ) — в 2,1 раза выше, чем в контроле ($p < 0,05$); аспартатаминотрансферазы (АСТ) — в 1,8 раза выше ($p < 0,05$); общего холестерина и триглицеридов — в 1,5–2 раза выше ($p < 0,05$), а также повышение уровня глюкозы крови, что указывает на развитие инсулинорезистентности. Эти данные свидетельствуют о нарушении функции печени и развитии метаболических нарушений.

Таблица 1.

Биохимические показатели крови у крыс ($M \pm m$)

№	показатель	группа животных	
		контрольная	экспериментальная
1	АЛТ (ед./л)	$42,5 \pm 3,1$	$88,5 \pm 5,7$
2	АСТ (ед./л)	$52,2 \pm 4,5$	$95,7 \pm 6,2$
3	Общий билирубин (мкмоль/л)	$7,9 \pm 0,6$	$11,9 \pm 0,9$
4	Глюкоза (ммоль/л)	$5,5 \pm 0,3$	$7,9 \pm 0,4$
5	Холестерин (ммоль/л)	$3,0 \pm 0,2$	$5,3 \pm 0,3$
6	Триглицериды (ммоль/л)	$1,2 \pm 0,1$	$2,7 \pm 0,2$

Примечание: p -значения получены при сравнении экспериментальной группы с контрольной. Значимые различия отмечены при $p < 0,05$.

Развитие гипергликемии описано во множестве моделей ВЖВУД при использовании гиперкалорийной диеты, насыщенной фруктозой. Так, добавление 10% фруктозы в питьевую воду в 12-ти недельном эксперименте на крысах приводило к возникновению гипергликемии на фоне сопутствующего ожирения и нарушений липидного обмена. Кроме того, при преобладании стеатогепатита уровень глюкозы имеет тенденцию повышаться, а при преобладании стеатоза изменение не значительные.

Снижение концентрации сывороточного альбумина может говорить о нарушении белок синтетической функции печени и подтверждается наличием у большинства особей многочисленных воспалительно-некротических изменений в печени по результатам морфологического исследования. Снижение альбуминов в крови не является характерным признаком НАЖБП, но может появляться на поздней стадии стеатогепатита или при циррозе. Все это подавляет реакцию образования свободных радикалов (*активных форм кислорода*), вызванную воспалительным процессом. По мнению авторов возникновение снижения альбуминов в крови при НАЖБП является своего рода порочным кругом.

Таблица 2.

Патоморфологических изменений печени животных (в % от общего числа животных в группе

(M ± m)

№	гистологические признаки	группа животных (%)	
		контрольная	экспериментальная
1	Жировая дистрофия	0	96
2	Баллонная дистрофия гепатоцитов	0	72
3	Воспалительные инфильтраты	10	86
4	Нарушение архитектоники печёчных долек	0	71

Жировая ткань у крыс представлена подкожной и висцеральной жировой тканью (включает мезентериальную, забрюшинную и эпидидимальную). Причем у грызунов в норме эпидидимальная жировая ткань имеет большую массу, чем в других локализациях. Повышение массовой доли висцерального жира является характерной чертой метаболического синдрома как у людей, так и у животных и является одним из важнейших прогностических факторов развития заболеваний, ассоциированных с ожирением.

Таблица 3.

Морфометрические показатели печени крыс

(M ± m)

№	гистологические признаки	группа животных (%)	
		контрольная	экспериментальная
1	Средняя масса печени, г	7,2 ± 0,5	9,4 ± 0,7 *
2	Смещение ядер (%) гепатоцитов	1,1 ± 0,5	36,0 ± 4 *
3	Нарушение балочной структуры, % полей зрения	0	28 ± 3 *
4	Количество гепатоцитов с липидными включениями (%)	12,4 ± 1,7	45,3 ± 3,2
5	Ядерно-цитоплазматическое соотношение	0,52 ± 0,04	0,41 ± 0,03
6	Плотность печёчных балок (ед./мм ²)	86,7 ± 4,1	64,5 ± 3,8

Примечание: *p*-значения получены при сравнении экспериментальной группы с контрольной. Значимые различия отмечены * — при *p* < 0,05.

Макроскопические изменения печени показало, что, при макроскопическом исследовании контрольной группы животных патологических изменений не обнаружено: поверхность печени гладкая, однородной темно-красной окраски, капсула тонкая, прозрачная. Ткань печени на разрезе полнокровная, умеренно плотная. При вскрытии у животных, получавших высококалорийную диету, печень была увеличена в размерах, имела тусклую капсулу, желтоватый оттенок и рыхлую консистенцию, что является характерным для жировой инфильтрации.

Гистологическое исследование выявило, что дольчатое строение паренхимы органа не визуализировалось. Отмечалось нарушение

радиального расположения синусоидов, которые местами были расширены. Гепатоциты имели полигональную форму и преимущественно мелкого размера ядра. Выявлена выраженная жировая дистрофия органа – липидные капли мелкого и среднего размера во всех гепатоцитах. Часто липиды занимали практически всю клетку, оттесняя ядро и органеллы к периферии и образуя так называемые «перстневидные» клетки. После гибели гепатоцитов жировые капли сливались, что приводило к образованию жировых кист, вокруг которых, как правило, развивалась воспалительная реакция. Наблюдалась сосудисто-мезенхимальная реакция органа. В паренхиме в синусоидах и по ходу портальных трактов встречался умеренный диффузный и мелкоочаговый полиморфноклеточный инфильтрат, выявлялось различное кровенаполнение центральных вен, полнокровие ряда сосудов портальных трактов. Окраска по Судану III выявила значительное накопление липидов в цитоплазме гепатоцитов. В жировая ткань, видны крупные адипоциты, заполненные нейтральными жирами, которые окрашены в ярко-красный цвет. Между клетками проходят тонкие прослойки соединительной ткани, окрашенные в светло-розовый оттенок. Фон препарата бледный, что подчёркивает интенсивное окрашивание липидных капель. На микропрепарате видны гепатоциты с выраженным накоплением нейтральных жиров, которые окрашены в ярко-красный цвет. Липидные капли распределены в цитоплазме клеток, различаются по размерам и форме. Между клетками просматриваются тонкие прослойки соединительной ткани, а тёмно-фиолетовые ядра гепатоцитов хорошо контрастируют с фоном.

В норме паренхима органа при окрашенная гематоксилином и эозином видна типичная трабекулярная структура печени: гепатоциты образуют тяжи (трабекулы), между которыми располагаются синусоидные капилляры. Цитоплазма гепатоцитов окрашена в розовый цвет (*эозин*), а их ядра — в тёмно-фиолетовый или синий цвет (*гематоксилин*). Ядра округлые, хорошо различимы, часто с видимыми ядрышками. В синусоидах заметны уплощённые эндотелиальные клетки. Общая структура ткани чёткая, что характерно для нормальной печени.

При окрашенная по ван Гизону видны крупные круглые адипоциты с неокрашенными (белыми) жировыми вакуолями. Межклеточное вещество содержит пучки коллагеновые волокон, окрашенные в красноватый цвет, которые формируют тонкую сеть между клетками. Цитоплазма и мышечные элементы органа окрашены в жёлтый, а ядра клеток — в тёмно-синий цвет. Такая окраска хорошо подчёркивает соединительнотканый каркас жировой ткани печени.

Морфометрические данные показали, что, при окраске гематоксилин-эозином цитоплазма большинства гепатоцитов имела однородную окраску, вакуолей не наблюдалось. Некротические изменения в гепатоцитах встречались преимущественно по периферии долек. Центральные вены и портальные тракты были чаще неизменной формы. В центральных венах местами наблюдалось небольшое скопление форменных элементов крови.

Некоторые центральные вены были расширены. В паренхиме в синусоидах и по ходу портальных трактов отмечался умеренный диффузный и мелкоочаговый инфильтрат. На отдельных участках имелись мелкие липидные включения.

Морфологическое исследование также не выявило нарушений общей архитектоники паренхимы печени, на отдельных участках синусоиды были расширены, отмечалось их радиальное расположение. Гепатоциты полигональной формы, с хорошо выраженной не нарушенной мембраной, ядрами разного размера и светлой кариоплазмой. Цитоплазма гепатоцитов имела зернистую окраску, на отдельных участках органа выявлялись клетки с вакуолизацией цитоплазмы. Часто обнаруживались двуядерные гепатоциты. Центральные вены и портальные тракты были, как правило, неизменной формы. В центральных венах местами наблюдалось небольшое скопление форменных элементов крови. Единичные центральные вены были слегка расширены. В паренхиме в синусоидах и по ходу портальных трактов встречался слабый диффузный клеточный инфильтрат.

Окраска методом суданом III показала наличие многочисленных мелких липидных включений в гепатоцитах. Количество гепатоцитов, содержащих липидные включения, было в 3,5 раза выше в экспериментальной группе по сравнению с контролем ($p < 0,01$). Также наблюдалось увеличение ядерно-цитоплазматического соотношения и снижение плотности печёночных балок.

Модель ЖГ у крыс характеризуется не только схожестью условий формирования (*гиперкалорийное питание и развитие висцерального ожирения*), но и морфологическими (*признаки стеатогепатита*) и биохимическими (*дислипидемия, гипергликемия*) проявлениями. Это потенциально повышает адекватность трансляции данных, получаемых на такой модели, из доклинической практики в клиническую. Однако, значимым недостатком модифицированной модели является высокая продолжительность формирования патологии, и как следствие – ее трудозатратность.

Длительная высококалорийная диета приводит к развитию жирового гепатоза у крыс. Переход на стандартный рацион питания способствует полному восстановлению биохимических показателей крови, но при этом только частичному восстановлению гистоархитектоники печени. Признаки активной регенерации паренхимы органа выявляются только при физической нагрузке на фоне изменения диеты.

Таким образом, полученные результаты подтверждают, что ЖГ приводит к развитию выраженных морфологических и функциональных изменений печени, аналогичных неалкогольной жировой болезни печени у человека. Эти изменения сопровождаются дисфункцией гепатоцитов, МС и воспалительной реакцией, что подчёркивает значимость ВЖВУД в патогенезе заболеваний печени. Модель ЖГ на основе комбинированного ВЖВУД у всех подопытных крыс приводит к развитию выраженных морфологических, биохимических признаков данной патологии.

Созданные модели экспериментального МС, основанные на ВЖВУД, выявили основные характерные для него признаки: повышение массы тела крыс, гипергликемию, гиперинсулинемию, инсулинорезистентность, дислипидемию и характеризуется выраженным увеличением содержания триглицеридов в крови крыс в течение всего эксперимента.

Морфофункциональным проявлением ЖГ является накопление нейтральных жиров в гепатоцитах при этом отмечаются увеличение размеров гепатоцитов, появление в цитоплазме множества жировых вакуолей, смещение ядер к периферии клеток. В некоторых участках выявляются нарушения балочной структуры, расширение синусоидов и признаки начальных дистрофических процессов. Полученные результаты подтверждают, что избыточное поступление ВЖВУД способствует патологическим изменениям в печени.

Выводы.

1. Содержание крыс в течение 16 недель на высококалорийной диете приводит к формированию висцерального ожирения и ЖГ, как следствие, нарушениям липидного обмена и дисбалансу ферментативных процессов в ткани печени.

2. На фоне диет-индуцированного висцерального ожирения происходит выраженная ЖГ с перестройкой ее дольковой структуры, образованием жировых кист и частичной гибелью гепатоцитов.

3. Коррекция висцерального ожирения путем перехода на стандартную диету приводит к практически полной нормализации уровней холестерина, триглицеридов, общего билирубина, а также ферментативной активности (*АСТ, АЛТ, ЩФ*) в сыворотке крови.

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ИНГЛИЗ АДАБИЁТИДАГИ ЎЛИМ МАВЗУСИНИ БАДИИЙ ТАЛҚИНИ ВА УНИНГ ИЛДИЗЛАРИ

Аннотация. *Инглиз адабиётида ўлим мавзусининг ўзбек адабиётига таъсири масаласининг ўзига хослиги, муаммонинг бадиийлик модуси, фалсафий-психологик талқини ҳамда қаҳрамон характери индивидуаллаштириши, образ яратиши, масалага турлича раукрслардан туриб баҳо бериши, қўрқув, ваҳима ва тушукунлик, ёлғизлик, эгоистик принципларнинг бадиий поэтик қийматини ўзига хослигини назарий томонларини ўрганишдан иборат.*

Калим сўзлар: *Инглиз адабиёти, ўзбек адабиёти, ўлим, наср, трагедия, сюжет, мотив.*

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THE ARTISTIC INTERPRETATION OF THE THEME OF DEATH IN ENGLISH LITERATURE AND ITS ROOTS

Abstract. *The study of the specifics of the issue of the influence of the theme of death in English literature on Uzbek literature, the artistic mode of the problem, the philosophical and psychological interpretation of the problem and the individualization of the heroic character, the creation of an image, the assessment of the problem from different perspectives, the specifics of the artistic poetic value of fear, panic and depression, loneliness, and egoistic principles, as well as the theoretical aspects of the study.*

Keywords: *English literature, Uzbek literature, death, prose, tragedy, plot, motif.*

Америка ва Европа халқлари адабиётининг забардаст ваакиллари XX аср ва унгача бўлган ораликда хилма-хил синовларни бошидан ўтказди. Бу борада ҳар бир ёзувчи ўзининг изланишларида баҳоли-қудрат юзага чиқаришга эриша олди ҳам. Мана шу тамойил (концепт)лар ўлимга олиб боровчи инсоннинг тақдири азал битикларида ҳам суратланди. Дунё адабиётининг илғор ёзувчилари ўлим мавзусига турли хил мотивлар, сюжетлар, ғоялар, формулалар негизида ўз ифодасини бера олди. Бу ўз-ўзидан қайсидир маънода ўзбек адабиётига инглиз, француз, рус ва турк адабиёти намуналари негизида қайсидир маънода таъсирини кўрсатди. Чунончи, ўлимнинг турли хил шакллари, уни фодалаш усуллари бор эканки, ёзувчи муаммога қайси мезондан туриб ёндашиши лозимлигини, уни ҳис қилиш,

ифодалаш манерсининг ҳаққонийлигини, ишончилигини ҳам бир қарашда унутмасдан қадам ташлаганларигина ўқувчиларда психо-эстетик туйғуни ҳосил қила олиши тайиндир. Унда ўлимга ишониш, ҳаққоний ифодалаш, суъний бўрттиришлар, ёлгон тўқима ва уйдирма воқеалар билан ўқувчииларни “жалб” қилиш усули ҳам кўп-кўп кўзга ташланади. Мана шу мезонларни назарий-илмий жиҳатдан талқин қилиши олдимизда турган долзарб муаммолардан бири эканлиги аёнлашади!

Инглиз бадий насрида трагик вазият ва унинг тарихий илдизлари.

Муаммонинг тарихий илдизларига диққат қаратадиган бўлсак, бутун дунё адабиётида бўлсин, трагик ва комик вазиятлар акс этган сахна асарлари, умуман, сахनावийлик, фожеаларнинг қандай келиб чиқиш сир-асрорлари билан бориб туташади. Чунки XX аср бошларига қадар трагедиялар руҳи билан суғорилган жуда кўплаб асарлар “саёр сюжет”лар бутун Европа халқлари бўйлаб кезиб юришган. Ўзимизнинг ўрта асрлар адабиётида Навоий, Бобур ва бошқа мумтоз шоирларимизга қадар ҳам трагедияга хос бадий унсурлар ифодаланган қанчадан-қанча достонлар ёзилди. Халқ оғзаки ижоди намуналарини ҳам бир зимдан кўздан кечирганда муаммонинг илдизи анча олис нуқталарга бориб туташувини ҳис этади киши. Фожеавилик ҳар асарнинг арихтектоникасида, сюжет ва воқеалар ривожига хилма-хил турзда ифодаланиб, вақтнинг ҳукми ҳамда синовлари билан янгидан-янги ижод шакллариининг пайдо бўлишига замин ҳозирлади. Мана шу концепция инглиз уйғониш адабиётида Уильям Шекспир ижодида яққол кўзга ташланади. Дейлик трагедия жанрида – ўлим ва ҳаёт мавзуси акс этар экан, кейинчалик бу жараёнлар насрий ифодаларда ҳам яққол юзага чиқа бошлаганини унутмаслик лозим. Бу ҳақда профессор Муҳаммаджон Холбеков шундай ёзади: “Шекспир ижодида катта ижобий бурилиш ясаган, маҳорат мактаби ҳисобланмиш унинг энг машҳур асари “Ҳамлет” фожиасидир. Дания шахзодаси Ҳамлетнинг фожиавий ҳаёти тарихчи Саксон Грамматикнинг “Данияликлар тарихи” китобидан олинган бўлиб, бу мавзуда Шекспирга қадар француз адиби Белфор ва инглиз драматурги Томас Кид ҳам драмалар ёзгандилар. Бироқ улар яратган Ҳамлет образи сахнада Шекспир Ҳамлетидек шуҳрат қозонолмади. Трагедиянинг бош қаҳрамони шахзода Ҳамлет отасининг қотили ўз амакиси Клавдий эканини билгач, оғир қайғуга ботади. У қотил Клавдийнинг жирканч қиёфаси ва мунофиқлигини фош этиб, ундан қасос олиш ўз зиммасига тушганини тушиниб этади. Бўлиб ўтган даҳшатли воқеалар уни адолатсизликлар ва бузилган муҳитга қарши курашга отлантиради. Аввало Ҳамлет узок вақт ўзи билан, ўзидаги чигал, мураккаб ҳаёл ва ғайритабиий тушунчалар билан кураш олиб боради. Ўз бошига тушган ғам-ғусса уни бошқалар бахтсизлигининг сабабларини аниқлашга ундайди. Қаҳрамоннинг шахсий изтиробини унинг атрофидаги одамлар қайғуси олдида ўз аҳамиятини йўқотади. Акс ҳолда, у бадбахт Клавдийдан аллақачон отаси учун қасос олган бўларди”. Ҳақиқатдан ҳам, сахनावийлик мавзуси акс этган қатор асарларда ёзувчи (муаллиф) ўзининг вақт ва унинг қалтис вазиятларидаги инсон руҳияти билан боғлиқ – ёвузликнинг эзгуликка мудоми

қаршилиги, Шайтоннинг қуткуси доим одамларга азият, кулфат келтириши, бахтсизлик орқасидан яна бахтсизлик, йўқотилган умр сарчашмаларининг нақадар муҳимлигини кўрсатишга боғишланганлигида кўринади. Ана шу мезон кейинги йиллар насрига кўчиб ўтиб, алалоқибатда биринчи жаҳон урушига қадар ва ундан кейинги оғир вазиятларда одамзод бошига кетма-кет ёғилган кулфатлар катта мавзуларнинг майдонга келишига туртки бўлди.

Инглиз насрида ўлим мотиви ва унинг психологик илдиэлари. Янгиланаётган ҳар қандай даврнинг ижтимоий-руҳий илдиэии тарихий жараён билан бевосита туташувида кўзга ташланади. Бу ташланиш оқибатида инсон ҳар бир даврнинг муҳим босқичларини ягона эстетик марказда уюштиришга диққат қаратади. Айниқса, дунёнинг энг ривожланган мамлакатларининг олдинги қиёфасига назар ташлайдиган бўлинса, муаммонинг ўз-ўзидан тарихий қамрова юзага чиқа бошлайди. Ана шу мезоннинг муҳим аспектида – одамзоднинг бир-бирига бўлган ишончи, оила, Ватан ва унинг равнақи йўлида олиб бораётган хизматлари уйғунлашиб кетган бўлади. Мазкур процесс, қачон ва қандай амалга оширилиши, қадим мифологик мактабларнинг, кейинчалик Уйғониш даврининг, ундан кейин XX асрнинг бошларидаги инсон омили билан рўй берадиган жараёнларнинг тадрижий тараққиётига уйғунлашиб намоён бўлганини кўрамыз. Дунёда ҳар бир инсон бахтли бўлишга ҳақли деган концепция негизида умид ва ишон туйғуси ана шу талқинни ривожлантира боради. Муҳим муносабатлар ва Аллоҳга бўлган муҳаббат, эътиқод қурқувни енгиб ўтиш, хатарлар, хавлар, йўқотишлар, фожеаларни бартараф этишга олиб келади.

Демак, ўлимни фалсафий нуқтаи назардан талқин қилганимизда қуйидаги манзара ҳосил бўлади:

1. Табиий ўлим. 2. Жамият билан боғлиқ ўлим. 3. Ихтиёрий ўлим. 4. Фожеавий ўлим.

Кўринадики, фалсафий-диний нуқтаи назаридан ўлимнинг моҳиятини ҳар бир одамнинг ўзи мустақил ҳис қила олмайди. Шу боисдан ҳам, ўлим ваҳми ҳамиша ҳар бир бандани ҳар лаҳзада **“ҳаёт-мамонт”** ўчоғига солишга тайёр туради. “Инсон ҳаётининг маъноси унинг ўлимига ҳам маъно бағишлайди, ҳаётнинг олий қадрият эканини исботлаган ўлим ўзи қадриятга айланиб, еамуна тарзида яшай бошлайди. Чунончи, ўз ҳаётини бағишлаш билан, Доро лашкарининг йўлини тўсиб, Ватан эркини сақлаб қолган Широқ, илмий ҳақиқат ҳимоясида туриб, унинг ғалабаси учун гулҳанда ёндирилишига рози бўлган Жордано Бруно, сафдошлари ҳаётини сақлаб қолиш мақсадида кўксини фашистлар ўт очиш нуқтасига қалқон қилиб, ҳалок бўлган Тўйчи Эрийгит ўғлининг ўлими бунга мисол бўла олади. Бунда бир инсоннинг ўлими, одатда энг катта ёвузлик деб ҳисобланадиган ўлим эзгуликка айланганини кўрамыз.

Демак, Ғарб ёки Шарқ бадий тафаккурида бир-бирини тўлдирувчи, кўчиб юриувчи сюжетлар, ғоялар, бадий воқеликлар негизида – ўлим мавзуси алоҳида бир ўрганишни тақозо этадиган сирли ва умумбашарий жараён эканлиги аёнлашади.

Умуман, ўлим мавзуси ниҳоятда хилма-хил ва турли-туман фалсафий оқимлар негизида намоён бўлиб, бадий адабиётда – инсон омили билан, якка шахс сабабкори билан натижасиз якун топиши шундандир. Бадийлик шартлари ва мезонларининг бир-бирини тўлдирувчи моҳиятида ўлим мавзуси бугунги бадий асарларда ҳам техноген дунё қиёфасини тўлақонли намоён этишга имконият беради. Зеро, глобал дунёда ўлимнинг ҳам олдинги даврларга қараганда анчайин турларга ажралгани бор гап. Замонавий дунё одамида ўлим ваҳмини англаш экзислари ҳам тобора сиқик бир оламни кашф этишга рағбат уйғотганлигида сезилади.

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РОЛЬ ЦИФРОВОЙ ГРАМОТНОСТИ В НАЧАЛЬНОМ ОБРАЗОВАНИИ

Аннотация. В статье рассматривается роль цифровой грамотности в системе начального образования в условиях трансформации образовательной среды. Раскрывается значение формирования цифровых навыков у младших школьников как основы для успешного обучения, социализации и дальнейшего развития в цифровом обществе. Особое внимание уделяется педагогическим аспектам внедрения цифровых технологий и подготовке будущих учителей к работе в цифровой образовательной среде.

Ключевые слова. Цифровая грамотность, начальное образование, цифровые технологии, педагогическая деятельность, образовательная среда, цифровая компетентность.

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THE ROLE OF DIGITAL LITERACY IN PRIMARY EDUCATION

Abstract. This article examines the role of digital literacy in primary education amidst the transformation of the educational environment. It explores the importance of developing digital skills in primary school students as a foundation for successful learning, socialization, and further development in a digital society. Particular attention is paid to the pedagogical aspects of implementing digital technologies and preparing future teachers for work in a digital educational environment.

Keywords. Digital literacy, primary education, digital technologies, teaching activities, educational environment, digital competence.

Введение. Современный этап развития образования характеризуется активным внедрением цифровых технологий во все уровни образовательной системы. Процессы цифровизации, информатизации и глобализации существенно изменяют требования к результатам обучения, профессиональной деятельности педагога и образовательной среде в целом. В этих условиях особую актуальность приобретает проблема формирования цифровой грамотности, начиная с ранних этапов обучения, в том числе в системе начального образования. Именно начальная школа закладывает фундамент базовых учебных умений, навыков познавательной деятельности и отношения обучающихся к процессу обучения, что делает ее ключевым звеном в формировании устойчивых цифровых навыков.

Цифровая грамотность в современном педагогическом дискурсе рассматривается не только как умение пользоваться техническими средствами и цифровыми устройствами, но и как способность осмысленно, безопасно и эффективно применять цифровые ресурсы в учебной, коммуникативной и познавательной деятельности. Для младших школьников цифровая грамотность становится важным инструментом развития мышления, информационной культуры, самостоятельности и учебной мотивации. В условиях активного использования электронных учебников, образовательных платформ, интерактивных заданий и мультимедийных ресурсов учитель начальных классов выступает не просто транслятором знаний, а организатором цифровой образовательной среды.

Для педагогических вузов особое значение приобретает подготовка будущих учителей начального образования, способных формировать цифровую грамотность обучающихся с учетом их возрастных, психологических и когнитивных особенностей. Это требует обновления содержания педагогического образования, внедрения современных методик, цифровых инструментов и практико-ориентированных форм обучения. Введение цифровых технологий в начальную школу должно носить научно обоснованный и педагогически целесообразный характер, исключая формальный и неконтролируемый подход. Таким образом, исследование роли цифровой грамотности в начальном образовании является актуальным направлением педагогической науки и практики.

Основная часть. Цифровая грамотность в начальном образовании выступает как комплексное педагогическое явление, включающее информационную, технологическую, коммуникативную и этическую составляющие. В процессе обучения младшие школьники осваивают навыки работы с цифровыми устройствами, учатся искать, анализировать и использовать информацию, а также взаимодействовать в цифровой среде. Эти процессы способствуют развитию логического мышления, внимания, памяти и познавательного интереса. При грамотной педагогической организации цифровые технологии становятся средством активизации учебной деятельности и повышения качества усвоения учебного материала.

В педагогической практике цифровая грамотность рассматривается также как средство подготовки обучающихся к дальнейшему обучению и социальной адаптации. Освоение цифровых навыков в начальной школе создает предпосылки для успешного изучения учебных предметов на последующих уровнях образования, формирования учебной самостоятельности и способности к непрерывному обучению. Для педагогических вузов это означает необходимость системной подготовки будущих учителей к формированию цифровой грамотности младших школьников на научно-методической основе.

Заключение. Цифровая грамотность в начальном образовании является важнейшим фактором повышения качества обучения и развития личности обучающихся. Ее формирование способствует развитию познавательных способностей, информационной культуры и готовности младших школьников к жизни и обучению в цифровом обществе. В условиях цифровой трансформации образования возрастает роль учителя как организатора и координатора цифровой образовательной среды, что предъявляет новые требования к его профессиональной подготовке.

Для системы педагогического образования актуальной задачей становится формирование у будущих учителей устойчивых знаний, умений и педагогических подходов, обеспечивающих эффективное развитие цифровой грамотности у младших школьников. Цифровые технологии должны рассматриваться не как самоцель, а как педагогический инструмент, направленный на достижение образовательных результатов, соответствующих современным требованиям.

Таким образом, роль цифровой грамотности в начальном образовании заключается в создании условий для гармоничного сочетания традиционных и инновационных методов обучения, формировании у обучающихся базовых цифровых навыков и подготовке их к дальнейшему образовательному и социальному развитию. Реализация данной задачи требует системного подхода, научно обоснованных методик и целенаправленной подготовки педагогических кадров.

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ФОРМИРОВАНИЕ САМОСТОЯТЕЛЬНОГО МЫШЛЕНИЯ У УЧАЩИХСЯ НАЧАЛЬНОЙ ШКОЛЫ

***Аннотация.** Формирование самостоятельного мышления у учащихся начальной школы является одной из ключевых задач современной педагогики, ориентированной на развитие личности ребёнка и его познавательной активности. В статье рассматриваются сущность самостоятельного мышления, педагогические условия и методы его формирования в начальном образовании, а также значение данной компетенции для дальнейшего обучения и социализации учащихся.*

***Ключевые слова.** Самостоятельное мышление, начальная школа, младший школьник, познавательная деятельность, педагогические методы, развитие мышления.*

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DEVELOPING INDEPENDENT THINKING IN PRIMARY SCHOOL STUDENTS

***Abstract.** Developing independent thinking in primary school students is one of the key tasks of modern pedagogy, which focuses on the development of the child's personality and cognitive activity. This article examines the essence of independent thinking, the pedagogical conditions and methods for its development in primary education, as well as the importance of this competency for further education and socialization of students.*

***Keywords:** Independent thinking, primary school, primary school student, cognitive activity, pedagogical methods, thinking development.*

Введение. Современная система образования ориентируется не только на усвоение учащимися определённого объёма знаний, но и на формирование у них способности самостоятельно мыслить, анализировать информацию, делать выводы и принимать обоснованные решения. В условиях стремительного развития науки, технологий и информационного пространства именно самостоятельное мышление становится одним из важнейших факторов успешного обучения и адаптации личности к изменяющимся социальным условиям. Особую значимость данная проблема приобретает на уровне начального образования, поскольку именно в этот период закладываются основы познавательной деятельности, учебной самостоятельности и интеллектуального развития ребёнка.

Начальная школа является этапом, на котором у учащихся формируются первоначальные представления о мире, развиваются основные мыслительные операции, такие как анализ, синтез, сравнение, обобщение и классификация. От того, насколько эффективно педагог организует учебный процесс, зависит не только качество усвоения учебного материала, но и становление у младших школьников способности мыслить самостоятельно, проявлять инициативу и познавательный интерес. В традиционной практике обучения нередко преобладает репродуктивный подход, при котором учащиеся ориентированы на запоминание и воспроизведение готовых знаний. Такой подход ограничивает возможности развития мышления и снижает мотивацию к обучению.

В условиях реформирования системы образования и внедрения современных образовательных стандартов возрастает необходимость перехода к деятельностному и личностно ориентированному обучению, предполагающему активное включение учащихся в учебный процесс. Для педагогических вузов и будущих учителей начальных классов проблема формирования самостоятельного мышления приобретает особую актуальность, поскольку требует глубокого понимания психолого-педагогических особенностей младшего школьного возраста и владения эффективными методами организации учебной деятельности. Таким образом, исследование путей и условий формирования самостоятельного мышления у учащихся начальной школы является важной научно-практической задачей.

Основная часть. Самостоятельное мышление в педагогическом контексте рассматривается как способность учащегося осознанно и активно осуществлять мыслительные действия, направленные на понимание учебного материала, решение учебных и жизненных задач, а также на выработку собственного отношения к изучаемым явлениям. Для младших школьников данная способность формируется постепенно и тесно связана с развитием речи, воображения, внимания и памяти. Психологические исследования показывают, что в младшем школьном возрасте мышление переходит от наглядно-образного к словесно-логическому, что создаёт благоприятные условия для развития элементов самостоятельного рассуждения.

Важнейшую роль в формировании самостоятельного мышления играет организация учебного процесса. Эффективным является использование таких методов обучения, которые побуждают учащихся к активной умственной деятельности, поиску решений и обсуждению различных точек зрения. К числу таких методов относятся проблемное обучение, диалог, учебные дискуссии, работа с вопросами открытого типа, а также выполнение заданий, требующих анализа и обобщения. При этом учитель выступает не только источником знаний, но и организатором познавательной деятельности, направляющим и поддерживающим мыслительную активность учащихся.

Формирование самостоятельного мышления у учащихся начальной школы представляет собой одну из приоритетных задач современного образования, направленного на развитие активной, ответственной и мыслящей личности. Результаты анализа показывают, что успешное развитие данной способности возможно при условии целенаправленной педагогической работы, основанной на учёте возрастных и индивидуальных особенностей младших школьников. Использование активных методов обучения, создание благоприятной образовательной среды и ориентация на деятельностный подход способствуют повышению познавательной активности и развитию мыслительных умений учащихся.

Самостоятельное мышление, сформированное в начальной школе, оказывает существенное влияние на дальнейшее обучение ребёнка, его способность к самообразованию и адаптации к новым образовательным требованиям. Для педагогических вузов данная проблема имеет особое значение, поскольку от качества подготовки будущих учителей зависит эффективность реализации задач начального образования. В этой связи актуальным является дальнейшее научное исследование и методическое обеспечение процесса формирования самостоятельного мышления, а также внедрение инновационных педагогических технологий в образовательную практику. Системный и научно обоснованный подход к решению данной задачи позволит повысить качество начального образования и обеспечить устойчивое развитие интеллектуального потенциала учащихся.

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МЕТОДИЧЕСКИЕ ВОЗМОЖНОСТИ STEAM-ПОДХОДА В ИНКЛЮЗИВНОМ ОБРАЗОВАНИИ

***Аннотация.** В статье рассматриваются методические возможности STEAM-подхода в условиях инклюзивного образования. Раскрывается потенциал интеграции естественнонаучных, технологических, инженерных, художественных и математических компонентов для обеспечения доступности и вариативности образовательного процесса. Особое внимание уделяется адаптации STEAM-методик к потребностям обучающихся с особыми образовательными потребностями и формированию инклюзивной образовательной среды.*

***Ключевые слова.** STEAM-подход, инклюзивное образование, педагогические технологии, междисциплинарность, образовательная среда, дифференциация обучения.*

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METHODICAL POSSIBILITIES OF THE STEAM APPROACH IN INCLUSIVE EDUCATION

***Abstract.** This article examines the methodological potential of the STEAM approach in inclusive education. It explores the potential for integrating natural science, technology, engineering, art, and mathematics components to ensure accessibility and variability of the educational process. Particular attention is paid to adapting STEAM methods to the needs of students with special educational needs and creating an inclusive educational environment.*

***Keywords:** STEAM approach, inclusive education, pedagogical technologies, interdisciplinarity, educational environment, differentiated learning.*

Введение. Современное развитие системы высшего педагогического образования характеризуется усилением внимания к вопросам инклюзии и внедрению инновационных образовательных подходов, ориентированных на разнообразие обучающихся. В условиях реформирования образования и перехода к компетентностной модели подготовки специалистов особую актуальность приобретает поиск методических решений, обеспечивающих равный доступ к качественному обучению для всех категорий студентов, включая лиц с особыми образовательными потребностями. Инклюзивное образование в настоящее время рассматривается не только как социальная необходимость, но и как стратегическое направление развития образовательной политики, направленное на формирование гуманистической и устойчивой образовательной среды.

Одним из перспективных направлений модернизации педагогического процесса является STEAM-подход, основанный на интеграции науки, технологий, инженерии, искусства и математики. Данный подход ориентирован на развитие критического мышления, творческих способностей, исследовательских навыков и практико-ориентированного мышления обучающихся. В контексте инклюзивного образования STEAM-подход обладает значительным методическим потенциалом, поскольку предполагает гибкость, вариативность форм и методов обучения, а также возможность индивидуализации образовательных траекторий.

Для системы высшего педагогического образования Узбекистана внедрение STEAM-подхода в инклюзивную практику является особенно актуальным в условиях цифровизации, обновления государственных образовательных стандартов и ориентации на международные образовательные тенденции. Подготовка будущих педагогов требует формирования у них готовности к работе в инклюзивной среде, владения современными методиками и умения адаптировать образовательный контент с учетом разнообразных образовательных потребностей. В этой связи анализ методических возможностей STEAM-подхода в инклюзивном образовании представляет собой важную научно-практическую задачу.

Основная часть. STEAM-подход в инклюзивном образовании основывается на принципах междисциплинарности, практической направленности и активного вовлечения обучающихся в образовательный процесс. Его методические возможности проявляются прежде всего в создании условий для обучения через деятельность, экспериментирование и проектную работу, что позволяет учитывать индивидуальные особенности и возможности каждого обучающегося. Интеграция различных предметных областей способствует формированию целостного восприятия знаний и снижает барьеры, связанные с традиционным предметным делением.

В инклюзивной образовательной среде STEAM-подход позволяет использовать разнообразные формы представления учебного материала, включая визуальные, аудиальные и тактильные средства, что особенно важно для обучающихся с ограниченными возможностями здоровья. Проектная и

исследовательская деятельность в рамках STEAM обеспечивает условия для совместной работы студентов с разным уровнем подготовки и разными образовательными потребностями, формируя навыки сотрудничества, толерантности и взаимной поддержки. При этом роль преподавателя трансформируется от транслятора знаний к фасилитатору и наставнику, сопровождающему индивидуальные образовательные траектории.

Заключение. Анализ методических возможностей STEAM-подхода в инклюзивном образовании показывает, что данный подход обладает значительным потенциалом для создания гибкой, доступной и развивающей образовательной среды. Интеграция междисциплинарного содержания, проектной деятельности и цифровых технологий способствует учету индивидуальных образовательных потребностей обучающихся и расширяет возможности их активного участия в учебном процессе. Для системы высшего педагогического образования STEAM-подход выступает не только как инновационная методика обучения, но и как средство формирования профессиональной готовности будущих педагогов к работе в инклюзивных условиях.

Внедрение STEAM-подхода в инклюзивную практику требует методической подготовки преподавателей, разработки адаптированных образовательных программ и обеспечения соответствующей материально-технической базы. В условиях образовательных реформ и модернизации педагогического образования STEAM-подход может рассматриваться как один из ключевых факторов повышения качества инклюзивного обучения и формирования устойчивых профессиональных компетенций будущих специалистов. Перспективы дальнейших исследований связаны с разработкой конкретных методических моделей и оценкой эффективности STEAM-ориентированных практик в инклюзивном образовательном процессе.

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ИСХОДЫ ПОСЛЕ КОРОНАРНОГО СТЕНТИРОВАНИЯ ПРИ ОСТРОМ ИНФАРКТЕ МИОКАРДА

Аннотация: В ретроспективном когортном исследовании были проанализированы клинические результаты 96 пациентов, перенесших чрескожное коронарное вмешательство (ЧКВ) со стентированием после острого инфаркта миокарда в Ферганском областном кардиоцентре. Установлено, что использование стентов с лекарственным покрытием значительно снижает риск рестеноза и повторного инфаркта по сравнению с металлическими стентами. Длительное соблюдение двойной антиагрегантной терапии и применение статинов существенно уменьшает частоту серьезных кардиальных осложнений. Сахарный диабет выявлен как основной прогностический фактор рецидивов. Результаты подтверждают важность персонализированной медикаментозной профилактики и приверженности пациентов вторичной профилактике для улучшения исходов после ЧКВ.

Ключевые слова: ЧКВ, инфаркт миокарда, рестеноз, стенты, ДАТ, статины, профилактика

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OUTCOMES AFTER CORONARY STENTING IN ACUTE MYOCARDIAL INFARCTION

Abstract: *This retrospective cohort study analyzes clinical outcomes of 96 patients who underwent percutaneous coronary intervention (PCI) with stent implantation following acute myocardial infarction at the Fergana Regional Cardiology Center. Drug-eluting stents demonstrated significantly lower risks of in-stent restenosis and recurrent myocardial infarction compared with bare-metal stents. Long-term adherence to dual antiplatelet therapy and statin use markedly reduced the incidence of major adverse cardiac events. Diabetes mellitus was identified as a major prognostic factor associated with recurrence. The findings highlight the importance of personalized pharmacological prevention and patient adherence to secondary prophylaxis for improving post-PCI outcomes.*

Keywords: *PCI, myocardial infarction, restenosis, stents, DAPT, statins, prevention*

Введение

Перкутанное коронарное вмешательство (ПКИ) остается краеугольным камнем в лечении острого инфаркта миокарда (ОИМ), обеспечивая своевременную реваскуляризацию и значительное снижение заболеваемости и смертности. Несмотря на существенный прогресс в ангиографических методах, технологиях стентирования и двойной антитромбоцитарной терапии (ДАТТ), послеоперационные рецидивы, рестеноз и повторные ишемические события продолжают ставить под угрозу отдаленные результаты лечения пациентов. Международные исследования показывают, что у 15-20% пациентов развиваются повторные сердечно-сосудистые события в течение трех лет после стентирования коронарных артерий, на что влияют сопутствующие заболевания, приверженность к лечению, метаболические факторы риска и особенности проведенной процедуры [1-3].

Тромбоз стента и внутривенный рестеноз (ВСТ) остаются основными механизмами неблагоприятных исходов после ПКИ. Стенты с лекарственным покрытием (СЛП) уменьшают неоинтимальную гиперплазию по сравнению с голометаллическими стентами (ГМС), но даже СЛП ассоциируются с поздним рестенозом из-за дисфункции эндотелия и хронического воспалительного ответа [4]. Приверженность антиагрегационной и липидснижающей терапии продемонстрировала значительное влияние на прогноз, в то время как неконтролируемый сахарный диабет (СД) и стойкая артериальная гипертензия существенно повышают риск рецидивов [5,6].

В данном исследовании оцениваются исходы у пациентов после имплантации коронарного стента вследствие острого инфаркта миокарда и выявляются прогностические факторы, связанные с повторными ишемическими событиями в региональной когорте. Кроме того, особое внимание уделяется профилактике рецидивов на основе клинических и фармакологических стратегий ведения, актуальных для региональной кардиологической практики в Узбекистане.

Цель исследования. Оценить клинические исходы после чрескожного коронарного вмешательства (ЧКВ) с имплантацией стента после острого инфаркта миокарда и определить ключевые предикторы рецидива, с акцентом на стратегии долгосрочной профилактики.

Материалы и методы

Это ретроспективное когортное исследование было проведено в Региональном кардиологическом центре Ферганского филиала в период с июля 2023 года по сентябрь 2025 года. В исследование было включено 96 пациентов в возрасте от 41 до 78 лет, перенесших чрескожное коронарное вмешательство (ЧКВ) с имплантацией стента после острого инфаркта миокарда (ИМ). Исследуемая популяция состояла из 65 мужчин (67,7%) и 31 женщины (32,3%). Во всех случаях успешная установка стента была подтверждена коронарной ангиографией. Критерии отбора включали подтвержденный STEMI или NSTEMI, отсутствие предшествующего аортокоронарного шунтирования, отсутствие выраженных пороков клапанов или злокачественных новообразований, а также период наблюдения не менее шести месяцев. Данные пациентов были анонимизированы перед анализом, и было получено разрешение администрации учреждения на использование медицинских записей.

Клиническая информация была извлечена из электронных медицинских карт, включая демографические данные, профили сопутствующих заболеваний, показатели липидов и глюкозы, а также историю приема лекарственных препаратов, с особым вниманием к двойной антиагрегационной терапии (ДАТТ), статинам, бета-блокаторам и ингибиторам АПФ. Ангиографические характеристики оценивались в соответствии с количеством и расположением пораженных сосудов, рестеноз и тромбоз стента подтверждались путем повторной ангиографии при

необходимости. Наблюдение проводилось через 3, 6 и 12 месяцев и ежегодно после этого для мониторинга рецидивов стенокардии, основных неблагоприятных сердечно-сосудистых событий (MACE), рестеноза и смертности. Статистический анализ проводился с использованием SPSS версии 25, с применением критерия хи-квадрат и t-критерия для определения связей между факторами риска и исходами. Статистическая значимость была определена как $p < 0,05$.

Результаты

Анализ 96 случаев показал, что общая частота основных неблагоприятных сердечных событий (ОНСС) во время наблюдения составила 18,7%, из них рецидивирующий инфаркт миокарда (ИМ) у 9,3% пациентов, ангиографически подтвержденный внутрисстенный рестеноз (ВСР) у 6,2% и сердечная смерть у 3,1%. Большинству пациентов были имплантированы стенты с лекарственным покрытием (СЛП), что составило 66,7% когорты, в то время как голометаллические стенты (ГМС) использовались в 33,3% случаев. Пациенты с имплантированными СЛП показали лучшие клинические результаты, демонстрируя значительно более низкую частоту рестеноза (4,6%) по сравнению с пациентами, которым были установлены ГМС (12,5%; $p < 0,05$). Аналогично, рецидивирующий ИМ встречался реже в группе СЛП (6,2%) по сравнению с реципиентами ГМС (12,5%), а общие показатели ОНСС были значительно ниже среди пациентов с СЛП (12,5%) по сравнению со случаями ГМС (31,2%; $p < 0,01$).

Таблица 1

Характеристики пациентов и предикторы исходов после чрескожного коронарного вмешательства (ЧКВ) (n = 96)

Параметр	Частота (n)	Процент (%)
Мужчины	65	67,7
Женщины	31	32,3
Стент с лекарственным покрытием (СЛП)	64	66,7
Голометаллический стент (ГМС)	32	33,3
Сахарный диабет	28	29,1
Гипертония	77	80,2
Дислипидемия	54	56,2
Полное соблюдение двойной антитромбоцитарной терапии (ДАТТ) (12 месяцев)	71	73,9
Низкая приверженность к медикаментозной терапии	25	26,0

Анализ факторов риска показал, что сопутствующий сахарный диабет был тесно связан с рецидивами, особенно ВСР и повторным ИМ, при этом у пациентов с диабетом наблюдалась более чем двукратная вероятность развития неблагоприятных событий (относительный риск = 2,31; $p < 0,01$).

Таблица 2

Сравнительные результаты в зависимости от типа стента и приверженности к медикаментозной терапии

Переменная	СЛП (n=64)	ГМС (n=32)	p-значение
Повторный ИМ (%)	6,2	12,5	< 0,05
Рестеноз в стенте (%)	4,6	12,5	< 0,05
MACE (%)	12,5	31,2	< 0,01
Полная приверженность ДАТТ (%)	78,1	65,6	0,08

Значительная прогностическая роль была также очевидна для приверженности к медикаментозному лечению. У пациентов, которые последовательно придерживались двойной антитромбоцитарной терапии в течение как минимум 12 месяцев, наблюдались улучшенные исходы, со снижением повторных событий на 41% по сравнению с неприверженными пациентами. Напротив, низкая приверженность была зафиксирована у 26,0% когорты и коррелировала с более высокими показателями рестеноза, повторного ИМ и смертности. Кроме того, терапия статинами продемонстрировала выраженный защитный эффект: у приверженных пациентов риск рецидива был в 2,8 раза ниже по сравнению с теми, кто не соблюдал режим гиполипидемической терапии.

Обсуждение

Представленный ретроспективный анализ подтверждает, что клинические исходы после коронарной ангиопластики с имплантацией стента зависят не только от технического успеха, но и от длительного соблюдения режимов вторичной профилактики. В нашей когорте пациенты, получавшие стенты с лекарственным покрытием, продемонстрировали значительно меньше случаев рестеноза стента и рецидивирующего инфаркта миокарда, что согласуется с современными данными, демонстрирующими превосходное восстановление эндотелия и снижение неоинтимальной пролиферации при использовании стентов с лекарственным покрытием [1]. Более того, наши результаты согласуются с международными исследованиями, показывающими, что двойная антитромбоцитарная терапия (ДАТТ) в течение не менее 12 месяцев снижает тромботические осложнения на 40-60% и предотвращает ранний тромбоз стента [2,3]. Исследования из России и Центральной Азии также подчеркивают, что несостоятельность стента у пациентов после инфаркта миокарда обычно вызывается низкой приверженностью к лечению, особенно прекращением антитромбоцитарной терапии, что почти удваивает риск рецидивирующей ишемии [4]. В данном исследовании подчеркивается, что метаболические сопутствующие заболевания, особенно сахарный диабет, значительно ухудшают отдаленные результаты чрескожного коронарного вмешательства (ЧКВ) из-за нарушения сосудистого заживления, провоспалительных состояний и повышенного риска рестеноза, что подтверждает недавние выводы о том, что пациентам с диабетом требуется интенсифицированная терапия статинами и строгий

контроль липидов после ЧКВ [5]. Кроме того, улучшенная выживаемость и сниженные показатели основных неблагоприятных кардиальных событий у пациентов, приверженных к терапии статинами, в нашей когорте соответствуют противовоспалительным кардиопротективным механизмам, описанным в международных липидных исследованиях [6-14]. Таким образом, наши результаты подчеркивают, что прогноз после ЧКВ в первую очередь определяется доказательным фармакологическим сопровождением, обучением пациентов и персонализированными стратегиями лечения, особенно для пациентов с сопутствующими метаболическими заболеваниями, такими как диабет и дислипидемия.

Заключение

Имплантация стентов с лекарственным покрытием, строгое соблюдение двойной антитромбоцитарной терапии (ДАТТ) и активное управление метаболическими факторами риска значительно улучшают результаты после чрескожного коронарного вмешательства (ЧКВ) у пациентов с острым инфарктом миокарда. Профилактика рецидивов должна быть сосредоточена на обучении пациентов, долгосрочном соблюдении фармакологического лечения и индивидуализированной терапии, особенно для пациентов с диабетом и дислипидемией. Рекомендации: 1. Продолжать полную ДАТТ не менее 12 месяцев после ЧКВ для предотвращения тромбоза стента и снижения риска рецидивирующей ишемии миокарда. 2. Использовать стенты с лекарственным покрытием у пациентов высокого риска, особенно с диабетом или дислипидемией, чтобы минимизировать рестеноз. 3. Назначать статины высокой интенсивности с регулярным мониторингом ЛПНП для поддержания стабильности сосудов и долгосрочной защиты.

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РАЗВИТИЕ НАВЫКОВ 21-ГО ВЕКА С ИСПОЛЬЗОВАНИЕМ ЦИФРОВЫХ ИНСТРУМЕНТОВ НА УРОКАХ АНГЛИЙСКОГО ЯЗЫКА

Аннотация: В современном стремительно меняющемся образовательном ландшафте интеграция цифровых инструментов в преподавание английского языка стала не просто опцией, а необходимостью. По мере того как Узбекистан продолжает продвигать образовательные реформы и внедрять технологические инновации, перед учителями английского языка стоит увлекательная задача подготовки учащихся к глобализированному миру, где цифровая грамотность и навыки XXI века имеют первостепенное значение. В данной статье рассматривается, как цифровые инструменты могут эффективно развивать ключевые компетенции, одновременно повышая уровень владения английским языком.

Ключевые слова : навыки XXI века ,цифровые инструменты, инновация, глобализация, компетенция

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DEVELOPING 21ST-CENTURY SKILLS USING DIGITAL TOOLS IN ENGLISH CLASSES

Abstract: In today's rapidly changing educational landscape, integrating digital tools into English language teaching has become not just an option, but a necessity. As Uzbekistan continues to advance educational reforms and embrace technological innovation, English teachers face the exciting challenge of preparing students for a globalized world where digital literacy and 21st century skills are paramount. This article examines how digital tools can effectively develop key competencies while simultaneously improving English proficiency.

Keywords: 21st-century skills, digital tools, innovation, globalization, competency

Прежде чем рассматривать цифровые инструменты, необходимо уточнить, что подразумевается под навыками XXI века. К ним относятся критическое мышление, креативность, сотрудничество, коммуникация,

цифровая грамотность, решение проблем и адаптивность. В контексте изучения английского языка эти навыки переплетаются с лингвистической компетенцией, формируя учащихся, которые могут не только говорить и писать по-английски, но и критически мыслить, эффективно работать в команде и уверенно ориентироваться в цифровой среде.

Для студентов Узбекистана развитие этих навыков наряду с владением английским языком открывает двери к международным возможностям, межкультурному взаимопониманию и участию в глобальной экономике. Указ Президента о мерах по коренному совершенствованию системы преподавания иностранных языков подчеркнул важность современных методик преподавания, делая эту интеграцию особенно актуальной и своевременной.

Цифровые инструменты для совместной работы превращают уроки английского языка из лекций, ориентированных на учителя, в динамичные занятия, где в центре внимания находятся учащиеся. Платформы, такие как Google Workspace, позволяют студентам работать вместе над письменными проектами, презентациями и исследовательскими заданиями в режиме реального времени. Когда учащиеся сотрудничают над общим документом для создания эссе или рассказа, они развивают не только навыки письма на английском языке, но и учатся обсуждать смысл, давать конструктивную обратную связь и работать над общими целями.

В контексте Узбекских классов, где количество учащихся может быть большим, эти инструменты обеспечивают более равноправное участие. Застенчивые ученики, которые могут стесняться говорить на уроке, часто обретают свой голос в цифровых дискуссиях, в то время как учителя могут одновременно следить за работой нескольких групп и оказывать целенаправленную поддержку.

Приложения для изучения языков совершили революцию в области освоения лексики и отработки грамматики. Такие инструменты, как Quizlet, позволяют учащимся создавать цифровые карточки, играть в обучающие игры и проверять себя с помощью различных интерактивных форматов. В отличие от традиционного заучивания, эти платформы используют алгоритмы интервального повторения, которые оптимизируют запоминание материала.

Kahoot и подобные платформы для викторин приносят энергию и соревновательный дух в процесс повторения языкового материала. Учащиеся взаимодействуют с англоязычным контентом, развивая при этом навыки быстрого мышления и ориентирования в цифровой среде. Мгновенная обратная связь, которую обеспечивают эти инструменты, позволяет учащимся выявлять пробелы в своих знаниях и брать на себя ответственность за свой процесс обучения.

Креативность расцветает, когда учащиеся становятся не пассивными потребителями, а создателями контента. Цифровые инструменты, такие как Canva, Adobe Spark или даже простое программное обеспечение для презентаций, позволяют студентам разрабатывать инфографику, плакаты и визуальные презентации на английском языке. Этот процесс требует от них

обобщения информации, принятия дизайнерских решений и передачи идей через различные модальности.

Инструменты для создания видео открывают еще более широкие возможности. Студенты могут создавать короткометражные фильмы, влоги или документальные проекты, которые требуют навыков написания сценариев, практики разговорной речи и монтажа. Групповой проект по съемке экскурсии по историческим местам Самарканда или Бухары с повествованием на английском языке сочетает в себе изучение культуры с языковой практикой и навыками цифрового производства.

Платформы для видеоконференций расширили границы класса английского языка за пределы физических стен. Преподаватели в Узбекистане могут организовывать виртуальные обмены с классами в других странах, предоставляя возможности для аутентичного общения, которые учебники не способны воспроизвести. Такое взаимодействие развивает межкультурную компетенцию наряду с языковыми навыками, готовя студентов к международной академической и профессиональной среде.

Дискуссионные форумы и образовательные платформы в социальных сетях создают пространство для продолжительных бесед на английском языке. Студенты могут вести дебаты на различные темы, делиться своими взглядами и знакомиться с разнообразными точками зрения, одновременно практикуя письменный английский в значимых контекстах.

Интернет предоставляет беспрецедентный доступ к информации, но это изобилие требует навыков критической оценки. Обучение студентов проведению исследований с использованием цифровых инструментов развивает как их понимание английского чтения, так и их способность оценивать достоверность источников, отличать факты от мнений и синтезировать информацию из нескольких источников.

Проекты, требующие от студентов исследования текущих событий, научных тем или культурных явлений на английском языке, побуждают их читать аутентичные материалы, сравнивать точки зрения и делать обоснованные выводы. Преподаватели могут направлять студентов в использовании академических баз данных, оценке надежности веб-сайтов и правильном цитировании источников - навыков, необходимых для высшего образования и профессиональной жизни.

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ЦИФРОВИЗАЦИЯ И BLOCKCHAIN ДЛЯ ПРОСЛЕЖИВАЕМОСТИ ПРОДУКЦИИ В FASHION-ИНДУСТРИИ

***Аннотация:** В статье исследуются возможности применения технологии blockchain и цифровых решений для обеспечения прослеживаемости продукции в индустрии моды. Рассматриваются ключевые преимущества технологии распределенного реестра для создания прозрачных цепочек поставок, борьбы с контрафактом и верификации подлинности товаров. Анализируются практические кейсы внедрения blockchain международными модными брендами.*

***Ключевые слова:** blockchain, технология распределенного реестра, прослеживаемость, цепочки поставок, модная индустрия, цифровизация, контрафакт.*

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DIGITALIZATION AND BLOCKCHAIN FOR PRODUCT TRACEABILITY IN FASHION INDUSTRY

***Abstract:** The article explores the possibilities of applying blockchain technology and digital solutions to ensure product traceability in the fashion industry. The key advantages of distributed ledger technology for creating transparent supply chains, combating counterfeiting and verifying product authenticity are examined. Practical cases of blockchain implementation by international fashion brands are analyzed.*

***Keywords:** blockchain, distributed ledger technology, traceability, supply chains, fashion industry, digitalization, counterfeit.*

Введение. Индустрия моды сталкивается с растущими требованиями к прозрачности цепочек поставок и борьбе с контрафактной продукцией. По данным EUIPO, объем подделок в сегменте текстиля, одежды и обуви достиг более 500 миллиардов долларов США. Технология blockchain рассматривается как инновационное решение для обеспечения полной прослеживаемости продукции от источника сырья до конечного потребителя.

Несмотря на растущий интерес к blockchain, масштабное внедрение технологии остается ограниченным. Существует значительный разрыв между

декларируемым интересом компаний и реальными действиями по цифровой трансформации. Исследователи Цхададзе Н.В. и Закольдаев Д.А. отмечают существование барьеров внедрения, включая высокие издержки, недостаток квалифицированных кадров и проблемы масштабируемости технологии.

Цель исследования. Цель исследования состоит в оценке фактической готовности международных модных брендов к внедрению blockchain для прослеживаемости продукции, выявлении ключевых факторов, влияющих на успешность цифровой трансформации, и разработке практических рекомендаций по интеграции технологии в действующие процессы управления цепочками поставок.

Материалы и методы исследования. Материалами исследования служат данные о современных blockchain-платформах для модной индустрии (Aura Blockchain Consortium, VeChain, Everledger), системах IoT-интеграции, технологиях NFC и RFID-маркировки, а также годовые отчеты и sustainability-отчеты международных модных компаний за период 2021-2024 годы.

В работе используются методы сравнительного анализа технологических решений, оценки уровня цифровой зрелости компаний, изучения технических характеристик blockchain-платформ, моделирования процессов внедрения и расчёта экономической эффективности цифровых решений. Для оценки готовности компаний разработана четырехуровневая модель цифровой зрелости (0-3 балла по каждому из шести критериев): техническая инфраструктура, организационная готовность, партнерские отношения, стратегическое видение, масштаб внедрения, прозрачность данных.

Результаты исследования. История внедрения blockchain-технологий в модной индустрии тесно связана с развитием концепции прозрачности цепочек поставок и борьбы с контрафактом. На ранних этапах, в начале 2010-х годов, модные бренды использовали преимущественно традиционные методы маркировки и сертификации, которые не обеспечивали полной защиты от подделок и не позволяли потребителям верифицировать происхождение товаров.

Первые пилотные проекты по применению blockchain в моде появились в 2017-2018 годах. Дизайнер Martine Jarlgaard представила первую коллекцию с blockchain-маркировкой, где каждый этап производства записывался в распределенный реестр. Однако массовое внедрение технологии началось только после создания отраслевых консорциумов: Aura Blockchain Consortium (LVMH, Prada, Cartier) в 2021 году и расширения применения платформы VeChain для сотрудничества с H&M и другими брендами (табл. 1).

Таблица 1 – Эволюция подходов к прослеживаемости в модной индустрии

Период	Характеристика технологий прослеживаемости
2010-2016	Традиционные методы: штрих-коды, голограммы, сертификаты подлинности. Отсутствие цифровой верификации для потребителей

2017-2019	Первые пилотные blockchain-проекты. Применение NFC-чипов для связи физического товара с цифровым двойником
2020-2022	Создание отраслевых консорциумов. Интеграция blockchain с IoT, RFID. Переход от пилотов к масштабному внедрению
2023-2024	Стандартизация протоколов. Публичный доступ потребителей к blockchain-данным через мобильные приложения

Рост требований к прозрачности, появление концепции устойчивого развития и ужесточение борьбы с гринвошингом в 2020-е годы усилили мировой тренд на цифровую трансформацию. Производители начали выпускать интегрированные решения, объединяющие blockchain с технологиями Интернета вещей, что позволило автоматизировать внесение данных на каждом этапе производства и логистики.

Комплексные результаты оценки готовности 45 исследованных компаний показали следующее распределение: высокий уровень готовности (15-18 баллов) продемонстрировали 8 компаний (18%), средний уровень (9-14 баллов) – 19 компаний (42%), низкий уровень (0-8 баллов) – 18 компаний (40%). Средний балл по выборке составил 9.2, что соответствует нижней границе среднего уровня готовности.

Сегментный анализ выявил значительные различия по уровню готовности. Luxury-сегмент показал наивысшую готовность с средним баллом 12.4: шесть из 15 компаний достигли продвинутого уровня. Лидеры включают LVMH (17 баллов), Prada (16 баллов) и Kering (15 баллов). Premium-сегмент продемонстрировал средний результат с баллом 9.1, где только две компании достигли высокого уровня. Mass-market сегмент показал наименьшую готовность (средний балл 7.1): ни одна компания не достигла продвинутого уровня, несмотря на декларируемый интерес к технологии.

Анализ по критериям показал следующие результаты. Наивысшие баллы получены по критерию "стратегическое видение" (средний балл 2.1 из 3.0) – 73% компаний упоминают blockchain в стратегических документах и годовых отчетах. Критерий "техническая инфраструктура" показал средний результат 1.6 балла – большинство компаний имеют базовую IT-инфраструктуру, но не интегрировали IoT-системы. Наименьшие баллы получены по критерию "масштаб внедрения" (0.8) – только 22% компаний вышли за рамки пилотных проектов на отдельных коллекциях. Критерий "прозрачность данных" также показал низкий результат (1.1) – лишь 29% компаний предоставляют потребителям реальный доступ к blockchain-информации через публичные интерфейсы или мобильные приложения.

Следует отметить, что современные модные компании сталкиваются с целым комплексом проблем, затрудняющих внедрение и эффективную работу blockchain-систем прослеживаемости. Одним из ключевых препятствий

остаётся высокая стоимость технологического оборудования и программного обеспечения. Установка NFC-чипов, RFID-меток, интеграция с blockchain-платформами и создание пользовательских интерфейсов требуют значительных первоначальных инвестиций. Дополнительные расходы связаны с модернизацией IT-инфраструктуры, обучением персонала и необходимостью регулярного технического обслуживания систем.

Другой серьёзной проблемой является сложность интеграции blockchain с существующими корпоративными системами (ERP, SCM, CRM). Многие модные компании используют устаревшее программное обеспечение, которое не поддерживает API-интеграцию с распределёнными реестрами. Необходимость переноса данных, обеспечения совместимости форматов и синхронизации информации между различными системами создаёт технические и организационные сложности.

Серьёзное препятствие создают и нормативные ограничения. В некоторых регионах требования к защите персональных данных (GDPR в ЕС) вступают в противоречие с принципом неизменяемости blockchain-записей. Экологические стандарты также ставят под вопрос использование энергоёмких blockchain-платформ на основе Proof-of-Work. Отсутствие единых международных стандартов для blockchain в fashion-индустрии препятствует масштабированию решений и создаёт правовую неопределённость.

По нашему мнению, решение проблем внедрения blockchain для прослеживаемости в модной индустрии требует комплексного подхода, сочетающего технологическую модернизацию, организационные изменения и совершенствование управления процессами цифровой трансформации.

Одним из наиболее эффективных направлений является выбор оптимальной blockchain-платформы с учетом специфики бизнеса. Для максимальной прозрачности подходят публичные blockchain (Ethereum), для контроля доступа к конфиденциальной информации – частные платформы (Hyperledger Fabric), для отраслевого сотрудничества – консорциумные решения (Aura Blockchain Consortium). Важно обеспечить интероперабельность – способность различных blockchain-систем взаимодействовать друг с другом без потери данных.

Важную роль играет применение поэтапного подхода к внедрению. Рекомендуются начинать с пилотных проектов на ограниченных сегментах продукции (премиум-коллекции) или географических рынках, анализировать результаты и масштабировать успешные решения. Такой подход позволяет минимизировать риски, оптимизировать процессы и обосновать дальнейшие инвестиции на основе фактических данных о ROI.

Большое значение имеет организационный аспект. Создание dedicated команды по цифровой трансформации, обучение персонала принципам работы с blockchain и внедрение внутренних стандартов качества данных позволяют обеспечить стабильность работы систем. Участие в отраслевых консорциумах способствует обмену опытом, снижению затрат на разработку

и формированию единых стандартов. Регулярный мониторинг показателей эффективности (KPI) внедрения blockchain помогает выявлять слабые места и корректировать стратегию цифровой трансформации.

Заключение. Решение проблем внедрения blockchain для прослеживаемости продукции в модной индустрии требует продуманного и комплексного подхода, опирающегося на современные технологии и грамотную организацию процессов цифровой трансформации.

Результаты исследования выявили значительный разрыв между декларируемым интересом модных компаний к blockchain (73% упоминают в стратегических документах) и фактическим внедрением (лишь 18% достигли продвинутого уровня). Выявленная закономерность показывает, что успешность внедрения обратно пропорциональна сложности цепочки поставок и прямо пропорциональна премиальности бренда. Luxury-сегмент с более короткими и контролируемыми цепочками поставок демонстрирует лидерство (средний балл 12.4 против 7.1 в mass-market сегменте).

Применение blockchain-технологий, систем IoT-интеграции и NFC-маркировки, а также участие в отраслевых консорциумах позволяет существенно повысить прозрачность цепочек поставок и сократить объёмы контрафактной продукции. Не менее важным остаётся внедрение поэтапного подхода к цифровой трансформации, обучение персонала и регулярный мониторинг эффективности внедрения, что обеспечивает стабильность работы и своевременное выявление проблем. Совмещение технических решений с организационными мерами делает возможным достижение высокой цифровой зрелости без ущерба для экономической эффективности. Такой подход создаёт условия для устойчивого развития предприятий, повышения их конкурентоспособности и выполнения современных требований прозрачности и ресурсосбережения.

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АКУСТИЧЕСКАЯ КОММУНИКАЦИЯ МЛЕКОПИТАЮЩИХ ЮЖНОГО ПРИАРАЛЬЯ: ЦЕЛИ И ПЕРСПЕКТИВЫ ИССЛЕДОВАНИЯ

Аннотация: *Исследование акустической коммуникации млекопитающих Южного Приаралья направлено на выявление адаптивных изменений сигналов и оценку влияния экологических и антропогенных факторов. Планируется фиксация и анализ сигналов с использованием полевых наблюдений, дистанционной записи и спектрального анализа, а также сравнительный анализ стратегий в разных средах обитания. Результаты позволят определить закономерности коммуникации, оценить состояние популяций и разработать меры по сохранению биоразнообразия региона.*

Ключевые слова: *Южное Приаралье, млекопитающие, акустическая коммуникация, адаптация, экологический стресс, мониторинг популяций.*

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ACOUSTIC COMMUNICATION OF MAMMALS IN THE SOUTHERN ARAL REGION: OBJECTIVES AND RESEARCH PERSPECTIVES

Abstract: *The study of acoustic communication of mammals in the Southern Aral region aims to identify adaptive changes in signals and assess the impact of ecological and anthropogenic factors. The research involves recording and analyzing signals through field observations, remote sound recording, and spectral analysis, as well as comparative analysis of strategies in different habitats. The results are expected to reveal communication patterns, evaluate population status, and develop measures for biodiversity conservation in the region.*

Keywords: *Southern Aral region, mammals, acoustic communication, adaptation, ecological stress, population monitoring.*

Акустическая коммуникация млекопитающих представляет собой одну из ключевых форм взаимодействия в животном мире, обеспечивая передачу информации о социальном статусе, территориальной принадлежности, опасности, ресурсах и состоянии здоровья. В условиях Южного Приаралья изучение звукового общения животных приобретает особую актуальность, поскольку регион характеризуется экстремальными экологическими условиями: засушливый климат, высокие температуры, дефицит пресной воды, деградация растительности, трансформация ландшафтов и значительная антропогенная нагрузка создают уникальные условия обитания. Эти факторы оказывают прямое влияние на поведение животных, формируя специфические адаптивные стратегии акустической коммуникации, которые обеспечивают выживание и поддержание социальных связей в неблагоприятной среде.

В последние десятилетия экологическая ситуация в регионе значительно изменилась: высыхание Аральского моря, засоление почв и фрагментация естественных местообитаний усилили стрессовые условия для млекопитающих. В этих обстоятельствах способность животных эффективно передавать информацию через звуковые сигналы становится критическим элементом выживания, координации групповой активности и поддержания социальных структур. Исследование акустической коммуникации в Южном Приаралье позволяет выявить особенности адаптационных механизмов, понять поведенческие стратегии животных и оценить состояние экосистем региона.

Основной целью планируемого исследования является изучение акустической коммуникации млекопитающих Южного Приаралья с акцентом на выявление адаптивных изменений сигналов и определение перспектив использования этих данных для мониторинга популяций и сохранения биоразнообразия.

Для достижения цели исследования планируется решение следующих задач: идентификация видов млекопитающих Южного Приаралья и анализ их социального поведения; фиксация и классификация акустических сигналов с использованием полевых наблюдений и дистанционной записи; спектральный, временной и частотный анализ сигналов для выявления закономерностей и адаптивных изменений; определение контекста использования сигналов — территориальные взаимодействия, предупреждение об опасности, социальное поведение и координация групп; оценка влияния антропогенных факторов и изменённого ландшафта на структуру и частоту сигналов; сравнительный анализ акустических стратегий млекопитающих в разных типах среды обитания.

Планируемое исследование предполагает комплексный методологический подход. Полевые наблюдения позволят задокументировать поведение животных и контекст использования акустических сигналов. Дистанционная запись звуков с использованием высокочувствительных

микрофонов и цифровых рекордеров обеспечит получение качественных данных для последующего анализа.

Спектральный и временной анализ сигналов с помощью специализированного программного обеспечения позволит определить частотные диапазоны, длительность сигналов, их повторяемость и структуру. Сравнительный анализ сигналов в различных ландшафтных и антропогенно изменённых условиях позволит выявить адаптивные изменения акустической коммуникации и определить, каким образом животные компенсируют неблагоприятные факторы среды.

Предполагается, что исследование позволит создать классификацию акустических сигналов млекопитающих Южного Приаралья, выявить виды сигналов и их функциональное значение в социальном взаимодействии, а также определить влияние антропогенных и экологических стрессоров на структуру и использование сигналов. Результаты также могут использоваться для экологического мониторинга, выявления скрытых и труднодоступных видов и оценки состояния популяций.

Низкочастотные сигналы, вероятно, будут использоваться для передачи информации на большие расстояния, в то время как высокочастотные сигналы — для внутривидового общения и координации групповой активности на малых расстояниях. Изменения в акустической коммуникации под воздействием антропогенного шума, фрагментации среды и деградации растительности продемонстрируют пластичность поведения животных и адаптивные механизмы выживания.

Результаты исследования имеют высокое практическое значение. Они позволят разработать программы мониторинга популяций млекопитающих, оценить влияние экологических и антропогенных факторов, создать рекомендации по сохранению биоразнообразия и организации природоохранных территорий. Акустические методы обеспечивают возможность наблюдения за скрытыми и редкими видами, анализируют поведение животных в естественной среде и выявляют долгосрочные тенденции изменений экосистем.

Таким образом, исследование акустической коммуникации млекопитающих в Южном Приаралье открывает перспективы для комплексного понимания адаптационных механизмов животных в экстремальных условиях. Выявление закономерностей использования звуковых сигналов позволяет расширить знания о поведенческой экологии, оценить состояние экосистем и разработать меры по сохранению биоразнообразия региона. Дальнейшие исследования должны включать мультидисциплинарный подход, объединяющий экологию, поведенческую биологию, акустику и охрану природы, что обеспечит комплексное изучение популяций млекопитающих и их адаптации к изменяющейся среде.

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ПОКАЗАТЕЛИ ЭФФЕКТИВНОСТИ СИСТЕМ ОТОПЛЕНИЯ, ИСПОЛЬЗУЕМЫХ В ЭЛЕКТРОМОБИЛЯХ

Аннотация. В данной статье анализируется эффективность портативных устройств в электромобилях. В электромобилях системы генерации энергии влияют на энергопотребление и пробег из-за отсутствия прямого источника тепла, в отличие от традиционных автомобилей с двигателями внутреннего сгорания.

Ключевые слова: электромобиль, PTC, водитель, пассажир, энергия, тепловой насос, система отопления, температура.

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EFFICIENCY INDICATORS OF HEATING SYSTEMS USED IN ELECTROMOBILES

Abstract. This article analyzes the effectiveness of portable devices in electric vehicles. In electric vehicles, energy generation systems affect energy consumption and mileage due to the lack of a direct heat source, unlike traditional cars with internal combustion engines.

Keywords: electric vehicle, PTC, driver, passenger, energy, heat pump, heating system, temperature.

Сегодня растущий спрос на экологически чистый, энергоэффективный транспорт и производство обуславливает стремительное развитие электромобилей. Электромобили отличаются отсутствием двигателей внутреннего сгорания и высокой эффективностью по сравнению с автомобилями с двигателями. Однако в холодном климате у них есть ряд проблем. Электромобили потребляют электроэнергию на систему отопления. Это влияет на запас хода электромобиля, его быстрое снижение и общее

энергопотребление. Углубленное изучение показателей эффективности производства этих электромобилей определяет научно-технические показатели. Для обеспечения комфорта водителя и пассажиров в холодном климате электромобили оснащены системой отопления салона, которая полностью отличается от системы отопления, используемой в автомобилях с двигателями внутреннего сгорания. Это связано с тем, что в автомобилях с двигателями внутреннего сгорания салон обогревается теплом двигателя. В электромобилях двигатель внутреннего сгорания не является источником тепла. Поэтому электромобили оснащаются энергосберегающими электрическими системами отопления. Таким образом, необходимо проанализировать, как работает система отопления и каково ее энергопотребление. Существует несколько основных целей использования системы отопления в электромобилях. В электромобилях используется несколько типов систем отопления, и в электромобилях производства BYD, таких как модель BYD SONG PLUS Champion, применяется одна из двух основных систем: PTC-система или тепловой насос.

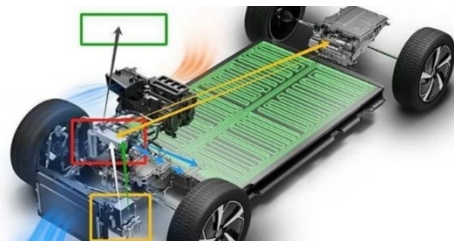


Рисунок 1. Система PTC-нагрева, используемая в электромобилях.

PTC (Positive Temperature Coefficient - Температурный коэффициент сопротивления) Это система отопления, основанная на электрическом сопротивлении. Принцип работы системы заключается в том, что при прохождении электрического тока через керамические элементы они нагреваются, и тепло передается внутрь помещения за счет вращения вентилятора. По мере повышения температуры сопротивление элемента системы PTC автоматически увеличивается. В результате обеспечивается защита от перегрева.

Система отопления PTC отличается простотой и быстротой работы. Однако у этой системы есть и свои недостатки, а именно высокое потребление электроэнергии во время работы. Этот показатель составляет приблизительно 3-5 кВт. Система теплового насоса также дает эффективные результаты. В последних электромобилях BYD используется система на основе теплового насоса.

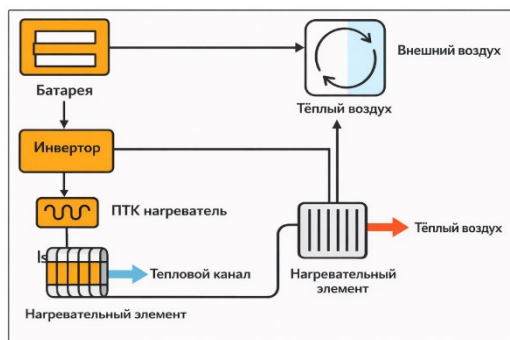


Рисунок 2. Схематическое устройство системы электрического отопления с параболическим температурным коэффициентом (РТС).



Рисунок 3. Тепловой насос

Это повышает энергоэффективность системы на 30–50%. Система работает по принципу реверсивного кондиционирования воздуха. То есть она забирает энергию из наружного воздуха или тепла, окружающего электробатарею или двигатель, и передает ее в салон. Это облегчает обогрев салона. Теплообмен происходит через фреоновый компрессор, испаритель, конденсатор и электронные клапаны.

Конструкция и принцип работы системы отопления отличаются от других систем отопления. Она представляет собой пластину, покрытую с обеих сторон металлическими электродами. Пластины в этой системе отопления размещаются на алюминиевых радиаторных решетках и служат для направления воздушного потока. В процессе работы система отопления реализуется следующим образом. Духовка нагревается путем подачи напряжения 300–400 В от источника питания, такого как батарея или инвертор. Когда входящий электрический ток проходит через РТС-элемент, он генерирует тепло, которое передается на лопасти вентилятора, установленного в системе, направляющие горячий воздух через радиатор.

Анализ эффективности мощности системы отопления выражается следующей формулой:

$$Q = U \cdot I = I^2 \cdot R(T) \quad (1)$$

здесь:

Q — выделяемое тепло (Вт),

U — приложенное напряжение (В),

I — электрический ток (А),

$R(T)$ — сопротивление при температуре (Ом).

В электромобиле BYD Song Plus, выбранном в качестве объекта исследования, система отопления с использованием РТС-термистора работает в гибридном режиме совместно с тепловым насосом.

При температуре +10...+15 °С система переключается в режим теплового насоса. Рабочая мощность системы отопления РТС в электромобиле BYD Song Plus обычно составляет около 3–5 кВт, что позволяет повысить температуру в салоне электромобиля до 20–22 °С за 10 минут. Одним из главных недостатков системы отопления, используемой в электромобилях, является высокое энергопотребление, что приводит к низкой эффективности. Например, поскольку РТС-нагреватель преобразует электрическую энергию непосредственно в тепло, из 1 кВт·ч потребленной электроэнергии получается всего 1 кВт·ч тепла. При этом тепловой насос теряет свою эффективность при низких температурах ниже -10 °С, в результате чего автомобиль работает только в режиме РТС. Негативным следствием этого является снижение запаса хода в холодном климате на 30–40%.

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АНАЛИЗ РЫНОЧНОЙ СТРАТЕГИИ ХИАОМИ В РОССИИ: ЭТАЛОН РОСТА В УСЛОВИЯХ КРИЗИСА И АДАПТАЦИИ К МЕСТНЫМ УСЛОВИЯМ

Аннотация: В статье представлен системный анализ стратегии выхода и развития китайской технологической компании Хиаоми на российском рынке. На основе модели PEST рассматривается специфика макросреды для бизнеса в России, включая нестабильную политико-экономическую ситуацию, особенности потребительского поведения и проблемы цифровой инфраструктуры. Анализ показывает, как Хиаоми, используя сфокусированную продуктовую линейку, интеграцию онлайн- и офлайн-каналов продаж, адаптивную маркетинговую коммуникацию и глубокую локализацию услуг, воспользовалась возможностями, возникшими после ухода западных брендов, для быстрого роста рыночной доли и создания устойчивых конкурентных преимуществ. Результаты исследования подтверждают, что успех компании стал следствием точной оценки и гибкого реагирования на характерную для российского рынка дилемму: сочетание высоких рисков и значительного потенциала. Предложенный опыт может быть полезен для брендов, планирующих интернационализацию на развивающихся рынках.

Ключевые слова: Хиаоми; российский рынок; интернационализация; локализация; потребительская электроника; геополитика и бизнес

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AN ANALYSIS OF XIAOMI'S MARKET STRATEGY IN RUSSIA: A BENCHMARK FOR GROWTH IN A CRISIS AND ADAPTATION TO LOCAL CONDITIONS

Abstract: This article presents a systematic analysis of the entry and development strategy of the Chinese technology company Xiaomi in the Russian market. Using the PEST model, it examines the specifics of the Russian business macroenvironment, including the unstable political and economic situation, consumer behavior patterns, and digital infrastructure challenges. The analysis demonstrates how Xiaomi, through a focused product line, the integration of online and offline sales channels, adaptive marketing communications, and deep localization of services, seized the opportunities created by the departure of Western

brands to rapidly grow market share and create sustainable competitive advantages. The study's results confirm that the company's success was the result of an accurate assessment and flexible response to a dilemma characteristic of the Russian market: the combination of high risks and significant potential. The proposed experience may be useful for brands planning internationalization in emerging markets.

Keywords: *Xiaomi; Russian market; internationalization; localization; consumer electronics; geopolitics and business*

1. Введение

В контексте глобализации экспансия китайских брендов потребительской электроники на международные рынки стала заметным трендом. Особенно показательным в этом отношении является опыт интернационализации компании Xiaomi. Начав выход на российский рынок в 2014 году с осторожных онлайн-экспериментов, компания прошла динамичный путь к лидерству в отрасли. На фоне эскалации геополитической напряжённости в 2022 году, когда ряд западных брендов приостановили деятельность или покинули Россию, Xiaomi не только сохранила операционную непрерывность, но и использовала образовавшийся рыночный вакуум, укрепив позиции ведущего поставщика смартфонов. Согласно данным отраслевой аналитики, со второго квартала 2022 года Xiaomi вместе с суббрендом POCO стабильно удерживает первое место по объёмам продаж в России, с совокупной долей рынка, превышающей 30% [1]. Этот пример роста в условиях кризиса представляет значительный исследовательский интерес.

В данной статье на основе анализа макросреды российского рынка последовательно рассматриваются ключевые стратегические решения Xiaomi, что позволяет выявить логику её успеха и перспективы устойчивого развития.

2. Анализ макросреды российского рынка

Российский рынок представляет собой сложное и неоднозначное поле деятельности для транснациональных компаний, характеризующееся сочетанием высоких рисков и значительного потенциала.

Политико-правовая среда: высокая неопределённость и государственное вмешательство

Политическая система России отличается высокой централизацией. Несмотря на относительную преемственность внутренней политики, её стабильность подвержена резким колебаниям под влиянием международных отношений. После событий 2014 года в Крыму были введены западные санкции, а с 2022 года их масштабы стали беспрецедентными, затрагивая финансовый, технологический и торговый секторы. Это напрямую отразилось на отрасли потребительской электроники: ограничения в использовании международных платёжных систем (таких как SWIFT) осложнили расчёты,

разрыв логистических цепочек привёл к росту издержек, а технологические эмбарго нарушили поставки комплектующих.

В ответ на санкции российское правительство легализовало «параллельный импорт», создав законные каналы для ввоза товаров без согласия правообладателей, что трансформировало структуру дистрибуции [5]. Параллельно реализуется стратегия импортозамещения, стимулирующая развитие местного производства [10]. Подобная неопределённость формирует серьёзные риски, но одновременно открывает возможности для адаптивных компаний, позволяя им наращивать рыночную долю в условиях ослабленной конкуренции.

Экономическая и потребительская среда: устойчивый рынок в условиях нестабильности

Экономика России в значительной степени зависит от экспорта энергоресурсов, что обуславливает высокую волатильность курса рубля и уровня инфляции при колебаниях мировых цен на нефть и ужесточении санкций. Например, в 2022 году динамика курса рубля к доллару напоминала «американские горки», создавая сложности для ценообразования, управления запасами и планирования прибыли импортёров. Реальные доходы населения сокращаются под давлением санкций, что ведёт к нестабильности потребительских настроений.

Тем не менее, при населении около 140 млн человек Россия остаётся одним из крупнейших единых рынков в Европе, где сохраняется устойчивый спрос на высокотехнологичные товары, особенно на смартфоны. В условиях экономического давления потребители становятся более чувствительными к цене, демонстрируя явную тенденцию к поиску оптимального соотношения цены и качества. Вместо ориентации на премиальные бренды растёт внимание к базовой функциональности, надёжности и долговечности продукции в рамках ограниченного бюджета. Это формирует благоприятные условия для выхода на рынок брендов, предлагающих лучшее соотношение цены и качества [2].

2.3. Социокультурная и технологическая среда: уникальные пользовательские привычки и цифровая экосистема

Российские потребители имеют высокий уровень образования, хорошо воспринимают технологичные продукты, а проникновение интернета превышает 80% [3]. Локальная цифровая экосистема мощная: имеются собственная поисковая система (Yandex), социальная сеть (VK) и маркетплейсы (Wildberries, Ozon). Это означает, что общепринятые международные сервисы Google Mobile Services (GMS) изначально не доминировали в России, поэтому барьеры для замены их собственными экосистемами китайских брендов на основе Android (такими как MIUI) были относительно низкими.

Территория России обширна, логистическая инфраструктура на Дальнем Востоке и в Сибири относительно слаба, что создаёт вызовы для складских и дистрибьюторских систем компаний. Кроме того, предпочтения

потребителей сместились в сторону онлайн-покупок — особенно после пандемии этот тренд ускорился. Однако офлайн-магазины по-прежнему крайне важны для создания доверия к бренду, предоставления возможности «пощупать» товар и обеспечения послепродажного обслуживания, что сформировало спрос на гибридную модель «онлайн-заказ, офлайн-ознакомление/получение».

3. Анализ ключевых стратегий Xiaomi на российском рынке

Столкнувшись с уникальными вызовами российского рынка, Xiaomi отказалась от простого копирования моделей, успешных в Китае или Индии, и реализовала ряд адаптивных стратегических инициатив.

Продуктовая стратегия: агрессивная «пирамидальная» линейка и быстрое реагирование

- Прорыв за счёт ценности: изначально Xiaomi использовала онлайн-эксклюзивные модели серии Mi с высокими характеристиками при конкурентной цене для формирования имиджа технологического лидера. После укрепления позиций компания расширила портфель брендами Redmi и POCO, которые стали основным инструментом захвата массового рынка, точно отвечая запросу российских потребителей на оптимальное соотношение цены и качества [1].

- Естественная адаптация к «отказу от Google»: исторически меньшая зависимость российского рынка от Google Mobile Services (GMS) облегчила адаптацию пользователей к экосистеме MIUI с её собственным магазином приложений и сервисами. После 2022 года, когда другие Android-бренды столкнулись с ограничениями GMS, эта независимость превратилась в ключевое конкурентное преимущество Xiaomi [3].

- Расширение ассортимента для построения экосистемы: помимо смартфонов, Xiaomi активно продвигает продукты для умного дома (AIoT) — носимые устройства, телевизоры, пылесосы. Их интеграция в единую экосистему MIUI Home повышает лояльность пользователей, углубляет вовлечённость и диверсифицирует бизнес. В России умные носимые устройства Xiaomi прочно удерживают лидирующие позиции [8].

- Гибкая корректировка цепочки поставок и производства: для снижения логистических и тарифных рисков Xiaomi начала локализацию сборки смартфонов ещё до 2022 года в партнёрстве с контрактными производителями (например, на заводе «Нью Тон» в Калужской области). Это позволило использовать тарифные льготы и обеспечить стабильность поставок. После 2022 года устойчивость цепочек была дополнительно обеспечена через механизмы параллельного импорта [1, 5].

Стратегия каналов сбыта и розничной торговли: глубокое слияние онлайн и офлайн (ОМО)

- От онлайн-доминирования к гибридной модели: стартовав с онлайн-вспышек продаж на маркетплейсах Wildberries и Ozon, Xiaomi параллельно развивала офлайн-каналы. Были открыты премиальные фирменные магазины Mi Home в крупных городах и налажено сотрудничество с крупными

розничными сетями (М.Видео, Связной). Эта модель — «привлечение трафика онлайн и глубокая конверсия офлайн» — идеально соответствует российской специфике, где потребители склонны сравнивать цены в интернете, но ценить опыт офлайн-покупки [8].

- Оперативное замещение в премиальных каналах: после приостановки продаж Apple и Samsung в 2022 году Xiaomi быстро расширила своё присутствие через партнёров в освободившихся премиальных розничных точках, существенно увеличив офлайн-экспозицию и доступность продукции [6].

Маркетинговая и коммуникационная стратегия: локализованный нарратив и углублённая цифровая работа

- Фокус на локальных цифровых платформах: основными платформами для маркетинга стали не глобальные соцсети, а российские VK и Yandex. Xiaomi ведёт активные сообщества в VK для анонсов и взаимодействия с фанатами и использует инструменты Yandex для таргетированной рекламы [3, 8].

- Работа с локальными амбассадорами: для эмоционального вовлечения потребителей Xiaomi привлекала популярных российских блогеров и знаменитостей, а маркетинговый контент создавался с учётом локального контекста, а не был простым переводом [4].

- Прагматичная коммуникация в условиях кризиса: в период геополитической напряжённости PR-сообщения компании были сдержанными и сфокусированными на обеспечении бесперебойных поставок и сервиса, что позволило сохранить нейтральный деловой имидж и минимизировать риски [9].

Стратегия обслуживания и поддержки: построение долгосрочного доверия

- Развитая сервисная сеть: по всей России была развёрнута сеть авторизованных сервисных центров, предоставляющих гарантийное и послегарантийное обслуживание. Этот шаг был критически важен для преодоления стереотипов о качестве и формирования лояльности у чувствительных к цене потребителей [8].

- Локализованная клиентская поддержка: полноценная русскоязычная поддержка через сайт, горячую линию и соцсети обеспечила беспрепятственную коммуникацию с пользователями [8].

4. Обсуждение: вызовы устойчивому развитию и перспективы

Достижения Xiaomi на российском рынке стали следствием эффективной стратегической адаптации. Однако для сохранения лидерства компании предстоит преодолеть ряд серьёзных вызовов.

1. Обострение конкуренции: конкурентный ландшафт стремительно меняется. Другие китайские бренды (realme, Tecno, Infinix) демонстрируют агрессивный рост, усиливая конкуренцию в сегменте «лучшего соотношения цены и качества» [1]. Параллельно, в рамках государственной политики импортозамещения, могут укрепить позиции локальные российские

производители (например, BQ, Aquarius), пользуясь административной и регуляторной поддержкой [5, 10].

2. Уязвимость цепочек поставок и правовые риски: крайне зависимая от модели параллельного импорта, Xiaomi сталкивается с правовой неопределённостью, включая риски споров о товарных знаках и сложности с обеспечением гарантийной поддержки. Долгосрочная опора на эту модель может подорвать репутацию бренда. Кроме того, сохраняющаяся нестабильность глобальных логистических цепочек создаёт постоянную угрозу операционной непрерывности [5, 7].

3. Ограничения рыночного роста и необходимость инноваций: экономическая стагнация может привести к сокращению общего объёма рынка [10]. Удовлетворив базовый спрос, потребители начинают предъявлять повышенные требования к инновациям. Перед Xiaomi стоит сложная задача: сохранить ценовое преимущество, одновременно инвестируя в технологическое развитие продукции, чтобы избежать «ловушки» низкой добавленной стоимости.

4. Структурная геополитическая неопределённость: фундаментальным вызовом остаётся высокая нестабильность макросреды, на которую компания может повлиять лишь ограниченно. Эта неопределённость требует от бизнес-модели исключительной гибкости и устойчивости к потрясениям [9].

В будущем стратегия Xiaomi, возможно, потребует смещения в сторону более глубокой локализации производства (расширение вверх по течению от SKD), более консолидированного построения экосистемы (глубокая интеграция с локальными сервисами, такими как Yandex и VK), а также исследования более стабильных решений для цепочек поставок в рамках правового поля [3, 8].

5. Заключение

Опыт Xiaomi на российском рынке представляет собой показательный кейс адаптивной интернационализации, демонстрирующий принцип «извлечения возможностей из кризиса и преобразования перемен в потенциал роста». Результаты проведённого анализа позволяют утверждать, что достигнутый успех обусловлен комплексом взаимосвязанных факторов:

1. Системная оценка макросреды: точное понимание специфики российского рынка, включая волатильность политико-экономического контекста, структурные изменения в потребительском поведении и особенности цифровой экосистемы, легло в основу всех последующих стратегических решений [1, 2, 3].

2. Адаптивная бизнес-модель: формирование конкурентного продуктового портфеля с фокусом на ценность, создание гибридной (ОМО) дистрибуционной сети, глубокая локализация маркетинговых коммуникаций и сервисной поддержки позволили не только нивелировать внешние риски, но и конвертировать рыночные дисбалансы в конкурентные преимущества [6, 8].

3. Операционная гибкость и устойчивости к потрясениям: способность к быстрой реконфигурации цепочек поставок (включая локализацию сборки

и использование альтернативных логистических схем), а также прагматичная адаптация к меняющимся правовым реалиям стали критически важными для обеспечения операционной непрерывности [4, 5, 9].

Данный кейс иллюстрирует, что на развивающихся рынках с высокой геополитической чувствительностью долгосрочный успех зависит не столько от абсолютных технологических преимуществ продукта, сколько от адаптивности всей бизнес-системы. Ключевыми становятся способность к глубокой стратегической интеграции в локальный контекст, организационная гибкость и устойчивость операционной модели к внешним шокам.

Опыт Xiaomi в России, таким образом, служит не только важным этапом её глобальной экспансии, но и содержательным примером для теории и практики международного менеджмента, предлагая ценные инсайты для компаний, стремящихся к устойчивому развитию на сложных и динамичных рынках.

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МУСТАҚИЛЛИКНИНГ ДАСТЛАБКИ ЙИЛЛАРИ ФАРҒОНА ВИЛОЯТИДА ТАДБИРКОРЛИК: ИСЛОҲОТЛАР, МУАММОЛАР, ЯНГИЛАНИШЛАР

Аннотация: Ўзбекистон мустақилликка эришганнинг илк йиллариданоқ узоқ йиллар давомида аграр соҳага ихтисослашиб қолган республикада, ижтимоий –иқтисодий инқироз шароитида кўп укладли иқтисодиётни барпо этиш, аграр муносабатларнинг янги типини яратиш жараёнлари амалга оширилиши жуда зарур эди. Ўзбекистонда энг аввало аҳолини иш билан таъминлайдиган, уларни истеъмол товарлари билан таъминлайдиган соҳа тадбиркорликни ривожлантириш долзарб ва устувор вазифа эди. Ушбу мақолада Ўзбекистонда мустақиллик йилларида қишлоқ хўжалиги соҳасида тадбиркорликни ривожлантириш йўлида амалга оширилган ишлар таҳлил қилинган.

Калит сўзлар: аграр соҳа, тадбиркорлик, инновация, кўп укладли иқтисодиёт, аграр муносабатлар, ишлаб чиқариш, саноат, ислоҳотлар.

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ПРЕДПРИНИМАТЕЛЬСТВО В ФЕРГАНСКОЙ ОБЛАСТИ В ПЕРВЫЕ ГОДЫ НЕЗАВИСИМОСТИ: РЕФОРМЫ, ПРОБЛЕМЫ, ИННОВАЦИИ

Аннотация: В первые годы независимости Узбекистана, в республике, долгие годы специализировавшейся на сельском хозяйстве, в условиях социально-экономического кризиса необходимо было построить многоотраслевую экономику, создать новый тип аграрных отношений. Развитие предпринимательства в Узбекистане, которое в первую очередь обеспечивает занятость и товары народного потребления, было актуальной и приоритетной задачей. В статье анализируется работа, проделанная в Узбекистане за годы независимости по развитию предпринимательства в сельском хозяйстве.

Ключевые слова: аграрный сектор, предпринимательство, инновации, многоотраслевая экономика, аграрные отношения, производство, промышленность, реформы.

ENTREPRENEURSHIP IN FERGANA REGION IN THE FIRST YEARS OF INDEPENDENCE: REFORMS, PROBLEMS, INNOVATIONS

Abstract: *In the first years of independence of Uzbekistan, the republic, which for many years specialized in agriculture, in the context of socio-economic crisis, it was necessary to build a diversified economy, to create a new type of agrarian relations. The development of entrepreneurship in Uzbekistan, which primarily provides employment and consumer goods, was an urgent and priority task. This article analyzes the work done in Uzbekistan during the years of independence to develop entrepreneurship in agriculture.*

Keywords: *agrarian sector, entrepreneurship, innovation, multi-sectoral economy, agrarian relations, manufacturing, industry, reforms.*

Ягона халқ хўжалигининг таркибий қисмига айланиб қолган Ўзбекистонда мустақилликнинг дастлабки йилларидан иқтисодиётда катта ислохотларни амалга оширишни талаб этди. Бунинг учун аввало қишлоқ хўжалигида мулкчилик шаклини ўзгартириш, меҳнатнинг ташкил этишнинг деҳқон учун тушунарли бўлган турларини вужудга келтириш лозим эди. Бу борада мулкни ислоҳ қилиш ва мулкчиликнинг турли шаклларида ўтиш масалалари муҳим бўлган бир пайтда республикада тобора хусусий сектор салоҳиятини кўтариш муҳим масалалардан бирига айланди. Аммо узок йиллар мобайнида асосан, аграр соҳага ихтисослашиб қолган республикада, ижтимоий – иқтисодий инқироз шаороитида кўп укладли иқтисодиётни барпо этиш, аграр муносабатларнинг янги типини яратиш жараёнлари амалга оширилиши жуда зарур эди. Бинорбарин, бозор иқтисодиётига ўтиш шароитида аҳолининг халқ истеъмол товарларига бўлган талабининг ортиб боришида асосий вазифа табиийки аҳолини озиқ – овқат маҳсулотларига, саноат тармоғини хом ашёга бўлган талабини қондириш асосий вазифа бўлиб қолди. Бунинг устига аҳоли сонининг йилдан - йилга ошиб бориши, саноат ва қурилиш тармоқларининг тез ривожланиши, айниқса қишлоқ хўжалигига яроқли бўлган ерларга бўлган талабнинг ортиб бориши натижасида республикада бир киши ҳисобига тўғри келадиган ерлар майдони тобора камайиб борди. Республика қишлоқларида ери йўқ оилалар сони 240 минг нафар, уй-жой қурилиши ва қишлоқ хўжалиги маҳсулотларини етиштириш учун ерни кенгайтиришга муҳтож оилалар сони 1,8 млн.дан кўпроқ эди [1]. Агар 1976 йилда республика миқёсида бир киши ҳисобига 0,27 гектар ҳайдаладиган ер тўғри келган бўлса, 1995 йилда 0,16 гектарни ташкил этди ёки 41.2 фоизга қисқартирилди. Шу даврда республика аҳолиси сони 14.2 млн. кишидан 1996 йил бошига келиб 23 млн. кишига ошди [2]. Бу табиийки муаммоларни ҳам келтириб чиқарди.

Ўзбекистон Олий Совети Президиумининг 1989 йил 19 август “Колхозчилар, совхозларнинг ишчилари, фуқароларнинг шахсий ёрдамчи хўжаликларини ва яқка тартибдаги уй – жой қурилишини ривожлантириш тўғрисида”ги Қарор қабул қилингандан сўнг аҳолини ер билан таъминлаш мақсадида ўтказилган тадбирлар ўз натижасини берди, Бу қонун қабул қилингандан сўнг 181 минг гектар ер майдони аҳолига томорқа учун ажратиб берилди. Бироқ ислохотлар давомида ўйламасдан, шошма – шошарлик билан ерларни ажратиш ҳолатлари ҳам бўлиб ўтди. Масалан, 1993-1995 йилларда Фарғона водийсида аҳоли зич яшаётганлиги, ер майдонларининг бошқа вилоятларга нисбатан жуда чегараланганлиги, жумладан бир кишига водийда 0,9 гастр, Фарғона вилоятида 0,7 гектар, Андижон вилоятида – 0,6 гектар ер майдони тўғри келганлиги хусусиятларини ҳисобга олмай жамоа ва ширкат хўжаликларидаги мустақил фермаларни кредит олиш билан фермерликка айлантириш оқибатида 1996 йил сентябрдан бошлаб, улар яна жуда заифлашиб борди, моллар сони камайиб, чорва молларни сақлаш ва ем-хашак билан таъминлаш шароити ёмонлашди, деҳқон (фермерлар)дан фермалар жамоа хўжаликларига қайтариб олиш ҳоллари юз берди. Масалан, Фарғона вилояти Бешариқ тумани “Рапқон” жамоа хўжалиги фермани 5 млн. сўмга кредитга фермерлика олинган ер катта зарар билан қайтариб берилди. Бундай ҳолатлар Олтиариқ, Фарғона, Тошлоқ туманларида ҳам бўлди [3].

1991 йил 11 январда “Аҳолининг шахсий ёрдамчи хўжаликларини янада мустаҳкамлаш тўғрисида”ги Фармон чиқиб, унга мувофиқ 516.6 минг гектар ер майдони аҳолининг шахсий ёрдамчи хўжаликларига муддатсиз фойдаланиш учун ажратиб берилди. Натижада 1993 йилга келиб аҳолининг шахсий ёрдамчи хўжаликларидаги экин майдонлари 343,6 минг гектарга етиб, улардан унумли фойдаланиш ҳисобига 210 минг тонна дон, 1843,6 минг тонна сабзавот, 198,5 минг тонна картошка, 363.5 минг тонна полиз маҳсулотлари ҳамда 281,5 минг тонна мева етиштирилди. 1995 йилга келиб республикада етиштирилаётган доннинг 10 фоизи, картошканинг 42 фоизи, сабзавотнинг 62 фоизи, полизнинг 65 фоизи, сутнинг 75 фоизи, тухумнинг 43 фоизи, жуннинг 64 фоизи аҳолининг шахсий ёрдамчи хўжаликларида етиштирилди [4].

1991 йил мустақиллик қўлга киритилгач, табиийки муаммолар ҳам келиб чиқа бошлади. Иқтисодий танг аҳволда бўлган Ўзбекистонда аҳолини иш билан таъминлаш муҳим муаммолардан ҳисобланди. Аҳолининг 61 феоиздан ортиқроғи қишлоқ жойларда яшаган Ўзбекистонда эса аввало мулкчиликни давлат тасарруфидан чиқариб, унинг турли шакллари ривожлантириш долзарб бўлиб қолди. Аҳолини иш билан таъминлаш, оила бюджетини яхшилаш ва кишиларни халқ истеъмол молларига бўлган талабини қондиришнинг асосий йўлларида бири қишлоқ жойларида турли саноат корхоналарини ташкил этиш эди. Бу муҳим ижтимоий ва иқтисодий аҳамиятга эга бўлиб, бу биринчидан, қишлоқ хўжалигидаги мавжуд хом ашё базаларидан унумли фойдаланиш имконини берар, икинчидан, аҳолини иш жойлари билан таъминлаши, уларнинг оила бюджетлари, турмуш даражасини яхшилаш, учинчидан, жамоа хўжаликларининг даромадини ошириш,

иктисодиётни мустаҳкамлаши, тўртинчидан, қишлоқ жойларида қурилиш индустриясини ривожлантириш имконини берар эди.

Аҳолиси зич жойлашган минтақалардан бири Фарғона вилояти эди, бу ернинг қарийиб 70 фоиз аҳолиси қишлоқларда истиқомат қилган. 1995 йилда вилоятда аҳоли сони 2444 минг кишини ташкил этиб, йилига аҳоли ўсиши 2.5 фоиз ёки 50-60 минг кишига кўпайган. Мавжуд аҳолининг 1165,2 минги меҳнатга лаёқатли бўлиб, 869,3 минг киши жамоат секторларида, 143,7 минг киши эса уй хўжалигида банд бўлганлар. Меҳнат ресурсларининг йиллик ўсиши 23,0 минг кишини ташкил қилиб, шундан 10 минги қишлоқ жойларга тўғри келган [5]. Шу мақсадда янги тузилган фермер хўжаликларининг ўрни қишлоқ хўжалиги ишлаб чиқаришдаги ўрни юқори бўлиб борди. Масалан, Қорақалпоғистон Республикасининг Тахтақўпир туманида Н.Боғлонов, Самарқанд вилоятининг Ургут туманида В.Бозоров, Сурхондарё вилоятининг Қумқўрғон туманидан С.Қорабоев, Фарғона вилоятининг Учкўприк туманидан М.Аҳмедов бошлиқ фермер хўжаликлари ҳар гектар ердан 50 центнердан ғалла етиштиришга муваффақ бўлганлар. Худди шунингдек, Қорақалпоғистон Республикаси Тўрткўл туманида А.Абдуллаев, Наманган вилояти Чортоқ туманидан Н.Темиров, Фарғона вилояти Охунбобоев туманидан М.Маҳмудовалар раҳбарлик қилган фермер хўжаликлари 75-85 тонна сут, 15-20 тонна гўшт тайёрлашга муваффақ бўлганлар [6]. 1996 йилнинг иккинчи яримида республикада кичик корхоналарнинг сони 7622 тага ортган бўлса, шуларнинг 90 фоизи хусусий корхоналар ҳиссасига тўғри келган [7].

Айнан Фарғона вилояти ҳақида гапирсак, мустақилликнинг дастлабки йилларида Фарғона вилоятида ёрдамчи хўжалиklar Ўзбекистон, Бувайда, Бешариқ, Қува ва Тошлок туманларидаги хўжалиklar алоҳида ўрнатқўрсатди. Бешариқ туманидаги ширкатлар уюшмасида 15 дан ортиқ ёрдамчи хўжалиklar фаолият қўрсатган бўлса, уларда ғишт цехи, тикувчилик, оҳак, қандолатчилик, кулолчилик, гилам тўқиш, дурадгорчилик маҳсулотлари ишлаб чиқарилди. Бу цехларда 100 мингдан ортиқ киши меҳнат қилди. Бундай хўжалиklarга Бешариқ туманидаги “Рапқон”, “Ўзбекистон” жамоа хўжаликлари, Боғдод туманидаги “Намуна” жамоа хўжалиги, Бувайда туманидаги “Бувайда”, “Янгиқўрғон” жамоа хўжаликлари, Тошлок туманидаги “Яккатут” ва “Заркент” жамоа хўжаликларини киритиш мумкин эди. Бу хўжалиklarнинг ҳар бирида ўнлаб ёрдамчи хўжалиklar бўлиб, уларда қишлоқ ёшлари меҳнат қилишди.

1994-1995 йилларда Бешариқ тумани “Рапқон” жамоа хўжалигида тери ошлаш ва ундан ҳар хил оёқ кийимлари ҳамда курткалар тикиш цехи ишга туширилди. Бу жамоа хўжалиги ҳар йили пахта, пилла, мева – сабзавот етиштириш режаларини бажариб келган. Бу ерда 13 та ёрдамчи ва кичик корхоналар барпо этилган. Уларда 308 нафар қишлоқ ёшлари меҳнат қилди. Тошлок тумани “Заркент” жамоа хўжалигида консерва цехи ва нутрия терисидан телпак тикиш цехлари ишга туширилди [8].

Ўзбекистон туманидаги Ғофур Ғулом номли жамоа хўжалигининг аҳолиси зич жойлашган бўлиб, ҳар бир жон бошига 0,09 гектардан экин майдони, ҳар бир ишловчи ҳисобига эса 0,6 гектардан экин майдони тўғри келар эди. Бу хўжаликда деҳқончиликнинг бошқа тармоқлари қатори чорвачилик ҳам ривожлантирилди. Хўжаликнинг жами ер майдони 3.612 гектар, аҳоли сони эса 24.500 кишини ташкил қилган бўлса, шундан 3.250 нафари жамоа хўжалигида ишлади. Хўжалик ўзида етиштирган хом – ашёни қайта ишлаб, маҳсулот ҳолига келтириб ишлайдиган ғишт, консерва, атлас, гилам, шарф ва рўмол тўқиш, тикувчилик, оҳак ишлаб чиқариш, кулолчилик, ипак толаси ишлаб чиқариш, шолча тўқиш, телпак тикиш, макоран цехлари ишлаб чиқарувчи корхоналар сонини кўпайтириши натижасида уларнинг сони 16 тага етди. 1993 йилда эса пахта тозалаш цехи ишга туширилиб, Нурсух қишлоғининг 30 нафар ёшларини иш билан таъминлаган. Завод комплексига кирган тўқимачилик цехида 3 маҳсулот: пайпоқ, газлама ва тайёр кийим –кечак ишлаб чиқариш йўлга қўйилган ва 86 нафар киши иш билан таъминланган, атлас тўқиш цехида 35 киши меҳнат қилди [9].

1995 йилда белгиланган 61000 корхона тузилиши ўрнига 64428 та кичик ва ўрта корхоналар ташкил топди. Фарғона водийсининг ўзида Андижонда 5272 та, Фарғонада 5005 та, Наманганда 5010 та кичик корхоналар тузилиб, ўз фаолиятини олиб борганлар [10].

Бундай корхоналарни ривожлантириш, халқаро бозорда рақобатбардош маҳсулотлар ишлаб чиқарадиган янги корхоналар барпо этиш ва мавжуд қувватларни модернизация қилиш тизимли равишда давом эттирилди. Экспорт қилувчи корхоналар ҳар томонлама қўллаб –қувватланиб, кичик бизнес ва хусусий тадбиркорлик субъектлари экспорт фаолиятига кенг жалб қилинди. Шунингдек, сармоя киритувчи корхоналар, ташкилотлар билан ҳам ҳамкорлик йўлга қўйилди.

Умуман. Мустақиллик йиллари Ўзбекистонда совет давлатидан сўнг қолган мураккаб иқтисодий аҳволни изга солиш борасида бир қатор тадбирлар амалга оширилсада, танг аҳволда қолган қишлоқ хўжалиги, саноатни изга солиб олишда ўзига хос мураккаб вазиятлар келиб чиқди. Ўзбекистон, айниқса Фарғона вилояти туманларининг қишлоқ хўжалигига мослашганлиги бу ерда асосан деҳқончилик билан шуғулланиш лозимлигини кўрсатди. Бироқ, мустақилликнинг дастлабки йиллари бу ўзига хос қийинчилик билан амалга оширилди.

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ЛИНГВО-КУЛЬТУРОЛОГИЧЕСКИЕ ИССЛЕДОВАНИЯ КОНЦЕПТА “ЧЕЛОВЕК” НА РУССКОМ И УЗБЕКСКОМ ЯЗЫКАХ

Аннотация: Статья посвящена лингво-культурологическому исследованию концепта «человек» в русском и узбекском языках. Рассматриваются теоретические подходы к изучению концептов, анализируются особенности формирования образа человека в национальном сознании двух народов. В основе исследования лежат методы когнитивного, семантического, паремиологического и сопоставительного анализа. Показано, что концепт «человек» в обеих культурах имеет универсальные характеристики, связанные с разумностью, духовностью и социальной значимостью личности. В то же время отмечаются различия в оценочной и ценностной составляющих: в русской традиции акцент сделан на внутреннем нравственном выборе и философской рефлексии, тогда как в узбекской — на идеалах духовного совершенства, чести и гармонии в обществе.

Ключевые слова: концепт человек, лингвокультурология, русский язык, духовность, национальная картина мира, сопоставительный анализ.

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LINGUISTIC AND CULTURAL STUDIES OF THE CONCEPT OF "HUMANITY" IN RUSSIAN AND UZBEK

Abstract: The article is devoted to the linguocultural study of the concept of "human" in Russian and Uzbek. Theoretical approaches to the study of concepts are considered, and the features of the formation of the human images in the national consciousness of the two peoples are analyzed. The research is based on cognitive, semantic, paremiological, and comparative analysis methods. It has been shown that the concept of "human" in both cultures have universal characteristics related to the rationality, spirituality, and social significance of the individual. At the same time, differences are noted in the evaluative and value components: in the Russian tradition, emphasis is placed on internal moral choice and philosophical reflection,

while in the Uzbek tradition, on the ideals of spiritual perfection, honor, and harmony in society.

Key words: *the concept of human, linguoculturology, the Russian language, spirituality, national worldview (linguistic picture of the world), comparative analysis.*

Введение: В условиях глобализации и активного межкультурного взаимодействия возрастает интерес к изучению национально-культурных особенностей языков и способов отражения в них мировоззренческих категорий. Одной из таких фундаментальных категорий является концепт «человек». Он представляет собой не только языковую номинацию биологического индивида, но и сложную ментально-культурную структуру, объединяющую представления народа о природе человека, его моральных качествах, социальной роли, ценности существования. Концепт «человек» относится к числу универсальных, так как присутствует во всех культурах и языках мира, однако его семантические и культурные наполнения имеют значительные различия, формируемые историческими, религиозными, социальными и философскими особенностями развития этноса.

В лингвокультурологии концепт рассматривается как ключевая единица картины мира, содержащая в себе знания, опыт и духовные ориентиры сообщества. Он существует на стыке языка, культуры и сознания, проявляется в лексике, фразеологии, поговорках, художественных текстах, а также в речевом поведении носителей языка. Таким образом, исследование концепта позволяет глубже понять структуру национального менталитета и ценностные приоритеты народа.

Русский и узбекский языки относятся к разным языковым семьям и имеют различные культурно-исторические корни. Русская культурная традиция формировалась под влиянием православия, европейской философии, богатого литературного наследия и социальных потрясений, что обусловило глубокое философское и нравственное осмысление природы человека. В русском языке концепт «человек» включает идею трагичности судьбы, личной ответственности, способности к состраданию и духовному поиску. В пословицах, поговорках и литературе человек часто представлен как существо, стоящее перед сложным выбором между добром и злом, силой и слабостью, свободой и моральным долгом.

Материалы и методы: Исследование концепта «человек» в русском и узбекском языках основывается на современных принципах когнитивной лингвистики и лингвокультурологии, которые рассматривают язык как хранилище национальной памяти и культурных ценностей. Методологическая база включает как теоретические подходы к изучению концептов, так и практические методы анализа языкового материала.

Результаты исследования: Понятие концепта активно исследуется в работах отечественных и зарубежных лингвистов. Существенный вклад в развитие концептологии внесли Д.С. Лихачёв, Ю.С. Степанов, В.Н. Телия, Е.

С. Кубрякова, В.И. Карасик и др. Они трактуют концепт как многогранную ментальную единицу, в которой отражается культурно значимая информация. В лингвокультурологическом подходе концепт рассматривается как элемент национального культурного пространства, формирующийся в процессе исторического развития народа и фиксируемый в языке.

В узбекском языкознании исследования концептов развиваются в трудах А.Х. Хасанова, Н. Махкамовой, Ш. Сафарова и других учёных, которые связывают концепт с понятием духовности — «ма'навият», подчеркивая его этическую природу. Исследователи отмечают, что в узбекской культуре концептуальное содержание слова «инсон» тесно связано с моральными нормами общества, семейными ценностями, религиозными представлениями.

В русской научной традиции концепт «человек» изучается в различных аспектах: философско-антропологическом, литературоведческом, когнитивном. Ученые обращают внимание на то, что образ человека в языке и культуре часто связан с категориями совести, духовности и свободы выбора. Значительный пласт исследований посвящён анализу паремиологии — пословиц и поговорок, в которых закреплены народные представления о человеческой сущности и поведении. Лингвисты отмечают, что русская языковая картина мира содержит противоречивые характеристики человека: он способен к добру, но подвержен слабостям, его судьба часто трагична, а жизнь непредсказуема.

В узбекской лингвокультуре внимание сосредоточено на нравственной сущности человека. В литературе подчёркивается, что человек — основная ценность общества, носитель чести, долга и ответственности перед семьёй. Работы, посвящённые анализу узбекского паремиологического фонда, показывают, что в народной мудрости позитивные качества личности — доброта, честность, щедрость — ценятся значительно выше материального благополучия. Широко представлены исследования роли человека в социальной структуре, его связи с национальными традициями и культурными нормами.

Применение комплекса методов обеспечивает объективность и многоаспектность исследования, позволяет рассматривать концепт «человек» как единое явление, проявляющееся на разных уровнях языковой системы.

Материалом исследования послужили:

- толковые и этимологические словари русского и узбекского языков;
- национальные корпуса текстов;
- сборники пословиц, поговорок, афоризмов;
- научные статьи и монографии по когнитивной лингвистике и антропоцентрическому языкознанию.

Таким образом, методологическая основа включает как теоретические положения концептологии, так и практические методы анализа языковых данных, что позволяет рассматривать концепт «человек» на пересечении языка, культуры и общественного сознания.

Такой подход обеспечивает целостное понимание концепта и даёт возможность проследить, каким образом в языках формируются культурно значимые представления о человеке, какие духовные ценности и социальные ориентиры определяют национальный образ личности. Методологическая основа исследования направлена на выявление того, как универсальная категория «человек» приобретает особое, этнокультурно окрашенное содержание в русском и узбекском языках.

Исследование концепта «человек» в русском и узбекском языках позволило выявить как общие универсальные черты данного понятия, так и значимые лингвокультурные различия, отражающие специфику этнического мировосприятия. Результаты анализа языкового материала — словарных дефиниций, паремиологии, литературного дискурса и употребления в речи — демонстрируют многоуровневую структуру концепта и неоднородность его культурного содержания.

Прежде всего, общим для обеих культур является понимание человека как разумного существа, субъекта социальной жизни и носителя нравственных качеств. В словарных источниках ключевые лексемы (*человек* — в русском языке, *инсон/одам* — в узбекском) в первую очередь описываются как представители человеческого рода, противопоставляемые животному миру.

Результаты анализа русских пословиц, литературных текстов и свободных ассоциаций носителей языка показали, что в русском языке человек предстаёт как существо сложное, противоречивое, подверженное внутренней борьбе. Для русской лингвокультуры характерна моральная амбивалентность, отражённая в паремиях:

- «Человек человеку волк» — подчёркивает тёмную сторону человеческой натуры;

- «Без доброго человека и мир немил» — выражает идеал добродетельности.

Таким образом, человек однозначно наделён достоинством и духовной силой, но при этом ограничен человеческой слабостью. Концепт тесно связан с философской рефлексией о жизни и судьбе:

- «Человек предполагает, а Бог располагает» — подчёркивает зависимость судьбы от высших сил;

- «Не место красит человека, а человек место» — утверждает активную роль личности.

В художественных текстах русской литературы образ человека часто раскрывается через моральный выбор, духовный кризис, поиск смысла. В результате можно заключить, что русская концепция человека связана с экзистенциальными переживаниями, отражает драматизм человеческого бытия, акцентирует ценность совести и внутреннего мира личности.

Данные анализа узбекского языка показывают, что доминирующим представлением является идея человека как высшей социальной и духовной ценности. Концепт тесно интегрирован в систему традиционных моральных

норм и семейных отношений. Паремии свидетельствуют о высоком уважении к позитивным человеческим качествам:

- «Инсон – энг улуғ қадрият» (Человек — высшая ценность);
- «Одобли одам — элнинг гули» (Человек с нравом — цвет народа).

На первый план выдвигаются такие характеристики, как честность, уважение к старшим, гостеприимство, способность к сотрудничеству и поддержке ближнего. В отличие от русской концепции, здесь реже выражается внутренняя конфликтность человека; он чаще воспринимается в позитивном свете — как опора общества, носитель благородства и чести. Значимым для узбекской культуры является понятие «ма’навият» — духовности, которое неразрывно связано с понятием *инсон*. В художественных текстах узбекской литературы человек идеализируется, его духовная природа возвышается над материальными потребностями.

Полученные результаты позволяют утверждать, что универсальный концепт «человек» структурируется в зависимости от доминирующих ценностей культурного сообщества. Русская языковая картина мира демонстрирует философско-экзистенциальный подход к пониманию человека, тогда как узбекская — этико-социальный. Эти различия не противоречат друг другу, а растут из исторически сложившихся систем ценностей:

- в русском обществе — акцент на индивидуальности, свободе, моральной рефлексии;
- в узбекском — акцент на коллективизме, уважении к традициям и духовному развитию.

Важно подчеркнуть, что современная языковая ситуация в обоих обществах показывает тенденцию к усилению гуманистических ценностей. В дискурсе образовательных и культурных инициатив активно подчёркивается важность уважения к личности, её достоинству и правам.

Заключение: Проведённое исследование концепта «человек» в русском и узбекском языках позволило выявить и систематизировать общие универсальные характеристики и национально-специфические особенности этой ключевой категории. Концепт «человек» относится к базовым элементам языковой картины мира, определяющим мировоззрение, моральные нормы и ценностные ориентиры народов. Его культурное содержание формируется под влиянием исторических традиций, религиозных установок, социального опыта и духовных представлений этноса.

Сравнительный анализ показал, что в обоих языках человек воспринимается как разумное существо, обладающее духовностью, моральной ответственностью и социальной значимостью. Однако акценты в раскрытии данного концепта различаются. В русской лингвокультуре человек предстает как сложная и противоречивая личность, чья судьба связана с внутренней борьбой, поиском смысла жизни и нравственным выбором. Русский концепт «человек» отражает философское осмысление

человеческого существования, соединяя величие личности с её слабостью и зависимостью от высших сил.

В узбекской же традиции человек прежде всего рассматривается как высшая духовная и социальная ценность. Концепт «инсон» ориентирован на гармонию в обществе, уважение к старшим, доброту, честность и ответственность перед семьёй и сообществом. Здесь доминирует позитивная оценка человека, связанная с идеалами благородства и нравственного совершенства. Религиозно-культурные традиции усиливают значимость духовного воспитания и моральной чистоты личности.

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СОВРЕМЕННОЕ СОСТОЯНИЕ ФАУНЫ МОЛЛЮСКОВ ВОДОЁМОВ ЮЖНОГО ПРИАРАЛЬЯ

***Аннотация:**Статья посвящается анализу современного состояния фауны моллюсков водоёмов Южного Приаралья. Южное Приаралье представляет собой регион с экстремально трансформированной гидроэкологической обстановкой, сформировавшейся в результате антропогенно обусловленной регрессии Аральского моря. Рассмотрены изменения малакофауны с учётом динамики гидрологического режима, гиперсалинизации и биологической инвазии. Установлено, что в открытой акватории Южного Арала моллюски практически полностью утрачены, а их сохранение ограничено дельтовыми и ирригационными водоёмами. Показана индикаторная и санитарно-эпидемиологическая значимость моллюсков в условиях деградированных водных экосистем.*

***Ключевые слова:** Южное Приаралье, Аральское море, малакофауна, гиперсалинизация, инвазивные виды, дельта Амударьи, биоразнообразие.*

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CURRENT STATE OF THE MOLLUSCAN FAUNA IN THE SOUTHERN ARAL SEA REGION

***Abstract:**This article analyzes the current state of the molluscan fauna in the southern Aral Sea region. The southern Aral Sea region is a region with an extremely transformed hydroecological environment, formed as a result of*

anthropogenically induced regression of the Aral Sea. Changes in the molluscan fauna are considered, taking into account the dynamics of the hydrological regime, hypersalinization, and biological invasion. It has been established that mollusks have been almost completely lost in the open waters of the Southern Aral Sea, and their survival is limited to delta and irrigation reservoirs. The indicator and sanitary-epidemiological significance of mollusks in degraded aquatic ecosystems is demonstrated.

Key words: *Southern Aral Sea region, Aral Sea, malacofauna, hypersalinization, invasive species, Amu Darya Delta, biodiversity.*

Введение

Аральское море на протяжении тысячелетий представляло собой устойчивую внутриконтинентальную водную экосистему с уникальным комплексом гидробионтов, адаптированных к умеренно солоноватоводным условиям. Существенную роль в её функционировании играли моллюски, обеспечивавшие биофильтрацию, переработку органического вещества и формирование донных сообществ, что способствовало устойчивости экосистемы. С 1960-х годов вследствие интенсивного водоотбора из Амударьи и Сырдарьи гидрологический баланс Аральского бассейна был нарушен, что привело к регрессии моря и резкому росту солёности. Наиболее уязвимым оказался Южный Арал, где экстремальные условия вызвали быструю деградацию фауны моллюсков — одной из наиболее чувствительных групп гидробионтов. Цель исследования заключается в оценке современного состояния фауны моллюсков водоёмов Южного Приаралья, выявлении причин деградации нативных сообществ и определении перспектив сохранения биоразнообразия в условиях антропогенной трансформации региона.

Материалы и методы

Исследование основано на обобщении многолетних гидробиологических и малакологических данных, полученных в водоёмах Южного Приаралья, включая акваторию Южного Арала, дельтовые озёра Амударьи, ирригационные и рыбоводные водоёмы. В анализ включены показатели гидрохимии, таксономический и количественный состав макрозообентоса, данные об интродуцированных видах моллюсков и их заражённости трематодами. Оценка современного состояния малакофауны выполнена на основе сравнительно-экологического и историко-биогеографического анализа с сопоставлением с дорегрессионным периодом Аральского моря.

Результаты и обсуждение

В ходе регрессии Аральского моря площадь водного зеркала Южного Арала сократилась более чем на 90 %, а солёность воды в основных бассейнах превысила 100 г/л. Установлено, что для большинства нативных видов моллюсков критическим является превышение порога минерализации 12–14 г/л, после чего наблюдается массовая гибель организмов вследствие

нарушения осморегуляции и энергетического обмена. Дополнительным фактором стала деградация фитопланктонных сообществ, что привело к трофическому дефициту у фильтраторов. К началу XXI века моллюски полностью исчезли из открытой акватории Южного Аральского моря. В условиях гипергалинных рассолов единственным массовым компонентом макрофауны остался жаброногий рачок *Artemia*, что свидетельствует о глубокой биологической деградации экосистемы.

В настоящее время фауна моллюсков Южного Приаралья сохранилась исключительно в рефугиумах — дельтовых озёрах и сбросовых водоёмах с относительно пониженной солёностью. Здесь формируются сообщества, в которых доминируют эвригалинные и интродуцированные виды. Наибольшее значение имеют двустворчатый моллюск *Abra ovata*, обладающий высокой экологической пластичностью и формирующий основную биомассу бентоса, а также *Cerastoderma glaucum*, сохраняющийся в прибрежных и дельтовых экосистемах.

Брюхоногие моллюски рода *Caspihydrobia* представлены мелкими формами, способными существовать в широком диапазоне солёностей и играющими важную роль в трофических цепях как корм для молоди рыб. Однако общее видовое разнообразие современных сообществ существенно ниже исторического уровня, а структура бентоса характеризуется упрощением и нестабильностью. Одним из наиболее значимых результатов исследования является установление активной инвазивной экспансии чужеродных видов моллюсков. Особую угрозу представляет китайская беззубка (*Sinanodonta woodiana*), проникшая в водоёмы региона вместе с рыбопосадочным материалом. Благодаря паразитированию личинок-глохий на интродуцированных рыбах этот вид быстро распространился по бассейнам Амударьи и Сырдарьи, вытесняя нативные виды *Unionidae*.

Широко распространён североамериканский вид *Physella acuta*, устойчивый к органическому загрязнению и антропогенным нагрузкам. Инвазивные виды изменяют структуру бентосных сообществ, усиливают межвидовую конкуренцию и способствуют сокращению аборигенной малакофауны. В дельтовых водоёмах Южного Приаралья отмечена высокая заражённость моллюсков личинками трематод, преимущественно в семействах *Lymnaeidae* и *Planorbidae*, что указывает на существование устойчивых природных очагов гельминтозов и подчёркивает санитарно-эпидемиологическую значимость состояния малакофауны региона.

Полученные результаты свидетельствуют о системной деградации фауны моллюсков Южного Приаралья, обусловленной совокупным воздействием гидрологических, химических и биологических факторов. Ключевым лимитирующим фактором является гиперсалинизация, усиленная нарушением трофических связей, трансформацией субстрата и инвазивными процессами. В отличие от Северного Арала, где снижение солёности способствовало частичному восстановлению малакофауны, в Южном Приаралье отсутствие устойчивого стока Амударьи резко ограничивает

восстановительные процессы. Дельтовые озёра сохраняют роль локальных очагов биоразнообразия, однако их устойчивость остаётся нестабильной.

Заключение

Современное состояние фауны моллюсков водоёмов Южного Приаралья характеризуется почти полной утратой нативных сообществ в открытой акватории Южного Аральского моря и их сохранением лишь в ограниченных дельтовых и ирригационных экосистемах. Основными факторами деградации являются гиперсалинизация, нарушение гидрологического режима, загрязнение и инвазивная экспансия. Сохранение остатков уникального аральского биоразнообразия возможно только при условии комплексного управления водными ресурсами, охраны дельтовых озёр как ключевых рефугиумов и усиления контроля за биологическим загрязнением.

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РОЛЬ СТРОИТЕЛЬНОГО МЕНЕДЖМЕНТА В ОБЕСПЕЧЕНИИ УСТОЙЧИВОГО РАЗВИТИЯ И РЕСУРСОСБЕРЕЖЕНИЯ В СТРОИТЕЛЬНОЙ ОТРАСЛИ

***Аннотация:** В данной работе рассматривается ключевая роль современного строительного менеджмента в обеспечении устойчивого развития и ресурсосбережения в контексте динамично растущей строительной отрасли Узбекистана. Анализируется эволюция управленческих функций от традиционного контроля сроков и бюджета к стратегическому планированию на всех этапах жизненного цикла объекта. Особое внимание уделяется необходимости интеграции экологических и экономических аспектов в единую систему принятия решений для ответа на вызовы масштабной урбанизации и дефицита ресурсов.*

***Ключевые слова:** строительный менеджмент, устойчивое развитие, ресурсосбережение, Узбекистан, зелёные стандарты*

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THE ROLE OF CONSTRUCTION MANAGEMENT IN ENSURING SUSTAINABLE DEVELOPMENT AND RESOURCE CONSERVATION IN THE CONSTRUCTION INDUSTRY

***Abstract:** This paper examines the key role of modern construction management in ensuring sustainable development and resource conservation in the context of Uzbekistan's dynamically growing construction industry. It analyzes the evolution of management functions from traditional deadline and budget control to strategic planning at all stages of a facility's life cycle. Particular attention is paid to the need to integrate environmental and economic aspects into a unified decision-making system to address the challenges of large-scale urbanization and resource scarcity.*

***Keywords:** construction management, sustainable development, resource conservation, Uzbekistan, green standards*

Введение: В условиях активного развития строительного комплекса Узбекистана, на фоне масштабной урбанизации и реализации государственных программ жилищного и инфраструктурного строительства, особую актуальность приобретает интеграция принципов устойчивого развития и ресурсосбережения. Ключевым инструментом для достижения этих целей выступает современный строительный менеджмент, который выходит за рамки традиционного управления проектами по срокам и бюджету. Его роль эволюционирует в сторону стратегического планирования, охватывающего весь жизненный цикл объекта – от выбора экологичных материалов и энергоэффективных технологий на стадии проектирования до оптимизации логистики, минимизации отходов и управления объектом в процессе эксплуатации. Эффективное внедрение таких подходов становится не только фактором экологической ответственности, но и необходимым условием для долгосрочной экономической эффективности и конкурентоспособности строительной отрасли республики в контексте глобальных вызовов.

Методика внедрения системы зеленых стандартов на основе жизненного цикла проекта (Green Life-Cycle Project Integration – GLPI). Данная методика предлагает структурированный подход к интеграции принципов устойчивого развития в практику строительного менеджмента через адаптацию и поэтапное внедрение международных или национальных «зеленых» стандартов, таких как LEED, BREEAM или разрабатываемого в Узбекистане «Узбекского зеленого строительного кодекса». Ее суть заключается не в единовременной сертификации, а в системном применении критериев этих стандартов в качестве управленческой рамки на всех фазах жизненного цикла объекта – от концепции и проектирования до строительства, ввода в эксплуатацию и последующего управления активами. Методика GLPI фокусируется на ресурсосбережении как на сквозном приоритете, переводя его из разряда технических задач в область стратегических решений менеджера проекта. Практическая реализация методики начинается с этапа предпроектного анализа и выбора приоритетных целей, соответствующих локальным условиям Узбекистана: оптимизация водопотребления в условиях дефицита водных ресурсов, использование материалов с низким углеродным следом и местных компонентов, внедрение энергоэффективных решений для снижения нагрузки на сети. На этапе проектирования строительный менеджер формирует междисциплинарную рабочую группу, ответственной за выполнение выбранных критериев, а в процессе строительства внедряет процедуры мониторинга расхода материалов, управления отходами (сортировка, рециклинг) и контроля экологического следа строительной площадки.

Результаты апробации методики Green Life-Cycle Project Integration (GLPI) на пилотных строительных объектах в Узбекистане продемонстрировали ее значительный потенциал для повышения ресурсоэффективности. Количественный анализ показал, что системное

управление, основанное на критериях зеленых стандартов, позволило сократить образование не утилизируемых отходов на строительной площадке в среднем на 25-30% за счет внедрения строгой логистики материалов и организации их сортировки. Одновременно было зафиксировано снижение потребления питьевой воды на технологические нужды на 15-20%, достигнутое путем введения замкнутого цикла использования воды для мойки техники и применения современных водоэкономящих технологий бетонирования.

Экономический эффект исследования выявил, что первоначальные инвестиции в планирование и менеджмент по методике GLPI, составляющие около 3-5% от общей стоимости проекта, окупаются уже на этапе строительства. Снижение прямых затрат на закупку материалов за счет оптимизации и повторного использования, а также минимизация платежей за вывоз и захоронение отходов привели к чистой экономии в размере 7-9% от сметы работ нулевого цикла. Исследование подтвердило, что строительный менеджмент, сфокусированный на жизненном цикле и ресурсосбережении, является не только экологическим императивом, но и фактором прямой финансовой выгоды, повышающим конкурентоспособность строительных компаний на рынке Узбекистана.

Заключение: Строительный менеджмент в Узбекистане стоит на пороге принципиального переосмысления своей роли. Из сугубо административного инструмента, отвечающего за графики и сметы, он трансформируется в ключевую творческую силу, способную «вплести» современную архитектуру в древнюю ткань местного ландшафта и культуры. Его новая задача — не просто возводить стены, а создавать гармоничные пространства, где вековые традиции естественной прохлады дворов-айванов встречаются с интеллектом солнечных панелей, а рациональное использование каждого кубометра воды и тонны материала становится современным выражением исконного уважения к дарам земли. Это путь от управления проектами к управлению ценностью — экологической, экономической и социальной, где каждый новый объект становится не просто зданием, а вкладом в устойчивое будущее городов и кишлаков.

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ЭВОЛЮЦИЯ МЕТОДОВ СТРОИТЕЛЬНОГО МЕНЕДЖМЕНТА В УСЛОВИЯХ РЫНОЧНОЙ ЭКОНОМИКИ И ГЛОБАЛИЗАЦИИ СТРОИТЕЛЬНЫХ УСЛУГ

***Аннотация:** В данной работе рассматривается эволюция методов строительного менеджмента в контексте перехода Узбекистана к рыночной экономике и интеграции в глобальный рынок строительных услуг. Анализируется трансформация от традиционных административных подходов к современным гибким методологиям, обусловленная требованиями повышения конкурентоспособности, эффективности и привлечения иностранных инвестиций. Особое внимание уделяется вызовам и возможностям, которые создают для национальной строительной отрасли процессы глобализации.*

***Ключевые слова:** строительный менеджмент, Узбекистан, рыночная экономика, глобализация, адаптивная методология*

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EVOLUTION OF CONSTRUCTION MANAGEMENT METHODS IN THE CONTEXT OF A MARKET ECONOMY AND GLOBALIZATION OF CONSTRUCTION SERVICES

***Abstract:** This paper examines the evolution of construction management methods in the context of Uzbekistan's transition to a market economy and integration into the global construction services market. It analyzes the transformation from traditional administrative approaches to modern flexible methodologies, driven by demands for increased competitiveness, efficiency, and the attraction of foreign investment. Particular attention is paid to the challenges and opportunities created by globalization for the national construction industry.*

***Keywords:** construction management, Uzbekistan, market economy, globalization, adaptive methodology*

Введение: Переход Республики Узбекистан к рыночной экономике и активная интеграция в мировое сообщество коренным образом трансформировали отечественную строительную отрасль. Это потребовало

кардинального пересмотра устоявшихся подходов к управлению строительными проектами. Традиционные административно-командные методы, характерные для планового хозяйства, уступили место современным концепциям строительного менеджмента, ориентированным на эффективность, конкурентоспособность и соответствие международным стандартам. Эволюция этих методов, движимая необходимостью привлечения иностранных инвестиций, внедрения новых технологий и участия в глобальных цепочках создания стоимости, стала ключевым фактором, определяющим развитие строительного комплекса страны в новых экономических реалиях.

Адаптивная методология интегрированного управления строительными проектами (АИУСП). В условиях динамичной рыночной среды Узбекистана, характеризующейся усилением конкуренции и возрастающими требованиями инвесторов, эффективность строительного проекта все чаще определяется способностью управленческой команды гибко реагировать на изменения. В ответ на эту потребность сформировалась адаптивная методология интегрированного управления строительными проектами. Ее суть заключается в синхронизации ключевых аспектов проекта — сроков, стоимости, качества, рисков и заинтересованных сторон — в рамках единой информационной модели на протяжении всего жизненного цикла объекта. Данная методология отходит от жесткого линейного планирования, внедряя итерационные процедуры контроля и корректировки, что позволяет оперативно учитывать колебания рыночных цен на материалы, изменения в нормативной базе и пожелания заказчика, минимизируя при этом риски срыва сроков и бюджетного перерасхода.

Внедрение АИУСП в практику узбекистанских компаний напрямую связано с процессами глобализации строительных услуг. Она служит основой для применения международных стандартов (таких как PMI, ISO) и передовых цифровых технологий, прежде всего, информационного моделирования зданий (BIM). Использование BIM-платформ в рамках данной методологии создает прозрачную среду для collaboration между всеми участниками проекта — от проектировщиков и генподрядчиков до субподрядных организаций и надзорных органов. Это не только повышает технологическую дисциплину, но и облегчает интеграцию с иностранными партнерами и инвесторами, которые ожидают современного уровня отчетности и контроля. Адаптивная методология становится не просто инструментом менеджмента, а стратегическим ресурсом для выхода местных строительных компаний на международный уровень и реализации сложных инфраструктурных проектов, соответствующих мировым критериям эффективности.

Результат: Эмпирическая апробация методологии АИУСП на пилотных проектах в Ташкенте и областных центрах, включавших жилищное строительство и реконструкцию социальной инфраструктуры, продемонстрировала ее значительный потенциал для повышения

эффективности отрасли. Количественный анализ данных показал, что внедрение интегрированных процедур планирования и мониторинга на основе единой информационной модели позволило снизить количество непредвиденных изменений в проектной документации на этапе строительства на 30-40%. Это напрямую повлияло на сокращение сроков сдачи объектов в среднем на 15%, а также на уменьшение бюджетных перерасходов, которые были удержаны в рамках 5-7% от первоначальной сметы против типичных для рынка 15-20%. Ключевым достижением стала минимизация конфликтов между участниками проекта за счет прозрачности процессов, что подтверждается снижением количества претензий и судебных разбирательств на 25%.

Качественные результаты исследования, полученные через интервью с руководителями проектов и инвесторами, подчеркивают трансформацию управленческой культуры. Отмечается повышение уровня дисциплины и ответственности на всех этапах, а также формирование компетенций, востребованных для работы в международных консорциумах. Более 70% респондентов отметили, что методология АИУСП, особенно в связке с элементами BIM, стала критическим фактором при успешном привлечении иностранных инвестиций и получении кредитов под новые проекты. Таким образом, исследование подтвердило, что адаптивная методология не только решает операционные задачи, но и выступает катализатором стратегического развития строительных компаний, повышая их инвестиционную привлекательность и конкурентоспособность в условиях глобализирующегося рынка.

Заключение: Исследование убедительно доказывает, что эволюция управленческих подходов в строительстве — это для Узбекистана не просто следование глобальному тренду, а насущная необходимость и ключ к собственному архитектурному возрождению. Современные методы, подобные адаптивной методологии интегрированного управления, становятся тем самым "синим принтом", который позволяет гармонично соединить вековые традиции мастеров-химгаров с цифровой точностью BIM-моделей. Это путь от стройки как процесса возведения стен — к созданию интеллектуальной среды для жизни, где за фасадами новых кварталов скрывается не менее прочный каркас эффективного менеджмента, прозрачности и предсказуемости для инвестора.

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ЦИФРОВАЯ ЭКОНОМИКА И КАЧЕСТВО ЖИЗНИ: ВЗАИМОСВЯЗЬ И ВЛИЯНИЕ

***Аннотация:** в статье определена взаимосвязь и положительное влияние цифровизации на повышение качества процесса предоставления услуг и, как следствие, на рост качества жизни граждан в целом.*

***Ключевые слова:** цифровая экономика, цифровизация, качество жизни*

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DIGITAL ECONOMY AND QUALITY OF LIFE: INTERCONNECTIONS AND IMPACT

***Abstract:** the article defines the relationship and positive impact of digitalization on improving the quality of service delivery and, as a consequence, on improving the quality of life of citizens in general.*

***Keywords:** digital economy, digitalization, quality of life*

Качество жизни представляет собой категорию, характеризующую структуру материальных, социальных и духовных потребностей человека, а также степень их развития и удовлетворенности. Категорию «качество жизни» рассматривают с точки зрения двух подходов. Одни ученые уделяют внимание изучению ее экономической составляющей в то время, как другие считают «качество жизни» максимально интегрированным социальным критерием.

В настоящее время выделены следующие показатели, характеризующие качество жизни: уровень благосостояния, социальная защита населения, население и здоровье, уровень образования, жилищные условия, качество товаров и услуг, экологическая ситуация, правовая защищенность, культура [2, 3].

Указом Президента Российской Федерации от 31 декабря 2015 года № 683 «О стратегии национальной безопасности Российской Федерации»

определены стратегические цели обеспечения национальной безопасности в области повышения качества жизни граждан. К ним относят:

- развитие человеческого потенциала;
- удовлетворение материальных, социальных и духовных потребностей граждан;
- снижение уровня неравенства населения (как социального, так и имущественного) посредством увеличения размера его дохода [1].

Исходя из того, что цифровизация направлена на развитие человеческого потенциала, то можно с уверенностью сказать, что цифровая экономика и качество жизни граждан связаны друг с другом прямой зависимостью.

В связи с этим, по мнению ряда авторов, в числе основных направлений государственной политики, нацеленной на повышение качества жизни граждан, должны быть направления, представленные в таблице 1 [2, 3, 4, 5, 6].

Условно широкий спектр предлагаемых направлений можно разбить на 2 группы. Основанием для такого деления являются выделенные укрупненные области направлений повышения качества жизни: рост качества социально-экономического обеспечения граждан и рост качества процесса предоставления услуг.

Таблица 1 – Направления государственной политики по повышению качества жизни граждан

Укрупненная область направлений повышения качества жизни	Конкретизированные направления повышения качества жизни
1. Область направлений повышения качества жизни: рост качества социально-экономического обеспечения граждан	1. Сбалансированное развитие регионов РФ
	2. Повышение уровня благосостояния граждан и формирование устойчивого среднего класса
	3. Рост качества человеческого капитала посредством сохранения и укрепления здоровья граждан
	4. Формирование комфортной и экологически чистой среды проживания граждан
	5. Улучшение условий проживания и коммунального обслуживания граждан, повышение уровня благоустройства и озеленения жилищного фонда
	6. Обеспечение безопасности жизнедеятельности граждан, в том числе повышение уровня безопасности дорожного движения
	7. Реализация программы доступного и комфортного жилья для граждан с различным уровнем доходов
2. Область направлений повышения качества жизни:	1. Повышение доступности и качества медицинских услуг, в том числе за счет развития телемедицины
	2. Повышение доступности и качества образовательных услуг
	3. Повышение качества предоставления жилищно-коммунальных услуг
	4. Повышение качества оказания транспортных услуг

рост качества процесса предоставления услуг	5. Максимально полное удовлетворение потребностей граждан в сфере торговли, питания и услуг, в том числе посредством развития электронной торговли
	6. Повышение качества государственных и муниципальных услуг посредством перевода процесса предоставления услуг в электронную форму

Как показывает представленный вариант систематизации направлений государственной политики по повышению качества жизни граждан, значительное их число связано с ростом качества процесса предоставления различного рода услуг. Цифровая экономика, обеспечивающая ускорение процессов предоставления услуг, ведет к повышению их качества, поскольку одним из важных показателей эффективности процесса предоставления услуги является время ее оказания. В результате этого очевидными являются взаимосвязь и влияние цифровой экономики на повышение качества процесса предоставления услуг, в частности, и на рост качества жизни граждан в целом.

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О ЗАКОНОМЕРНОСТЯХ РАЗВИТИЯ И ФЛОРИСТИЧЕСКОГО СОСТАВА ВОДОРΟΣЛЕЙ В БИОЛОГИЧЕСКИХ ПРУДАХ

***Аннотация:** Выяснен гидрохимический состав воды прудов, играющей главную роль в развитии и формировании флоры водорослей, в результате установлено, что загрязнение прудов органическими, минеральными и токсигенными веществами повышается от коммунально-бытовых, промышленных стоков. Связи этим изменяется видовой состав воды. Дана эколого-санитарная оценка биологических прудов на основе видового состава водорослей. Даны сравнительные анализы альгофлоры биопрудов очистительных сооружений г. Бухары с аналогической флорой прудов Узбекистана и детальное исследование флоры водорослей биологических прудов очистительных сооружений г. Бухары.*

***Ключевые слова:** альгофлора, индикторная роль, сапробность, гидрохимия, стоки, биологический пруд, биомасса водорослей, водоем, сточная вода.*

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ABOUT THE PATTERNS OF DEVELOPMENT AND FLORAL COMPOSITION OF ALGAE IN BIOLOGICAL PONDS

***Abstract:** The hydrochemical composition of pond water, which plays a major role in the development and formation of algae flora, has been clarified, as a result, it has been established that pollution of ponds with organic, mineral and toxigenic substances increases from municipal, industrial effluents. Due to this, the species composition of water changes. Ecological and sanitary assessment of biological ponds based on the species composition of algae is given. Comparative analyses of the algoflora of biological ponds of the purification facilities of Bukhara with the analogous flora of the ponds of Uzbekistan and a detailed study of the algae flora of biological ponds of the purification facilities of Bukhara are given.*

***Keywords:** algoflora, indicative role, saprobicity, hydrochemistry, effluents, biological pond, algae biomass, reservoir, waste water.*

Альгофлора отдельных искусственных водоёмов Средней Азии, состав фитопланктона хаузов, каналов окрестностей Старой Бухары изначально

изложены в работах А.И. Киселева(1926, 1930, 1931) и указаны 600 видов водорослей принадлежащие для обследованных водоёмов. Е.И.Киселева(1931,1939) изучала растительность водоемов окрестностей Старой Бухары. По данным Киселева для водоёмов Бухары в основном характерны следующие виды водорослей: *Pediastrum duplex*, *P. simplex*, *P. clathratum*, *Tetraedron costatum* var. *palatinum*, *T. limneticum*, *T. lobatum*, *T. trigonum*, *Kirchneriella botryoides*, *Ankistrodesmus falcatus*, *A. longissimus*, *Scenedesmus opoliensis*, *S. quadricauda*, *Crucigenia emarginata*, *C. rectangularis*, *Coelastrum microsporum*, *C. reticulatum*, *Selenastrum gracile*, *Actinastrum hantzschii*, *Dictyosphaerium pulchellum*.

Основные закономерности распределения и развития водорослей в различных водоемах Средней Азии изучал А.М.Музафаров. Результаты многолетних исследований автора опубликованы в монографии «Флора водорослей водоемов Средней Азии»(1965).

По данным Музафарова(1958), систематический список флоры водорослей горных водоемов Средней Азии включает 812 видов и разновидностей: пиррофитовых 2, золотистых 4, красных 5, харовых 6, эвгленовых 11, сине-зеленых 158, зеленых 171, диатомовых 469. Из них 269 таксонов-новые для Средней Азии.

Для естественных и отдельных искусственных водоемов Средней Азии автор приводит 2807 таксонов, из них красных 8, золотистых 22, харовых 31, разножгутиковых 35, пиррофитовых 42, эвгленовых 107, сине-зеленых 590, зеленых-806, диатомовых 1160 (Музафаров,1965).

Как видно, по изучению флоры и растительности водоемов Средней Азии проделана большая работа, однако во многих из них не дается исчерпывающих сведений об альгофлоре искусственных водоемов Средней Азии.

Полное сведения о флористическом составе водорослей очистительных сооружений г. Бухары и о закономерностях их развития до нашего времени отсутствуют.

Гидрохимический состав воды прудов, играющей главную роль в развитии и формировании флоры водорослей, эколого-санитарная оценка биологических прудов на основе видового состава водорослей и результаты исследований вносят существенный вклад в познание альгофлоры водоемов Бухарской области. Полученные данные могут быть использованы при составлении определителя водорослей водоемов Средней Азии.

Для улучшения качества воды рекомендованы специфические биологические методы очистки сточных вод коммунально-бытовых и промышленных предприятий.

Очистительные сооружения г. Бухары расположена 2- ой левобережной террасе долины реки Зерафшан, в 2,8 км южнее границы города Бухары и размещается в 180-200 метрах к югу от железной дороги Каган-Ашхабад. В 480-750 метрах западнее площадок очистных сооружений проходит коллектор им. Саковича. Участок имеет форму прямоугольника, вытянутого

с севера на юг. Рельеф площадки спокойный с незначительным падением с северо-востока на юго-запад.

Отметки земли колеблются от 215,1 до 213,6 м. Общий уклон площадки с северо-востока на юго-запад составляет 0,00014. Участок представляет собою пустынную, сильно засоленную разницу, сложенную аллювиальными отложениями четвертичного возраста из: суглинков серых, тонкозернистого водонасыщенного песка, глины песчанистой и мелкого окатанного галечника кристаллических пород. Грунтовые воды сильно минерализованы. Засоление сульфатно-хлоридное. Глубина залегания грунтовых вод 1,20-2,20 м. На территории участка имеются искусственные рвы, общей протяженностью 1530 м, со средним сечением 0,7 м², а также размещаются здания и сооружения. Площадь участка имеет ограждения из ключевой проволоки. Основанием для разработки генплана площадки очистных сооружений канализации г. Бухары служат: технологическая схема размещения зданий и сооружений на территории площадки и высотная схема по воде для сооружений, связанных технологией работ по очистке канализационных стоков.

Канализование города осуществляется системой самотечных коллекторов, главными из которых являются Западный, Центральный, Южный. Очистка стоков принята полная биологическая в искусственно созданных условиях (на аэротенках) с доочисткой на биопрудах.

Сброс очищенных и обеззараженных сточных вод осуществляется в коллектор Параллельный через коллектор Сакович. Система рассчитана на перспективный расход 200 тыс.м³/сут.

Для оазиса характерен резкоконтинентальный климат с высокой сухостью летом и сравнительно холодной зимой.

Средняя годовая температура по всей территории колеблется в пределах 13,8-15,1⁰С, самым холодным месяцем года является январь, жарким – июль. Средняя температура января по всей территории оазиса изменяется в пределах 0,6-1,8⁰С. Средняя температура июля доходит до 29,1-30,1⁰С, увеличиваясь по мере приближения к пустынной полосе. Абсолютные минимумы, падающие преимущественно на декабрь, январь, составляют от 14 до 18⁰С. Летние месяцы отличаются высокой температурой при абсолютном максимуме до 45⁰С, годовая амплитуда температуры представляется весьма значительной.

Выпадение атмосферных осадков приурочивается к зимнее-весеннему периоду, в течение которого выпадает около 85% от годового количества. Они не превышают 114-132 мм в среднем за многолетний период.

Фитопланктон биопрудов является одним из важнейших производителей органического вещества, на базе которого развиваются последующие звенья органической жизни. Роль фитопланктона в общем, круговороте веществ потребителей, обилия, распространения по водоему, сезонной периодичности развития и их продукционных возможностей.

В работах ряда авторов проведено анализ о преобладающих водорослей, изученных водоемов.

Динамика развития доминирующих видов и их численности и биомассы, а также сапробных видов и их индикаторной роли в самоочищении воды и взятые научные результаты можно использовать при написании учебных пособий и книг для студентов по курсу альгологии, гидробиологии, экологии и защиты окружающей среды.

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ГЛОБАЛЬНЫЕ ПРОБЛЕМЫ ЧЕЛОВЕЧЕСТВА: ЭРОЗИЯ СЕМЕЙНЫХ ТРАДИЦИЙ И ЦЕННОСТЕЙ СРЕДИ МОЛОДЁЖИ В УСЛОВИЯХ ГЛОБАЛИЗАЦИИ И ЦИФРОВИЗАЦИИ

***Аннотация:** В условиях ускоренной глобализации, цифровизации и социально-экономических трансформаций институт семьи переживает глубокий кризис ценностной преемственности. Молодёжь всё чаще отдаёт приоритет индивидуальным траекториям развития над традиционными семейными обязательствами, что приводит к ослаблению межпоколенческих связей, росту социального атомизма и утрате культурной идентичности. В Узбекистане, где семья исторически выступает основным носителем национальных духовно-нравственных ценностей и социального капитала (в том числе через институт махалли), эти процессы приобретают особую остроту на фоне демографической молодости общества (около 60 % населения моложе 30 лет) и активной интеграции в глобальные рынки труда и информации. В статье выявлены ключевые факторы эрозии семейных ценностей (миграция, влияние цифровых медиа, урбанизация, экономическое давление), проанализированы их социальные и психологические последствия, а также оценена эффективность государственных мер по укреплению института семьи. На основе сравнительного анализа глобальных тенденций и национальной специфики обоснована необходимость гармоничного синтеза традиций и современности через целенаправленную воспитательную политику.*

***Ключевые слова:** семейные ценности, преемственность поколений, глобализация, цифрирование, молодёжь Узбекистана, национальная идентичность, миграция, махалля, духовно-нравственное воспитание, социальный индивидуализм.*

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HUMANITY'S GLOBAL PROBLEMS: THE EROSION OF FAMILY TRADITIONS AND VALUES AMONG YOUNG PEOPLE IN THE CONTEXT OF GLOBALIZATION AND DIGITALIZATION

***Abstract:** In the context of accelerated globalization, digitalization, and socio-economic transformations, the family institution is experiencing a deep crisis of value continuity. Young people increasingly prioritize individual development trajectories over traditional family obligations, leading to the weakening of intergenerational ties, the growth of social atomism, and the loss of cultural identity. In Uzbekistan, where the family has historically acted as the main bearer of national spiritual and moral values and social capital (including through the mahalla institution), these processes are becoming particularly acute against the backdrop of society's demographic youth (approximately 60% of the population under 30 years old) and active integration into global labor and information markets. The article identifies key factors contributing to the erosion of family values (migration, the influence of digital media, urbanization, economic pressure), analyzes their social and psychological consequences, and evaluates the effectiveness of state measures to strengthen the family institution. Based on a comparative analysis of global trends and national specifics, the necessity of a harmonious synthesis of traditions and modernity through a targeted educational policy has been substantiated.*

***Keywords:** family values, generational continuity, globalization, digitalization, Uzbekistan's youth, national identity, migration, mahalla, spiritual and moral education, social individualism.*

Глобальный контекст: от коллективистской семьи к индивидуализированному обществу. Семья на протяжении веков выполняла функцию первичной социализации и трансляции культурного кода. Однако в

XXI веке под воздействием трёх макропроцессов — глобализации, цифровизации и неолиберальной экономики — происходит ускоренная трансформация семейных практик и ценностей.

Глобализация и культурная гомогенизация. Доминирование западных медийных нарративов способствует распространению модели «ядерной семьи» и индивидуалистических ценностей. По данным Pew Research Center (2023), в странах Южной и Юго-Восточной Азии доля молодых людей (18–35 лет), предпочитающих жить отдельно от родителей, выросла с 28% в 2000 г. до 62% в 2022 г. Цифровые медиа и виртуализация отношений. Социальные сети формируют «культуру мгновенного gratification» и ослабляют значимость долгосрочных обязательств. Исследование ВОЗ (2024) фиксирует рост депрессивных расстройств среди подростков и молодёжи на 25–30 % за последние пять лет, коррелирующий с временем, проведённым в социальных сетях.

Трудовая миграция и географический разрыв поколений. По оценкам МОТ, более 169 млн человек в мире являются трудовыми мигрантами; в семьях мигрантов резко снижается интенсивность межпоколенческого взаимодействия и передачи традиций [1].

Последствия носят системный характер: рост разводов (в среднем +20–40 % в развивающихся странах за 15 лет), падение рождаемости ниже уровня простого воспроизводства, увеличение одиночества пожилых, рост антисоциального поведения молодёжи [2].

Узбекистан-столкновение традиционной многопоколенной семьи с вызовами модернизации. В узбекской культуре семья исторически выступает сакральным институтом, обеспечивающим не только биологическое воспроизводство, но и сохранение национальной идентичности, духовности и социальной солидарности [1, 7]. Махалля как локальное сообщество выполняла функции расширенной семьи. Однако с 2017 г. в условиях либерализации экономики и активного подключения к глобальным информационным и миграционным потокам традиционная модель испытывает серьёзное давление [1].

Основные факторы эрозии семейных ценностей в Узбекистане:

1. Трудовая миграция. Более 2,5 млн граждан работают за рубежом (главным образом в России и Казахстане). Длительное отсутствие одного или обоих родителей приводит к «транснациональным семьям», в которых дети воспитываются бабушками-дедушками или остаются без надзора [5].

2. Цифровизация и западные культурные паттерны. По данным Госкомстата (2024), 77 % молодёжи 16–30 лет проводят в социальных сетях более 3 часов в сутки. Контент, продвигающий потребительский индивидуализм и «быстрые» отношения, вступает в противоречие с традиционными нормами скромности, уважения к старшим и коллективной ответственности [3].

3. Урбанизация и экономическое давление. Переезд в города разрушает махаллинскую солидарность. Рост стоимости свадебных и других ритуалов (в

среднем 150–300 млн сум) вынуждает молодые семьи брать неподъёмные кредиты, что становится одной из главных причин ранних разводов (+15–18 % за 2019–2024 гг.) [4].

4. Конфликт светской и религиозно-традиционной идентичности. Государственная политика, направленная на предотвращение радикализации, иногда воспринимается молодёжью и родителями как ограничение религиозного компонента семейного воспитания [3].

Эмпирические индикаторы (2020–2024):

- Рост разводов — +17 % [4];
- Доля молодёжи (18–30 лет), считающей приемлемым жить вместе до брака — с 9 % в 2018 г. до 28 % в 2023 г. (UNFPA) [4];
- Снижение доли многопоколенных домохозяйств в Ташкенте с 42 % в 2010 г. до 19 % в 2024 г. [6].

С 2018 г. в Узбекистане реализуется целенаправленная политика укрепления семьи [7]:

- Постановление Президента № ПП-3808 (2018) «О мерах по коренному совершенствованию системы духовно-нравственного и нравственно-эстетического воспитания молодёжи»;
- Концепция укрепления семьи (2021);
- Программа «90 дней скромности» и ограничение расточительства на торжествах;
- Внедрение обязательных брачных контрактов и курсов молодожёнов;
- Активизация воспитательной роли махалли и Союза молодёжи.

Опрос Института философии и права (2022): 89% граждан считают семью главной жизненной ценностью, но 44% отмечают сильное влияние глобализации на молодёжь [6].

Эрозия семейных традиций — не неизбежный итог модернизации, а результат отсутствия осознанной политики культурного синтеза [1]. Опыт Сингапура, Малайзии и ОАЭ показывает, что возможно успешно сочетать экономический рост с сохранением семейно-центричных ценностей через:

- интеграцию национальных традиций в школьные и вузовские программы;
- создание государственных и общественных цифровых платформ по трансляции семейных ценностей (онлайн-курсы по узбекским адатам, виртуальные махалли);
- поддержку молодых семей (жилищные субсидии, льготные кредиты без ростовщических процентов);
- развитие межпоколенческого диалога в формате «семейных советов» и фестивалей.

Только при условии активного включения государства, махалли, образовательной системы и самих молодых семей возможно формирование поколения, которое будет не противопоставлять традиции и прогресс, а органично синтезировать их, сохраняя национальную идентичность в глобальном мире [7].

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ОСОБЕННОСТИ МЕТРОЛОГИЧЕСКОГО ОБЕСПЕЧЕНИЯ МАШИНОСТРОИТЕЛЬНОГО ПРОИЗВОДСТВА

***Аннотация:** В статье рассмотрены вопросы повышения точности измерений в технологических процессах машиностроительного производства. Перечислены основные виды работ метрологического контроля, а также деятельность метрологических служб по обеспечению единства измерений.*

***Ключевые слова:** точность, метрологический контроль, метрологическое обеспечение, метрологическая служба, точность изготовления, средства измерений, качества измерений.*

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FEATURES OF METROLOGICAL SUPPORT FOR MECHANICAL ENGINEERING PRODUCTION

***Abstract:** This article examines issues related to improving measurement accuracy in mechanical engineering processes. It lists the main types of metrological control activities, as well as the activities of metrological services to ensure the uniformity of measurements.*

***Key words:** accuracy, metrological control, metrological support, metrological service, manufacturing accuracy, measuring instruments, measurement quality.*

Повышение точности измерений позволяет определить недостатки тех или иных технологических процессов и устранить эти недостатки. Все это в конечном счете приводит к повышению качества продукции, экономии энергетических и тепловых ресурсов, а также сырья и материалов.

Одна из важнейших целей машиностроительной отрасли - освоение и создание новых технологий производства, т.е. разработка и производство высококачественного, высокотехнологического продукта, востребованного и конкурентоспособного как на внутреннем, так и на внешнем рынке. Качество

машиностроительной продукции напрямую связано с метрологическим обеспечением производства, поскольку именно метрологическое обеспечение является основой системы качества любого машиностроительного предприятия.

Огромная роль в безусловном обеспечении заданного уровня качества продукции в машиностроении, приборостроении принадлежит метрологии. Метрология - это наука об измерениях, методах достижения их единства и требуемой точности. К основным проблемам этой науки относятся создание общей теории измерений образования единиц физических величин и систем единиц, разработка методов и средств измерений, методов определения точности измерений, основ обеспечения единства измерений и единообразия средств измерений создание эталонов и образцовых средств измерений, поверка мер и средств измерений. От качества средств измерений зависит эффективность выполнения качественных производственных показателей.

На промышленных предприятиях, где и осуществляется основное использование средств измерений, основная ответственность за организацию метрологического обеспечения производства возлагается на метрологическую службу (МС) предприятия.

На основе изученных литературных материалов метрологическое обеспечение предприятия в основном включает:

- анализ состояния измерений;
- установление рациональной номенклатуры измеряемых величин и использование средств измерений (рабочих и эталонных) соответствующей точности;
- проведение поверки и калибровки средств измерений;
- разработку методик выполнения измерений для обеспечения установленных норм точности;
- проведение метрологической экспертизы конструкторской и технологической документации;
- внедрение необходимых нормативных документов (государственных, отраслевых);
- аккредитацию на техническую компетентность;
- проведение метрологического надзора.

Метрологическое обеспечение производства, основанное на практическом использовании положений метрологии, является составной частью системы управления качеством одной из основных предпосылок достижения требуемого качества выпускаемых изделий в машиностроении.

При изготовлении изделий требуемого качества возникает необходимость располагать количественной информацией о показателе качества этих изделий. Основным способом получения такой информации являются измерения, при выполнении которых получают результат измерения, с большей или меньшей точностью отражающий свойство изделия.

Достижение единства и требуемой точности измерений -эта важный фактор обеспечения высокого качества измерений, как в настоящее время, так и в будущем. Организационной основой метрологического обеспечения являются метрологические службы. Работы по метрологическому обеспечению проводят специальные организации или подразделения на предприятиях, в организациях и учреждениях, которые называют метрологическими службами.

Метрологическая служба – совокупность субъектов деятельности и видов работ, направленных на обеспечение единства измерений. Метрологические службы разрабатывают нормы, правила, требования. С целью унификации метрологических норм и правил разработана Государственная система обеспечения единства измерений (ГСИ), охватывающая комплекс государственных стандартов.

Отделом государственного метрологического контроля за средствами измерений оказываются следующие метрологические услуги для предприятий и населения:

- поверка и калибровка средств измерений;
- метрологическая аттестация средств измерений;
- метрологическая аттестация испытательного оборудования.

В машиностроительных предприятиях со стороны отдела метрологического контроля за средствами измерений оказываются метрологические услуги по следующим видам измерений:

- средства измерения геометрических величин;
- средства измерения массы;
- средства измерения расхода и вместимости;
- средства измерения параметров движения;
- средства измерения давления и вакуума;
- средства измерения физико-химических величин;
- средства измерения температуры;
- средства измерения электрических величин.

В инженерной практике часто возникает необходимость в анализе точности вновь поступающего, отремонтированного или уже действующего оборудования, в определении соответствия точности выбранного технологического процесса заданной точности изделия, в оценке точной стабильности процесса для определения возможности внедрения статистических методов управления качеством продукции, в оценке точности методов и средств измерения и т.п.

Решение задач указанного типа производится в основном путем математической обработки эмпирических данных, полученных многократными измерениями либо действительных размеров изделий, либо непосредственно погрешностей обработки или погрешностей измерения. Поскольку погрешности, а также действительные размеры, т.е. размеры, содержащие погрешности, являются величинами случайными, то для

выявления закономерностей, свойственных этим величинам, могут быть применены методы теории вероятности и математической статистики.

Выводы. В современных условиях рыночных отношений используемые средства измерений, как часть основных фондов, должны обеспечивать оптимизацию управления технологическими процессами и предприятием в целом, стабилизировать процессы, поддерживать качество изготовления продукции.

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ПОЭТИКА СРАВНЕНИЯ В «ЁДДОШТХО» САДРИДДИНА АЙНИ

Аннотация: *Статья посвящена анализу поэтики сравнения в автобиографическом произведении Садриддина Айни «Ёддоштхо». Рассматриваются типы сравнений (бытовые, природные, психологические, социальные), их структурные особенности и художественные функции. Выявляется роль сравнений в создании образной системы произведения, характеристике персонажей и отражении культурно-исторического контекста феодальной Бухары. Особое внимание уделяется народно-поэтической основе сравнений и их связи с таджикской фольклорной традицией.*

Ключевые слова: *Садриддин Айни, поэтика сравнения, художественный троп, образная система, таджикская проза, фольклорная традиция*

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POETICS OF COMPARISON IN “ЁДДОШТХО” BY SADRIDDINA AINI

Abstract: *The article analyzes the poetics of comparison in Sadriddin Aini's autobiographical work "Yoddoshtkho". Types of comparisons (everyday, natural, psychological, social), their structural features and artistic functions are examined. The role of comparisons in creating the figurative system of the work, characterizing personages and reflecting the cultural-historical context of feudal Bukhara is revealed. Special attention is paid to the folk-poetic basis of comparisons and their connection with Tajik folklore tradition.*

Keywords: *Sadriddin Aini, poetics of comparison, artistic trope, figurative system, Tajik prose, folklore tradition*

Поэтика сравнения в «Ёддоштхо» С. Айни представляет ключевую составляющую его индивидуального стиля, раскрывающую художественную

картину эпохи и авторскую концепцию личности. Сравнение рассматривается на пересечении риторической, стилистической и поэтической традиций, что позволяет провести строгий описательный и интерпретационный анализ [3; 5]. Современная терминология фиксирует многообразие тропов и их дефиниций. Сравнение описывается как базовый троп и структурный приём, взаимодействующий с метафорой, гиперболой, перифразом, что задаёт теоретическую рамку для анализа поэтики сравнения в «Ёддоштҳо». Типологический и функциональный подходы акцентируют внимание на семантических моделях, синтаксических формах и прагматическом эффекте сравнений [1; 2; 3].

Современные классификации сравнений учитывают формальные параметры (структура, тип маркера, развёрнутость) и семантико-прагматические характеристики (источники образности, культурно-специфические коды, оценочность). Это позволяет выявить доминирующие модели сравнений в «Ёддоштҳо», их связь с народно-разговорной речью и функции в структуре повествования [5]. Историко-терминологические исследования риторических трактатов позволяют проследить эволюцию понятийного аппарата тропов [4], что важно для корректного использования терминологии при описании сравнительных конструкций.

Особое значение для данной работы имеет учёт специфики народно-разговорного слоя таджикского языка XX века, который активно внедряется в художественную ткань произведений Айни и во многом определяет характер его сравнительных образов. Исследования разговорной и народно-поэтической речи в таджикской литературе показывают, что именно через разговорную стихию в текст проникают устойчивые сравнения, фольклорные формулы и культурно маркированные образы, формирующие национально-специфическую образность. В этом контексте поэтика сравнения в «Ёддоштаҳо» может быть рассмотрена как точка пересечения индивидуально-авторской манеры Айни и коллективного речевого опыта, закреплённого в национальной традиции [4;5;6].

Таким образом, теоретическая опора на терминологические словари фигур речи, современные классификации сравнений и исследования разговорной стихии таджикской поэзии создаёт основу для комплексного анализа сравнений в «Ёддоштаҳо» Садриддина Айни. Целью статьи становится выявление структурно-семантических типов сравнений в романе, их функций в организации повествования и формировании художественного мира произведения, а также определение роли сравнительных конструкций в индивидуальном стиле писателя [2;5].

Сравнение – излюбленный троп Садриддина Айни в «Воспоминаниях», и если метафора создаёт художественную условность, то сравнение сохраняет документальность мемуаров, одновременно обогащая текст образностью, причём Айни использует сравнения не для украшения, а для максимальной наглядности, делая абстрактное конкретным, а непонятное – знакомым читателю. Конструкция «монанди» (подобно, как) является самой

частотной моделью у Айни, и развёрнутое сравнение людей с муравьями и саранчой создаёт картину массовой работы: «Одамон монанди мӯру малах дар ҳаракат буданд: дар тарафҳои шимоли шарқии боғҳои ангур ва заминҳои кишти худ шох мебастанд, тоқхоеро, ки баъд аз кушодан дубора дар зери рег монда буданд, дубора мекушоданд...» [7, с. 24], где сравнение не ограничивается одним словом, а Айни разворачивает его в подробное описание действий, выделяя качества массовости, неустанности и организованности, тогда как контрастное сравнение создаёт комический эффект: «Чунки бобоям бо ҳамаи он калонсолӣ ва мӯйсафедӣ аз озори рӯю мӯй монанди бачагон воҳ-воҳ гӯён фарёд кашида буд ва дар чашмонаш об чарх мезад» [7, с. 13], где старость и детский плач показывают универсальность боли. Романтизация образа Ҳабибы достигается через сказочную параллель: «Ҳайкали он духтари парипайкари нозукадом ба назарам ба шакли як қаҳрамони афсонавӣ мучассам мегардид» [7, с. 68], а антропоморфизация природы через человеческие эмоции создаёт контраст «до» и «после» бури: «Боғчае, ки дирӯз бо шукуфа ва сабзаҳои навхези худ шодӣ бар шодии кас меафзуд, имрӯз монанди хонаи мотамзадагон андӯҳовар ва ғамангез гардида буд» [7, с. 23], в то время как осуждение профессионализма исполнения у девушки выражено так: «Дар ҳаққи Ҳабиба бошад, «сабук, сергап, созандаҳо барин ғазал мехонад, ба хушрӯии худ ғарқа» – меғуфтанд» [7, с. 60-61], где «созандаҳо барин» (как певицы, или чтеца газелей) несёт негативную коннотацию. Конструкция «чунон...ки» (так...что) выражает интенсивность через результат, когда впечатление вызывает физическую реакцию: «Оҳанги ҳазинонаи ӯ чунон таъсир кард, ки пуштам ваҷаррос задан гирифт» [7, с. 69-70], или степень занятости измеряется через отсутствие обычной реакции: «Падарам... чунон машғул буд, ки ҳатто аз ман «чиҳоро тамошо кардӣ, то кучоҳо рафтӣ» гуфта напурсид» [7, с. 23], или интенсивность пения приводит к слезам: «Ҳабиба... он ғазалро чунон дилсӯзона хонд, ки дар чашмони ҳудаш об чарх зад» [7, с. 61], или создаётся гиперболическое сравнение: «Мӯҳои абрӯвонаш чунон дароз буданд, ки чашмонашро пӯшонда меистоданд» [7, с. 14], или качество одежды привлекает внимание: «Ин гуна либосҳои тоза, хусусан курта-лозимии сафеди шаффоф на танҳо маро хурсанд карда буд, ҳатто диққати бачагони дигарро ҳам ба ҳудаш ҷалб менамуд» [7, с. 10-11]. Природные явления служат источником сравнений, и развёрнутая метафора песка как воды с противоположным эффектом объясняет катастрофу через знакомый образ разлившегося арыка: «...рег монанди обе, ки аз роши ҷӯи пуроби саршор шорида фуруяд, кам-кам мефуромад ва лангон-лангон бошад ҳам, оҳиста-оҳиста пеш мерафт ва навдаҳои пунбакбастаи токро дар оғӯши нарми худ мекашид» [7, с. 24], тогда как домашнее пространство уподобляется дикой пустыне: «Аммо рӯи ҳавлӣ ва замини рӯидарича ба регзоре монанд гашта буд; дар реги рӯи ҳавлӣ ва замини боғча кафш то пошнааш меғӯтид» [7, с. 23], а эстетизация природы проявляется так: «Дар рӯидаричаи мо зардолуҳои рӯидаричаи мо гул карда бо шукуфаҳои худ дар боғча зинати хубе дода

буданд» [7, с. 50], и образ изоляции и опасности создаётся через метафору: «Хонаи бобоям монанди киштие дар байни дарёи рег монда буд» [7, с. 24], а количественное сравнение выражает пропорцию 1:1000: «Қувваи шамол чандин ҳазор бор зиёдтар аз пуфи туст, калонӣ ва чуқурии ғор ҳам аз кӯзаи мо аз ҳад афзун зиёда аст» [7, с. 39-40].

Животный мир даёт образы для характеристики через предельное оскорбление за эгоизм: «– Ба ӯ гап назанед, ӯ аз мо нест, ӯ хук аст» [7, с. 24], физиологическое сравнение эмоции с болезнью: «Лабонаш монанди вараҷағирифтагон меларзиданд» [7, с. 63], обозначение сверхъестественной силы и выносливости: «Лутфулло-Гӯппонро аз дигар 9 нафар калонкаланд фарқ мекарданд ва «ин девкор аст» мегуфтанд» [7, с. 46-47], где «девор» (работа демона) – высшая форма похвалы, а разумное поведение собаки описывается детально: «Хайбарро... дигар раветон, бо дастори махсус маро пеш кашид ва бо овози махсусе садо бароварда, маро сар дода, худ боз ба ҳамон чобукӣ ба пеши он чизе... рафта истод» [7, с. 40], и повадки аистов показаны подробно: «Лаклакҳо бар пештоки дарвозаи мазор барои худ ошёна мебастанд ва аз дарёбод, аз миёни сузорҳо морҳои обиро шикор карда оварда меҳӯрданд» [7, с. 50]. Бытовые объекты объясняют сложное через простое, когда научное объяснение даётся через бытовой опыт: «Дидӣ, ки ба як пуфи ту кӯза чӣ қадар ғуввос зад. Қувваи шамол чандин ҳазор бор зиёдтар аз пуфи туст, калонӣ ва чуқурии ғор ҳам аз кӯзаи мо аз ҳад афзун зиёда аст» [7, с. 39-40], что является педагогикой отца через кувшин, а измерение через часть тела показывает народную метрологию: «Як порча нони қоқ, ки баробари кафи дасти одам меомад» [7, с. 64-65], и объяснение природного явления идёт через ирригацию, и реалии крестьянского быта перечисляются через инструменты: «Падарам табар, дасттеша, дастарра ва дасткола (токбур)-ро тайёр кунад» [7, с. 24], а народная оценка одежды выражена так: «Курта-лозимии сафеди шаффоф» [7, с. 10-11], где «шаффоф» (прозрачная) показывает качество ткани. Психологические состояния передаются через физические проявления в комплексном описании эмоции: «Чашмонаш аз оташи ғазаб медурахшиданд, лабонаш монанди вараҷағирифтагон меларзиданд, пӯстҳои рӯй ва атрофи чашмонаш мепариданд» [7, с. 63], где три признака гнева создают цельный образ, а оксюморон передаёт сложность эстетического переживания: «Дар вақте ки ман он ғазалҳоро дубора мехондам, ҳамон ҳолати Ҳабиба ба пеши чашмам омада маро ба як кайфияти маҳзунонаи гуворо меандохт» [7, с. 69-70], где «маҳзунонаи гуворо» (грустно-приятное) передаёт амбивалентность, и последовательность трёх эмоций даётся с объяснением: «Ман аввал тааҷҷуб кардам, баъд оташин шудам ва баъд аз он хандаам гирифт: тааҷҷуб кардам барои ин ки ман ба бадали хизмати хатбардории худ ин гуна «музд» мегирам гуфта ҳеҷ наандешида будам; оташин шудам – чунки он чазо тамоман ноҳақона буд: хандаам омад – чунки ӯ... хулаш хулашро ҳақорат карда буд» [7, с. 64], а метафора наворачивающихся слёз показана через круговое движение: «Дар чашмонаш об чарх мезад» [7, с. 13], и метафора неснимаемой тревоги выражена так: «Падар бо ҳамон ваъияти

андӯхгинона... пешонааш кушода намешуд» [7, с. 50-51]. Социальные типаж и ситуации получают характеристику через сравнения, когда героиня преодолевает препятствия как в сказке: «Он духтари қаҳрамон дар шароити истибдоди феодалии асримиёнагӣ маъз бо сахтиродагии худ ба ҳамаи монеаҳо пуштипо зада ба ҷонони худ расида буд. Аммо, ростӣ, «ҷонони» Ҳабиба ба ман мақбул нашуда буд, ҷунки ӯ ба замми саҳт ланг будан баднамо ҳам буд» [7, с. 68], где реализм противопоставлен романтике, а социальный ритуал переносится на природу: «Имрӯз монанди хонаи мотамзадагон андӯховар ва ғамангез гардида буд» [7, с. 23], и критика общества идёт через иронию: «Магар ду девонаро дар як ҳавлӣ намонанд ва ҳол он ки дар деҳаи худамон ман даҳ ҳавлиро медонам, ки дар ҳар кадомаш ду-се девона ҳаст» [7, с. 46-47], где социальная норма опровергается реальностью, а философское переосмысление долголетия даётся так: «Маънии ҳазорсола шудани як одам он нест, ки ӯ дар зиндагии худ ҳазор солро аз сар гузаронад, балки маънии ин суҳан ҳамин аст, ки ӯ ҳазор сола умр баробари як сола умри дигарон зиндагӣ карда бошад» [7, с. 47], где важна не количество лет, а интенсивность жизни, и переход от конкретного образа к социальному типу показан здесь: «Ҳабиба дар ин ёддошт, ҷунонки як номи реалӣ шуда даромад, дар айни замон ин духтар типӣ он духтаронест, ки ба муқобили истибдод ва шиканҷаҳои аз ҳад зиёди замони амирӣ исён ва қаҳрамонӣ нишон дода, бо дилдодагони худ мегурехтанд ва ба қозихонаҳо рафта бо овози баланд никоҳи худро талаб мекарданд» [7, с. 68].

Народно-разговорные элементы в сравнениях проявляются через фольклорные формулы (устойчивые народные сравнения трудолюбия, приёмы комизма, ритуалы траура, мифологические формулы сверхчеловеческих усилий, сказочная идеализация красоты), бытовые реалии (объяснения через бытовые предметы, измерения через части тела, ирригационные системы, крестьянский быт, народная оценка одежды), пословичные обороты (гиперболические проклятия, народная мудрость, цитаты из Хафиза, разговорное усиление упрёка), природные метафоры (слёзы как вода в глазах, огонь гнева, эмоция как болезнь, сердце горело, физиологические реакции), разговорную лексику (просторечные сравнения с животными, обозначения душевнобольных, осуждение певиц, дом как корабль в песке).

Количественный анализ: сравнения – ~60% всех тропов, эпитеты – ~25%, метафоры – ~10%, гиперболы – ~5%. По жанровым ситуациям: описания природы требуют сравнений и эпитетов, драматические эпизоды – гипербол и метафор, рефлексии – аллюзий и философских сравнений.

Айни извлекает сравнения из живой народной речи, создавая эффект документальности и этнографической достоверности. Художественные функции: наглядность (объяснение сложного через простое), социальная типизация (характеристика сословий), психологизм (внутренние состояния через физические проявления), документальность (бытовые сравнения

воссоздают атмосферу эпохи), философская глубина (переход от конкретного к обобщению).

Простота сравнений Айни – для читателя, но не для автора: за каждым образом – точное наблюдение, за каждым сопоставлением – глубокое понимание человеческой природы. Айни создаёт сравнения из материала собственной жизни, потому они органичны, убедительны и запоминаются.

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РАСЧЁТ КОЛИЧЕСТВА ПОДНИМАЕМЫХ БУРИЛЬНЫХ СВЕЧЕЙ БУРОВОЙ УСТАНОВКОЙ С ДИЗЕЛЬНЫМ И ЭЛЕКТРИЧЕСКИМ ПРИВОДОМ НА ПЕРЕМЕННОМ ТОКЕ

Аннотация. В данной статье приводятся сведения о расчёте грузоподъёмности буровой лебёдки, а также количество поднимаемых свечей при дизельном и электрическом приводе на переменном токе.

Ключевые слова. Машинное время, нормативы времени, буровая лебедка, талевый блок, крюкоблок, кронблок, трансмиссия, коэффициент полезного действия талевой системы, подъёмный вал лебёдки, число струн оснастки, барабан лебедки.

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CALCULATION OF THE NUMBER OF DRILL STANDS TO BE RAISED BY A DRILLING RIG WITH DIESEL AND ELECTRIC DRIVES ON AC

Annotation. This article provides information on calculating the lifting capacity of a drilling winch, as well as the number of stands lifted with a diesel and AC electric drive.

Keywords. Machine time, time standards, drilling winch, traveling block, hook block, crown block, transmission, efficiency of the traveling system, winch lifting shaft, number of lines of equipment, winch drum.

Введение. Норма времени на единицу измерителя работ определяется по формуле:

$$H_{BP} = t_{on} \left(1 + \frac{a_{отл}}{100} \right) \quad (1)$$

где t_{on} – оперативное время на единицу измерения работ, мин; $a_{отл}$ – время на отдых и личные надобности в процентах от оперативного времени.

Нормативы времени на отдых и личные надобности приведены в общей части любого сборника по нормам времени [1,2,3,4].

Оперативное время на операции подъёма и спуска бурильных свечей определяется по формуле:

$$t_{on} = t_m + t_{mp} + t_p \quad (2)$$

где t_m – машинное время на подъем и спуск одной бурильной свечи, мин;
 t_{mp} – машинно-ручное время на подъем и спуск бурильной свечи, мин;

t_p – ручное время на подъем и спуск бурильной свечи, мин;

Нормативы времени на машинно-ручные и ручные приемы при подъеме и спуске бурильных свечей зависят от типа буровой установки и лебёдки [5,6,7].

Машинное время на подъем и спуск одной бурильной свечи или порожнего элеватора определяется по формуле:

$$t_m = \frac{L \cdot K}{V_{cp}} \quad (3)$$

где t_m – машинное время на свечу, мин; L – длина бурильной свечи, м;
 V_{cp} – средняя скорость подъема крюка, м/мин; K – коэффициент, учитывающий замедление скорости подъема крюка при включении и торможении барабана лебёдки.

Основная часть. Количество поднимаемых свечей определяется по формуле:

$$B = \frac{Q - Q_{TC}}{P \cdot L} \quad (4)$$

где Q – расчетная грузоподъемность буровой лебедки, кг; Q_{TC} – вес подвижных частей талевой системы, кг; P – средний вес 1 м бурильных труб, кг; L – длина поднимаемой свечи, м.

Расчетная грузоподъемность буровой лебедки определяется по формуле:

$$Q = \frac{75 \cdot N_6 \cdot \eta_{TC}}{V_{cp}}, \text{ кг} \quad (5)$$

где N_6 – мощность на подъемном валу лебедки, л.с.; η_{TC} – коэффициент полезного действия талевой системы; V_{cp} – средняя скорость подъема крюка, м/сек.

Мощность на подъемном валу лебедки определяется по формуле:

$$N_6 = N \cdot \eta \quad (6)$$

где N – мощность двигателей привода подъемного механизма, л.с.; η – коэффициент полезного действия кинематической цепи от вала двигателя до подъемного вала лебедки.

Под мощностью двигателей привода подъемного механизма понимается мощность, снимаемая с валов всех двигателей, одновременно работающих на лебедку в режиме подъемных операций при заданной скорости вращения и усредненных эксплуатационных условиях.

Дизельный привод. Мощность двигателя привода подъемного механизма определяется по формуле:

$$N = N_1 \cdot Z \cdot K_1 \cdot K_2 \cdot K_3 \cdot K_4 \cdot K_5, \text{ л.с.}, (7)$$

где N_1 – максимальная часовая мощность, которую можно снять с вала дизеля при заданной скорости вращения в течение одного часа непрерывной работы при стендовых условиях испытаний: температуре окружающего воздуха $+20^{\circ}\text{C}$, на уровне моря (760 мм рт.ст.), без вентилятора и при ограниченном сопротивлении на всасывании и выхлопе, л.с.; Z – количество дизелей в приводе лебедки; K_1, K_2, K_3, K_4, K_5 – коэффициенты, учитывающие потери в дизеле, работающем в режиме привода лебедки. Значения этих коэффициентов (для дизелей без надува) приведены в табл. 1.

Таблица 1

№	Виды потерь мощности	Величина коэффициента
1	Коэффициент, учитывающий отклонение условий эксплуатации дизелей от стендовых условий, при которых определялась паспортная характеристика двигателя (возможное повышение температуры окружающего воздуха свыше $+20^{\circ}\text{C}$, понижение барометрического давления ниже 760 мм рт. ст., износ при снижении качества топлива и т.п.) – K_1	0,90
2	Потери на привод вентилятора – K_2	0,95
3	Потери на выхлоп и всасывание (в среднем) – K_3	0,95
4	Приведенные к одному дизелю затраты мощности на привод воздушного компрессора – K_4	
5	Потери, связанные с несинхронной работой нескольких дизелей на один потребитель (при отсутствии гидropередачи) – K_5 : - для двух дизельного привода - для трех дизельного привода и более	0,95 0,92

Произведение коэффициентов $K_1 \cdot K_2 \cdot K_3 \cdot K_4 \cdot K_5$ составляет:

- при двух дизельном приводе – 0,73;
- при трех дизельном приводе – 0,71.

Электрический привод на переменном токе. Мощность привода в режиме подъемных операций определяется с учетом допустимой кратковременной перегрузки электродвигателей по формуле:

$$N = N_{\text{э}} \cdot K_{\text{п}}, (8)$$

где $N_{\text{э}}$ – номинальная мощность электродвигателей;

$K_{\text{п}}$ – коэффициент допускаемой кратковременной перегрузки электродвигателя, величина его принимается равной 1,25.

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РАСЧЁТ ГРУЗОПОДЪЁМНОСТИ БУРОВОЙ ЛЕБЕДКИ И КОЛИЧЕСТВА ПОДНИМАЕМЫХ СВЕЧЕЙ

Аннотация. В данной статье приводятся сведения о расчёте грузоподъёмности буровой лебедки, а также количество поднимаемых свечей при исходных расчётных данных.

Ключевые слова. Буровая лебедка, талевый блок, крюкоблок, кронблок, трансмиссия, коэффициент полезного действия талевой системы, подъёмный вал лебедки, число струн оснастки, барабан лебедки.

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CALCULATION OF THE LOADING CAPACITY OF THE DRILLING WINCH AND THE NUMBER OF LIFTED STANDS

Annotation. This article provides information on calculating the lifting capacity of a drilling winch, as well as the number of stands lifted using the initial calculation data.

Keywords. Drilling winch, traveling block, hook block, crown block, transmission, efficiency of the traveling system, winch lifting shaft, number of lines of equipment, winch drum.

Введение. Норма времени на единицу измерителя работ определяется по формуле:

$$H_{BP} = t_{on} \left(1 + \frac{a_{отл}}{100} \right) \quad (1)$$

где $t_{оп}$ – оперативное время на единицу измерения работ, мин; $a_{отл}$ – время на отдых и личные надобности в процентах от оперативного времени.

Нормативы времени на отдых и личные надобности приведены в общей части любого сборника по нормам времени [1,2].

Оперативное время на операции подъёма и спуска бурильных свечей определяется по формуле:

$$t_{on} = t_m + t_{mp} + t_p \quad (2)$$

где t_m – машинное время на подъём и спуск одной бурильной свечи, мин;

t_{mp} – машинно-ручное время на подъём и спуск бурильной свечи, мин;

t_p – ручное время на подъём и спуск бурильной свечи, мин;

Нормативы времени на машинно-ручные и ручные приемы при подъёме и спуске бурильных свечей зависят от типа буровой установки и лебёдки [7,8,9,10].

Расчётная часть. При следующих исходных расчётных данных рассчитать грузоподъемность буровой лебедки установки БУ-2500ЭУ (лебедка ЛБ-750):

1. Мощность привода подъёмного механизма 450 кВт.
2. Коэффициент полезного действия кинематической цепи от вала двигателя до подъёмного вала лебедки $\eta=0,913$ [1,2,3,4].
3. Число струн оснастки талевой системы $i=8$ (оснастка 4х5).
4. Коэффициент полезного действия талевой системы $\eta_t=0,874$.
5. Скорость вращения подъёмного вала лебедки: $n_I=77,4$ об/мин; $n_{II}=114,4$ об/мин; $n_{III}=163,4$ об/мин; $n_{IV}=310,6$ об/мин;
6. Средний диаметр барабана лебедки с намотанными на него рабочими рядами каната, $d_{cp}=0,806$ м.

Подставляя приведенные выше значения в формулу (3),

$$Q_1 = 1949 \frac{N \times i \times \eta \times \eta_{mc}}{d_{cp} \times n_{\sigma}}, \quad (3)$$

получим для каждой скорости лебедки:

$$Q_1 = \frac{1949 \times 450 \times 1,25 \times 8 \times 0,913 \times 0,874}{0,806 \times 77,4} = 112192 \text{ кг};$$

$$Q_1 = \frac{1949 \times 450 \times 1,25 \times 8 \times 0,913 \times 0,874}{0,806 \times 114,4} = 75906 \text{ кг};$$

$$Q_1 = \frac{1949 \times 450 \times 1,25 \times 8 \times 0,913 \times 0,874}{0,806 \times 163,4} = 53140 \text{ кг};$$

$$Q_1 = \frac{1949 \times 450 \times 1,25 \times 8 \times 0,913 \times 0,874}{0,806 \times 310,6} = 27960 \text{ кг};$$

Найденные значения грузоподъёмности буровой лебедки, рассчитанные исходя из мощности привода подъёмного механизма, должны быть проверены по формуле (2),

$$Q_{бур} = P_k \cdot i \cdot \eta_{mc} \quad (4)$$

где P_k – натяжение подвижного конца талевых канатов при номинальной грузоподъёмности на крюке, кг; η_{mc} – коэффициент полезного действия талевой системы для соответствующей оснастки.

Натяжение подвижного конца талевых канатов при номинальной грузоподъёмности для буровой лебедки ЛБ-750 $P_k=21000$ кг:

$$Q_{\text{бур}} = 21000 \times 8 \times 0,874 = 146832 \text{ кг}.$$

Ранее определенная грузоподъемность для I скорости лебедки $Q_I=112192$ кг меньше, чем $Q_{\text{бур}}=146832$ кг. Поэтому в расчёт принимается грузоподъемность $Q_I=112192$ кг.

При следующих исходных расчётных данных рассчитать количество поднимаемых свечей для установки БУ-2500ЭУ (лебёдка ЛБ-750):

1. Грузоподъемность буровой лебедки по скоростям принята на основании расчёта, приведенного в предыдущем примере: $Q_I=112192$ кг, $Q_{II}=75906$ кг, $Q_{III}=53140$ кг, $Q_{IV}=27960$ кг.

2. Вес подвижной части талевой системы $Q_m=4205$ кг.

3. Вес 1 м бурильной свечи диаметром 127 мм при толщине стенки 10 мм $P=34$ кг.

4. Длина свечи – 25 м [5,6,7,8,9,10].

По формуле (3) определяем количество поднимаемых свечей на каждой скорости буровой лебедки:

$$B = \frac{Q - Q_{mc}}{P \times L}, (5)$$

где Q – расчётная грузоподъемность буровой лебедки, кг; Q_{mc} – вес подвижных частей талевой системы, кг; P – средний вес 1 м бурильных труб, кг; L – длина поднимаемой свечи, м.

$$\text{На I скорости } B = \frac{112192 - 4205}{34 \times 25} = 127,$$

$$\text{На II скорости } B = \frac{75906 - 4205}{34 \times 25} = 84,$$

$$\text{На III скорости } B = \frac{53140 - 4205}{34 \times 25} = 57,$$

$$\text{На IV скорости } B = \frac{27960 - 4205}{34 \times 25} = 27.$$

Распределение поднимаемых свечей по скоростям лебедки в этом случае будет следующим:

I скорость: $127-84=43$;

II скорость: $84-57=27$;

III скорость: $57-27=30$;

IV скорость: $27-0=27$.

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ПРИНЦИПЫ ПОСТРОЕНИЯ, АЛГОРИТМ РАБОТЫ ИМИТАЦИОННО-ТРЕНАЖЕРНОГО КОМПЛЕКСА ДЛЯ ПОДГОТОВКИ ОПЕРАТОРОВ БОЕВОГО РАСЧЕТА ЗРК

Аннотация: в данной статье описываются принципы построения, алгоритм работы, основные функции программы, предназначение и состав тренажера. Тренажер имеет рабочие места операторов боевого расчета. Он предназначен для проведения эффективной подготовки и обучения курсантов в качестве операторов боевого расчета выполняющих боевую задачу на зенитном ракетном комплексе, целесообразно использования тренажера как в высших военных учебных заведениях, так и в действующих войсковых частях ЗРВ, с целью формирования и дальнейшего развития навыков ведения боевой работы по отражению ударов средств воздушного нападения (СВН) в различных условиях воздушной и помеховой обстановки.

Ключевые слова: боевой расчет, ЗРК, тренажер, СВН, оператор, АРМ.

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PRINCIPLES OF DESIGN AND OPERATING ALGORITHM OF A SIMULATION AND TRAINING COMPLEX FOR TRAINING OPERATORS OF A SURFACE-TO-AIR MISSILE SYSTEM COMBAT CREW

Abstract: *This article describes the design principles, operational algorithm, main software functions, purpose, and structure of the simulator. The simulator includes workstations for combat crew operators and is intended for effective training and education of cadets as combat crew operators performing combat missions on a surface-to-air missile (SAM) system. The use of the simulator is considered appropriate both in higher military educational institutions and in active air defense missile units, with the aim of forming and further developing skills for conducting combat operations to repel air attack means (AAM) under various air and electronic countermeasure environments.*

Keywords: *combat crew, SAM system, simulator, AAM, operator, ARM (Automated Workstation).*

В современных условиях в системах вооруженной борьбы с воздушным и наземным противником для наблюдения за различными объектами (целями) широко применяются радиолокационные станции обнаружения и наведения зенитных ракетных войск ПВО с задачами обнаружения, сопровождения, опознавания, определения местоположения, скорости и направления движения целей, а также их уничтожения.

Основным действующим лицом в радиолокационной станции является сидящий за экраном машины командного управления оператор, от правильных действий которого в решающей степени зависит своевременное обнаружение, сопровождение, распознавание объекта и определение его местонахождения и параметров движения. Для операторов ЗРК в системе противовоздушной обороны главной задачей является быстрое и безошибочное решение вышеназванных задач. Начинаящему оператору это не просто сделать, так как объекты его наблюдения - воздушные цели - обладают высокой скоростью, большой разностью высот и сложными, порой пересекающимися на разных высотах маршрутами движения. Качественному ведению боевой работы, быстрому ориентированию в ситуациях, отображаемых на экране монитора, необходимо долго учиться, набирая достаточный практический опыт с использованием огромного затрат ресурса топлива и наработки времени зенитного ракетного комплекса. В современном методе обучения операторов ЗРК в зарубежных странах применяются тренажеры по подготовки операторов ЗРК [1].

Методика подготовки операторов ЗРК предполагает многомесячные тренировки, как на реальном рабочем месте, что предполагает огромный расход ресурса техники и не всегда доступно, так как воздушная обстановка неподвластна руководителю занятий, особенно при подготовке операторов

ЗРК при выключенном состоянии комплекса (на холодной технике)[2]. Предлагаемый программный комплекс предназначен именно для моделирования различных вариантов воздушной обстановки, возникающей на экранах рабочих мест операторов ЗРК. Главным его достоинством является экономия ресурса техники при подготовке операторов, создания очень сложной воздушной обстановки без полетов авиации и возможность проведения комплексных тренировок подразделения (подразделений), создание необходимой обстановки при проведении тактических учений (тренировок) [3].

Тренажер в широком смысле — это комплекс, система моделирования и симуляции, компьютерные и физические модели, специальные методики, создаваемые для того, чтобы подготовить личность к принятию качественных и быстрых решений. Тренажеры необходимо использовать, так как они позволяют сформировать у учащегося навыки действий моторно-рефлекторного и когнитивного типа в сложных ситуациях, понять сущность протекающих процессов и их взаимную зависимость. Применение тренажеров обусловлено следующими факторами: достаточно высокой стоимостью и недостаточным количеством оборудования которое может быть использовано для решения учебных задач, затратами на эксплуатацию реального оборудования, ограниченностью временного ресурса на подготовку оборудования к использованию, большой сложностью изменения параметров оборудования и среды, сложностью введения нового технологически усовершенствованного оборудования, необходимостью выработки устойчивых практических навыков при работе с оборудованием, опасностью выполняемых работ.

Тренажеры призваны решить следующие задачи: ознакомить со строением объектов и их элементами; сформировать устойчивые навыки выполнения, как отдельных операций, так и полного их цикла; изучить технологическую схему и получить представление об этапах технологического процесса; изучить инструмент и технологическую оснастку, необходимые для проведения работ; ознакомиться с требованиями техники безопасности; научиться выявлять дефекты в работе оборудования и его отдельных узлов; закрепить умение правильно оформлять документацию.

Конструктивная часть отражает точную и виртуальную копию рабочего места оператора. Модельная часть создает адекватный образ функционирования оборудования, моделируя протекание в нем базовых процессов. Дидактическая часть представляет собой рабочее место преподавателя с программой оценки и контроля действий обучающегося или систему автоматизированного контроля над работой обучающегося.

Опыт применения тренажеров в учебном процессе позволяет выделить следующие положительные моменты: учитывается индивидуальный темп работы учащегося, который сам управляет учебным процессом; сокращается время выработки необходимых навыков; увеличивается количество

тренировочных заданий; легко достигается уровневая дифференциация; повышается мотивация учебной деятельности.

Особое место среди тренажеров занимают компьютерные **имитационные** тренажеры. Ведь именно в данном виде тренажера модель объекта управления, рабочее место обучаемых и преподавателя реализовано на базе компьютерных программных средств. По сути дела, это программа, предназначенная для выработки у учащихся устойчивых навыков действий и обеспечивающая выполнение необходимых для этого функций преподавателя. Если оформление и модель поведения **имитационного** тренажера отражает элементы обучаемой формы, то такие тренажеры называют учебными компьютерными тренажерами.

Имитационно-тренажерный комплекс должен соответствовать следующим принципам [4,5]:

- максимальное приближение результатов симуляции к реальным будущим условиям работы обучаемых операторов;
- возможность изучения (освоения) операторами нескольких операций на одном и том же автоматизированном рабочем месте (АРМ);
- возможность симуляции всего потенциального многообразия ситуаций, в которых могут оказаться операторы в реальной практике, включая чрезвычайные ситуации;
- рабочее место оператора должно позволять манипулировать органами управления способом, приближенным или идентичным используемому в реальном процессе;
- рабочее место руководителя занятия должно позволять управлять работой тренажера и выбирать сценарий тренировки.

Упрощенный алгоритм работы с программным комплексом представлена на рисунке 1.



Рисунок 1. Упрощенный алгоритм работы с программным комплексом

В состав комплекса входит следующий пакет программ [5]:

1. **Программа для руководителя** — программа автоматизации создания (программирования) налетов и получения результатов выполнения задачи операторами ЗРК.

2. **Программа рабочего места оператора ЗРК** — программа графической имитации радиолокационной обстановки. Воспроизводит на экране монитора учебного комплекса индикатор обзора сектора радиолокационной станции. Программа предназначена для воспроизведения воздушной обстановки при проведении тренировок расчетов неавтоматизированных командных пунктов подразделений ПВО и тренировки операторов ЗРК.

Основные понятия, используемые в программах:

трасса - участок траектории полета цели, в пределах которого она движется прямолинейно и равномерно без изменения характеристик;

узловая точка - точка начала трассы цели, точки маневров по скорости, высоте и курсу, изменения характеристик, конечная точка трассы;

параметры трассы цели - номер, время начала и конца трассы, начальная и конечная высота, количество, индекс принадлежности и сигнал, который будет выводиться в отчетный документ.

Эхо-сигналы целей отображаются с учетом ширины диаграммы направленности имитационной антенны ЗРК, при этом отображаются три типа отметок: бомбардировщик, истребитель и ракета.

Сигналы, отображаемые на экране дальномера:

— отраженные сигналы целей;

- отраженные сигналы ракет;
- шумы приемника;
- отметки сигналов опознавания;
- отметки сигналов бедствия;
- сигналы активных помех;
- азимутальные отметки и рубежи;
- отметки дальности.

Заключение: Таким образом, нет сомнения в том, что информационно коммуникационные технологии (ИКТ) способны предложить все возрастающие возможности для развития систем военного образования а именно по подготовке специалистов ЗРВ ПВО. В этом глобальном процессе обучения и воспитания ведутся работы для создания всех условий по подготовке квалифицированных специалистов.

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ПРИНЦИПЫ ПОСТРОЕНИЯ И СОДЕРЖАНИЕ ТРЕБОВАНИЙ, ПРЕДЪЯВЛЯЕМЫХ К СИМУЛЯЦИОННЫМ ТРЕНАЖЕРАМ ЗРК

Аннотация. В данной статье рассматриваются основные правила, принципы и порядок разработки, алгоритм работы оператора боевого расчета зенитного ракетного комплекса и построения симуляционных тренажеров зенитных ракетных комплексов, а также требования, предъявляемые к тренажерам существующих и перспективных зенитных ракетных комплексов зенитно-ракетных войск ПВО.

Ключевые слова: симуляционный тренажер, ЗРК, оператор, АРМ, СВН.

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PRINCIPLES OF DESIGN AND REQUIREMENT SPECIFICATIONS FOR SIMULATION TRAINING SYSTEMS OF SURFACE-TO-AIR MISSILE SYSTEMS

Abstract. This article examines the basic rules, principles, and procedures for the development of simulation-based training systems, the operator workflow algorithm of a surface-to-air missile (SAM) combat crew, and the design of

simulation trainers for SAM systems. It also addresses the requirements imposed on trainers for existing and prospective SAM systems of the Air Defense Missile Forces.

Keywords: *simulation trainer, SAM system, operator, ARM (Automated Workstation), SVN.*

Одной из важнейших задач обучения является формирование основных специальных учебных навыков, многие из которых должны быть доведены до автоматизма. Такой технологией обучения, позволяющей успешно решить эту задачу, являются симуляционные тренажеры. Симуляционные тренажеры представляют собой симуляционные образовательные ресурсы, предполагающие многократное выполнение учащимися подобных заданий с целью закрепления изучаемого материала и формирования прочных учебных навыков. Каждый симуляционный тренажер содержит систему разноуровневых заданий по определенной теме. Использование симуляционных тренажеров зенитного ракетного комплекса (ЗРК) может происходить на разных этапах процесса обучения: при изучении и совершенствовании навыков боевой работы в составе боевого расчета дивизиона, освоении методик проведения боевой работы и технического обслуживания, а также устранения неисправностей на вооружении и военной технике, при проверке самостоятельного задания, а также в ходе объяснения нового материала, закрепления пройденной темы по специальности, контроля за усвоением изученного, обобщения и систематизации пройденных тем, для занятий развития специальной подготовке. [1].

Симуляционный тренажер должен обеспечивать проведение эффективного обучения и тренировок боевых расчетов существующих на вооружении ЗРК, приемам боевой работы при обстреле виртуально имитированных воздушных целей в различных условиях фоновой, воздушной и помеховой обстановок без расхода боевых ракет и полетов реальной авиации с объективным контролем и документированием действий обучаемых на всех этапах их работы. Тренажеры можно классифицировать по количеству участников (локальный – один учащийся и сетевой – группа учащихся) и по виду основной технологии (с использованием специальной аппаратной интерфейсной части и без нее – компьютерные тренажеры). [1,2].

Особое место среди тренажеров занимают компьютерные тренажеры. Ведь именно в данном виде тренажера модель объекта управления, рабочее место обучаемых и преподавателя реализовано на базе компьютерных программных средств. По сути дела, это программа, предназначенная для выработки у обучаемых устойчивых навыков действий и обеспечивающая выполнение необходимых для этого функций преподавателя. Исходя из классификации и области применения тренажеров как тренажеры-презентации, тренажеры-программы и тренажерные комплексы.

Симуляционные тренажеры можно разделить на несколько групп:

1). Тренажеры-презентации - эти тренажеры предназначены для демонстрации на интерактивной доске или экране. Они содержат серию вопросов. Каждый вопрос отображается на экране, и учащиеся устно должны дать на него ответ. После получения нескольких ответов на экране высвечивается правильный. Другим технологическим приемом использования тренажеров является такой, на котором ответы появляются автоматически, а до их появления обучаемый должен дать правильный ответ.

2) Тренажеры-программы - предназначены для работы в офлайн-режиме, содержат краткую информацию по изучаемой теме, серию заданий.

3) Тренажерные комплексы - аппаратные средства в данном типе тренажеров аналогичны техническим средствам, на которые производится обучение, а программное обеспечение, реализованное в них, позволяет создать обстановку, максимально приближенную к реальной. Данный тип тренажеров обеспечивает наиболее эффективную подготовку обучаемых (Рис.1).



а) тренажеры-презентации;



б) тренажеры-программы;



в) тренажерные комплексы.

Рис.1. Классификация симуляционных тренажеров

Применительно к принципу построения и содержания, а также требованиям предъявляемых к симуляционным тренажерам ЗРК по подготовки операторов боевых расчетов в данный момент уделяется особое внимание так как они выполняют боевую задачу по уничтожению средств воздушного нападения противника.

Тренажер зенитно-ракетного комплекса в широком смысле означает комплекс, систему моделирования и симуляции, компьютерные и физические модели, специальные методики, создаваемые для того, чтобы подготовить специалиста к принятию качественных и быстрых решений. Необходимость использования тренажеров очевидна, так как они позволяют сформировать у обучающихся навыки действий моторно-рефлекторного и когнитивного типа в сложных ситуациях, понять сущность протекающих процессов, их взаимозависимость. [3,4].

Тренажеры призваны решить следующие задачи:

- ознакомить со структурой объектов и их элементами;
- сформировать устойчивые навыки выполнения, как отдельных операций, так и полного их цикла;
- изучить технологическую схему и получить представление об этапах технологического процесса;
- изучить инструментарий и технологии, необходимые для проведения работ;
- ознакомиться с требованиями техники безопасности;
- научиться выявлять дефекты в работе оборудования и его отдельных узлов;
- закрепить навыки правильного оформления документации.

Применительно к образовательному процессу мы определим тренажер как устройство для обучения, которое по условиям выполнения психологических и дидактических требований, должно иметь три необходимые и достаточные части: конструктивную, модельную и

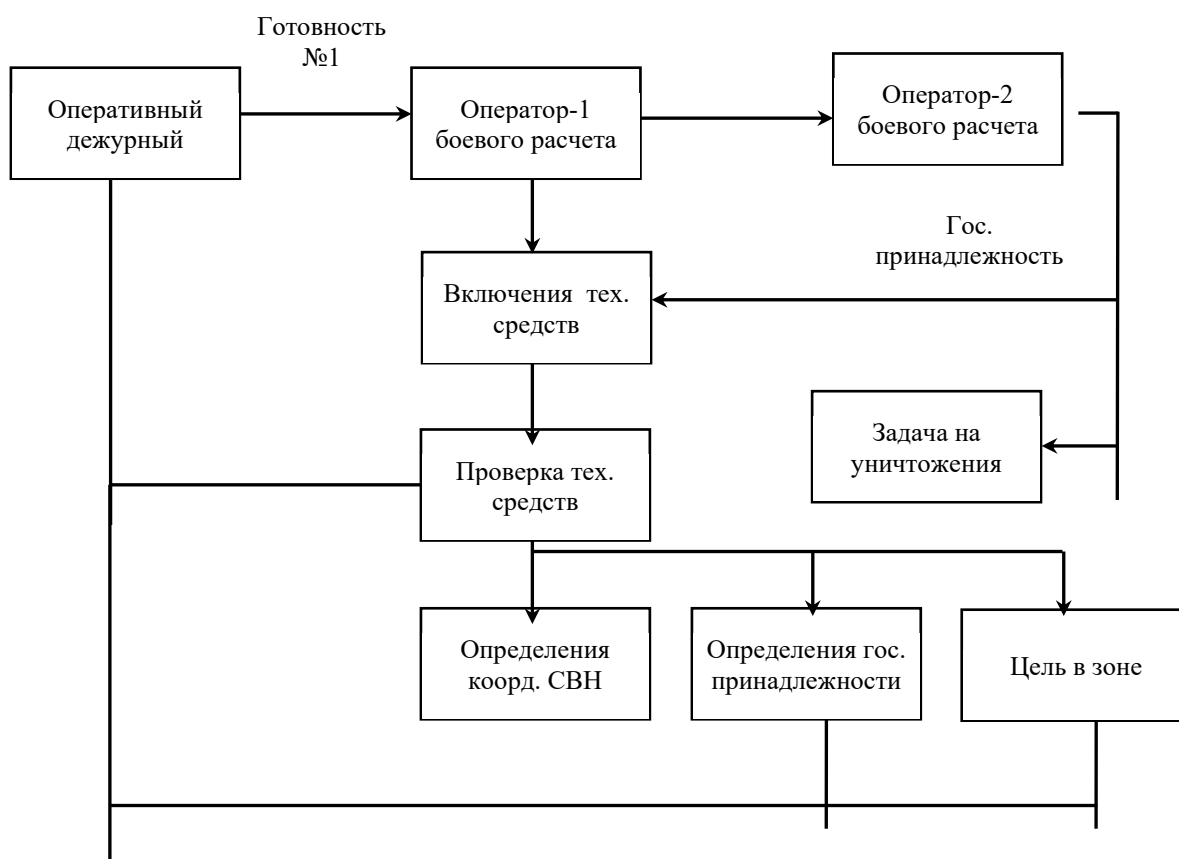
дидактическую. Тренажер работает в режимах обучения, функционального контроля и экзамена. В этих режимах тренажер обеспечивает: регистрацию во времени последовательности действий обучаемого стрелка-зенитчика и фиксацию его ошибок; автоматический анализ и оценку результатов стрельбы; вывод основных результатов тренировки на мониторы индивидуальной видеосистемы обучаемого, рабочего места инструктора и экран средств группового обучения; документирование в хронологической последовательности результатов тренировки и экзаменационных стрельб каждого стрелка-зенитчика. Дальнейшим обеспечивает адекватное выполнение не менее 90% действий оператора, в том числе: соответствие характеристик имитаторов пуска, пускового алгоритма и блока наземного питания характеристикам ЗРК; максимальное подобие имитаторов пуска, пускового алгоритма и блока наземного питания реальным; полный перечень воспроизводимых функций органов управления и индикации ЗРК; соответствие диапазонов перемещения, усилий и реакции органов управления в тренажере характеристикам реального ЗРК (соответствие эргономических характеристик индикатора рабочего места обучаемого в тренажере рабочему месту оператора); соответствие алгоритмов функционирования оборудования тренажера во всех режимах и реакции органов управления и индикации тренажера на управляющие воздействия обучаемых реальному ЗРК; расчет дальности визуальной видимости наземных объектов и воздушных целей с учетом условий наблюдения; учет в модели контура управления ЗУР всех основных характеристик (реализованного метода наведения, характеристик головки самонаведения, стартового и маршевого двигателя и т.д.); соответствие звуковых эффектов работы комплекса в тренажере реальным; визуализация наземной и воздушной обстановки, полета зенитной ракеты, попадания (промаха), самоликвидации ЗУР, падения воздушной цели, столкновения ЗУР с землей; учет фоновой обстановки. Одной из особенностей тренажера, по утверждению его разработчиков, является очень качественная визуализация фоноцелевой обстановки, которая достигается: применением расчетов реальности высокого разрешения; детализацией и прорисовкой текстур местности; соответствием цветовой гаммы текстур местности и объектов реальным цветам и контрастности; соответствием угловых размеров, формы, местных предметов, растительности; наземных и воздушных целей реальным объектам при визуальном наблюдении. [5,6].

Тренажеры ЗРК обеспечивают приобретение боевым расчетом профессиональных навыков при:

- первоначальном обучении операторов по поиску, обнаружению, распознаванию типа и визуальному определению параметров (дальности, скорости, высоты, курсового параметра) движения воздушной цели;
- обучении боевого расчета правилам подготовки ЗРК к использованию по назначению;
- обучении боевого расчета боевой работе по поиску, обнаружению, опознаванию, захвату, сопровождению, обстрелу визуально наблюдаемых

воздушных целей, как на встречных, так и на догонных курсах, в условиях простой и сложной фоновой и помеховой обстановки;

Алгоритм работы операторов боевого расчета осуществляется следующим образом:



В связи с этим очень важна профессиональная подготовленность операторов боевых расчетов зенитно-ракетных комплексов. С этой целью необходимо создание тренажеров, имитирующих различные условия

обстановки приближенных к реальным действиям для повышения практических навыков операторов боевых расчетов.

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СИНДРОМ СУХОГО ГЛАЗА И СЕЗОННЫЕ АЛЛЕРГИЧЕСКИЕ ЗАБОЛЕВАНИЯ: КЛИНИКО-ЭПИДЕМИОЛОГИЧЕСКИЙ АНАЛИЗ

Аннотация. Синдром сухого глаза (ССГ) и сезонный аллергический ринит (САР) являются распространенными заболеваниями глаз и дыхательной системы. Согласно имеющимся данным, эти заболевания приводят к снижению качества дыхания и зрения у населения, ухудшению качества жизни. В статье на основе эпидемиологических исследований проанализированы клинические симптомы, распространенность и взаимосвязь ССС и ЦАР.

Ключевые слова: Синдром сухого глаза, сезонная аллергия, клинический анализ, эпидемиология, глазные симптомы

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DRY EYE SYNDROME AND SEASONAL ALLERGIC DISEASES: A CLINICAL AND EPIDEMIOLOGICAL ANALYSIS

Abstract. Dry eye syndrome (DES) and seasonal allergic rhinitis (SAR) are common diseases of the eye and respiratory system. According to available data, these diseases lead to a decrease in the quality of breathing and vision, a deterioration in the quality of life of the population. The article analyzes the clinical symptoms, prevalence, and interrelationship of VAT and ARF based on epidemiological studies.

Keywords: seasonal pollinosis, dry eye syndrome, clinical history, allergic conjunctivitis, eye surface, antihistamines, diagnostic methods

Синдром сухого глаза (ССГ) - это мутное и воспалительное состояние, возникающее в результате нарушения водного баланса глаз. Сезонные аллергические заболевания появляются в основном в период цветения и проявляются риноконъюнктивитом. В последние годы во многих исследованиях рассматривается взаимосвязь НСС и сезонной аллергии, так как аллергические процессы снижают слезоотток и изменяют эпителий

конъюнктивы, что усиливает симптомы НСС (Akpek et al., 2010; Nelson et al., 2011).

В отчете TFOS DEWS II (Bron и Tiffany, 2017) подробно описаны клинические проявления и распространенность НДС. На основании этих исследований стало известно, что НДС встречается не только у взрослых, но и у молодых людей и значительно снижает качество жизни. Распространенность НДС среди населения США колеблется в пределах 5-30%, причем у женщин она чаще связана с гормональными и экологическими факторами (Lemp and Crews, 2012; Uchino et al., 2011).

В различных исследованиях доказана связь сезонного аллергического ринита и конъюнктивита с НДС. Аллергический конъюнктивит и МАР снижают секрецию слез через аллергические процессы и усиливают воспаление в конъюнктиве, в результате чего симптомы ССС становятся значительно более сложными (Stapleton et al., 2017; Leonardi et al., 2013). Также НДС и РАР имеют высокую распространенность преимущественно весной и осенью, что связано с сезоном цветения и экологической аллергией.

При НДС и ЦАР эффективны современные терапевтические подходы. Например, горяче-холодный компресс, приятные слезоточивые средства и антигистаминная терапия смягчают аллергические процессы, восстанавливают водный баланс и уменьшают глазные симптомы (Baudouin et al., 2012; Craig et al., 2017). Вместе с тем, последние исследования указывают на необходимость более глубокого изучения взаимосвязи между НДС и ЦАР и разработки индивидуализированных профилактических и терапевтических стратегий (Pflugfelder et al., 2008).

Поэтому клинико-эпидемиологический анализ НДС и сезонной аллергии имеет важное значение в сохранении здоровья населения и оптимизации терапевтических мероприятий.

Основной целью настоящего исследования является анализ клинико-эпидемиологических особенностей синдрома сухого глаза (ССГ) и сезонного аллергического ринита (САР). Для достижения этой цели были определены следующие задачи:

- Оценка клинических проявлений и степени тяжести НДС и ЦАР;
- Определение сезонного распространения и факторов риска;
- Анализ взаимосвязи НДС и ЦАР.

В направлении эпидемиологического анализа были проанализированы распространенность по сезонам года, состав по полу и возрасту, а также связь с сезонной аллергией. Статистический анализ также проводился с помощью программ Microsoft Excel и SPSS 26.0. Сравнительный анализ проводился на основе χ^2 теста и корреляционного анализа, что позволило определить клинические показатели ССС и МАР и их взаимосвязь.

Демографические показатели

Возрастная группа	Пол	Количество пациентов	Частота встречаемости ССГ (%)	Связь с САР (%)
18–30	Мужчины	25	36	40
18–30	Женщины	30	40	43
31–45	Мужчины	20	38	41
31–45	Женщины	25	42	45
46–60	Мужчины	15	30	32
46–60	Женщины	15	34	37

Клинические признаки:

- Сухость и зуд в глазах: 85%
- Покраснение и конъюнктивальное воспаление: 70%
- Слезотечение умеренное или нормальное: 60%
- Аллергические симптомы (связанные с окружающей средой): 65%

Эпидемиологический анализ:

- ССГ и сезонный аллергический ринит (САР) наиболее часто встречаются весной и осенью.
- У женщин ССГ встречается чаще ($p = 0,03$).
- Корреляция между ССГ и САР составила 0,68, что указывает на высокий уровень взаимосвязи.

Хулоса: Результаты исследования наглядно подтверждают взаимосвязь между НДС и сезонным аллергическим ринитом (САР). Чувствительность к аллергенам нарушает стабильность эпителия глаза и снижает водный баланс в глазах, в результате чего значительно усиливаются клинические симптомы ССГ - зуд, сухость и покраснение. Также аллергические реакции влияют на слезную секрецию, способствуя развитию воспалительного процесса в конъюнктиве, что приводит к сочетанным проявлениям ССГ и ЦАР.

НДС и сезонный аллергический ринит (САР) являются наиболее распространенными заболеваниями у населения и в значительной степени встречаются в весенний и осенний периоды. Установлено, что частота встречаемости НДС у женщин связана с гормональными и экологическими факторами. Результаты исследования показывают наличие статистически значимой корреляции между ССГ и ЦАР, что подтверждает патогенетическую связь этих заболеваний. Важно интегрировать клинико-профилактические мероприятия, включая противоаллергическую терапию и меры защиты глаз, чтобы уменьшить симптомы у пациентов и положительно повлиять на качество жизни. Современные исследования и индивидуализированные подходы позволяют значительно повысить эффективность профилактики и лечения НДС и ЦАР.

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ФИНАНСИРОВАНИЕ МЕЖДУНАРОДНОЙ ТОРГОВЛИ: ЗАРУБЕЖНАЯ ПРАКТИКА И НАПРАВЛЕНИЯ ЕЁ ИСПОЛЬЗОВАНИЯ

Аннотация: В статье рассматриваются современные механизмы финансирования международной торговли, анализируется зарубежная практика и выделяются направления ее применения в условиях глобальной нестабильности и кризисных явлений мировой экономики. Особое внимание уделено формам торгового финансирования, используемым в развитых и развивающихся странах, включая документарные аккредитивы, факторинг, форфейтинг и гарантии. Проведен сравнительный анализ преимуществ и ограничений различных инструментов, а также их влияния на снижение рисков внешнеэкономической деятельности.

Ключевые слова: международная торговля, торговое финансирование, аккредитив, факторинг, форфейтинг, экспортное кредитование, риски внешнеэкономической деятельности.

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INTERNATIONAL TRADE FINANCING: FOREIGN PRACTICE AND DIRECTIONS OF ITS USE

Abstract. The article examines modern mechanisms of international trade finance, analyzes foreign practices, and highlights the main directions of their application under conditions of global instability and economic crises. Special attention is given to trade finance instrument used in both developed and developing countries, including documentary letters of credit, factoring, forfaiting, and guarantees. A comparative analysis of the advantages and limitations of different instruments is presented, along with their role in mitigating risks in foreign economic activity.

Keywords: international trade, trade finance, letter of credit, factoring, forfaiting, export credit, foreign experience, foreign economic activity risks.

Введение. Международная торговля на протяжении последних десятилетий выступает одним из ключевых факторов экономического роста,

интеграции и глобализации мировой экономики. В условиях усложняющихся внешнеэкономических связей возрастает потребность в эффективных инструментах торгового финансирования, которые обеспечивают движение капитала, снижают риски и создают устойчивые условия для развития экспорто-ориентированных отраслей. Современные кризисные процессы, включая геополитическую нестабильность, колебания валютных курсов и дисбаланс в международных платежных системах, усиливают значение финансовых механизмов, способных поддерживать непрерывность торговых операций. Зарубежная практика демонстрирует широкий спектр решений в этой сфере, начиная от традиционных инструментов, таких как аккредитивы, до более гибких форм, включающих факторинг, форфейтинг и экспортное кредитование, активно поддерживаемое государственными структурами и международными организациями⁴².

Необходимость обращения к зарубежному опыту обусловлена как его высокой степенью апробированности, так и возможностью адаптации наиболее успешных моделей к национальной финансовой системе. Анализ применения торгового финансирования зарубежом позволяет выявить оптимальные механизмы снижения транзакционных издержек, минимизации кредитных и валютных рисков, а также стимулирования развития малого и среднего бизнеса, вовлечённого в экспортно-импортные операции⁴³. В то же время существует потребность в критической оценке данных подходов, учитывающей специфику национального регулирования, институциональную среду и уровень развития финансового рынка.

Исследование зарубежной практики финансирования международной торговли и направлений её использования в национальном контексте приобретает особую актуальность. Оно позволяет не только обогатить теоретическую базу, но и предложить практические рекомендации по формированию эффективной системы торгового финансирования, способной обеспечить конкурентоспособность и устойчивость внешнеэкономической деятельности в условиях современных вызовов.

Литературный обзор по теме финансирования международной торговли показывает, что данное направление активно изучается в научной и образовательной среде, а также освещается в работах международных организаций.

В исследовании «Финансирование международной торговли в условиях кризиса: попытка перезагрузки» отмечается, что глобальные экономические потрясения усилили риски для экспортеров и импортеров, что вызвало необходимость поиска новых форм и механизмов торгового

⁴² Кнорус М. Международная торговля. — М.: КНОРУС, 2019. — С. 45–47.

⁴³ Финансирование международной торговли в условиях кризиса: попытка перезагрузки // CyberLeninka, 2020; Применение методов торгового финансирования на российском финансовом рынке: диссертация. — Dissercat, 2019.

финансирования⁴⁴. В статье «Актуальные аспекты торгового финансирования на мировом рынке» акцент сделан на динамике развития основных инструментов, среди которых доминируют документарные аккредитивы и гарантии, при этом возрастает роль факторинга и форфейтинга как более гибких инструментов.

Существенный вклад в понимание специфики торгового финансирования вносит диссертационное исследование «Применение методов торгового финансирования на российском финансовом рынке», где анализируется адаптация международных практик к национальной среде, а также выявляются проблемы их внедрения⁴⁵. Похожие выводы представлены и в материалах Электронной библиотеки Белорусского государственного университета, где внимание уделено институциональным барьерам и необходимости регулирования в сфере внешнеэкономической деятельности⁴⁶.

Учебное издание «Международная торговля» систематизирует теоретическую базу и рассматривает торговое финансирование как неотъемлемую часть глобальной экономики⁴⁷. Практические подходы и образовательные программы в этой области представлены, в частности, на платформе Высшей школы экономики, где торговое финансирование включено в курсы, направленные на подготовку специалистов по международным экономическим отношениям⁴⁸.

Важным источником выступают материалы международных организаций. Так, ООН подчёркивает значимость справедливой торговли и доступа развивающихся стран к современным инструментам финансирования⁴⁹. В англоязычной научной среде актуальные подходы к торговому финансированию представлены в базе SSRN, где исследуются современные модели кредитования и роль банковских консорциумов в поддержке мировой торговли.

Наряду с академическими и прикладными исследованиями, энциклопедические ресурсы, такие как статьи Википедии «Торговое финансирование» и «Международная торговля», предоставляют общие определения, классификаций и исторический контекст, что формирует основу для дальнейшего углублённого изучения⁵⁰.

Анализ литературы позволяет выделить три ключевых направления: теоретические и учебные труды, формирующие понятийный аппарат и

⁴⁴ Финансирование международной торговли в условиях кризиса: попытка перезагрузки // CyberLeninka. — 2020. — URL: <https://cyberleninka.ru/article/n/finansirovanie-mezhdunarodnoy-torgovli-v-usloviyah-krizisa-popytka-perezagruzki> (дата обращения: 08.10.2025).

⁴⁵ Применение методов торгового финансирования на российском финансовом рынке: диссертация. — Disserscat, 2019.

⁴⁶ Электронная библиотека Белорусского государственного университета. — Минск: БГУ, 2021. — С. 112–118.

⁴⁷ Международная торговля: учебник / М. Кнорус. — М.: КНОРУС, 2019. — С. 52–56.

⁴⁸ Программа курса // Национальный исследовательский университет «Высшая школа экономики». — М.: НИУ ВШЭ, 2023. — С. 18–22.

⁴⁹ United Nations. Youth & Trade. — New York: UN, 2022. — С. 7–10.

⁵⁰ Международная торговля // Википедия. — 2024.

основы исследовательского поля; прикладные исследования, посвящённые анализу инструментов и практик торгового финансирования в условиях конкретных стран; а также международные инициативы и аналитика, раскрывающие глобальные тенденции и перспективы развития. Совокупность этих источников подтверждает актуальность темы и необходимость дальнейшей адаптации зарубежного опыта к национальной экономике.

Методология. В ходе исследования были использованы общенаучные и специализированные методы, позволяющие комплексно рассмотреть тему финансирования международной торговли. В первую очередь применялся анализ и синтез научных публикаций, что дало возможность обобщить имеющиеся теоретические подходы и выявить наиболее актуальные направления их развития. Для изучения зарубежного опыта использовался сравнительный метод, позволяющий сопоставить различные модели торгового финансирования и определить их сильные и слабые стороны.

Значимым этапом стала работа с электронными библиотеками, диссертационными базами, статьями в рецензируемых журналах, а также материалами международных организаций, в том числе ООН⁵¹. Это обеспечило разнообразие источников и позволило взглянуть на проблему с разных позиций: академической, практической и нормативной.

Использовался метод системного анализа, благодаря которому торговое финансирование рассматривалось как часть глобальной финансовой инфраструктуры, взаимосвязанной с валютными рынками, кредитными системами и государственными мерами поддержки. При рассмотрении практических аспектов применялся кейс-метод: были выделены примеры внедрения торгового финансирования в различных странах, что позволило проследить специфику их адаптации к условиям.

Методологическая основа исследования сочетает в себе теоретический и эмпирический подходы. Теоретическая часть обеспечила понимание сущности и классификации инструментов торгового финансирования, а эмпирическая — дала возможность оценить их эффективность и применимость в современных условиях мировой экономики.

Анализ и результаты. За период 2020–2024 гг. наблюдалась заметная динамика в объёмах мировой торговли, в доступности торгового финансирования и в скорости цифровой трансформации инструментов торгового финансирования. Мировой объём торговли товаров и коммерческих услуг сократился в 2023 г., но в 2024 г. показал восстановление и рост — по оценке ВТО, совокупный объём мировой торговли в 2024 г. составил около 32,2 трлн долл. США, что на ~4% больше по сравнению с предыдущим годом⁵².

Параллельно вырос разрыв в предложении торгового финансирования. По результатам опроса Азиатского банка развития и партнёров, дефицит

⁵¹ United Nations. Youth & Trade. — New York: UN, 2022. — С. 7–10.

⁵² World Trade Statistics // World Trade Organization. — Geneva: WTO, 2024. — С. 3–6.

торгового финансирования увеличился с порядка 1,7 трлн долл. в 2020 г. до примерно 2,5 трлн долл. в 2022 г.; это отражает сочетание ужесточения кредитных условий, повышения ставок и роста риск-премий после пандемии и на фоне геополитической нестабильности. Данные ADB показывают, что именно в 2021–2022 гг. наблюдались самые резкие изменения в доступности финансирования для МСП и развивающихся рынков.

По инструментам: факторинг и другие приёмные формы финансирования оборота демонстрировали устойчивый рост в эти годы. Отчёты международной ассоциации факторинговой индустрии (FCI) и суммарные обзоры рынка показывают рост объёмов факторинга в 2021–2024 гг.; в 2023–2024 гг. глобальные объёмы факторинга оставались на уровне нескольких триллионов евро (отметим оценки — ~€3.6–3.8 трлн объёма дебиторской задолженности в 2023–2024 гг.), что указывает на постепенное вытеснение части традиционных L/C-операций в пользу более гибких решений⁵³.

Качество портфелей и кредитные риски. Данные ICC Trade Register показывают, что в 2022 г. коэффициенты дефолтов по основным продуктам торгового финансирования выросли относительно 2021 г., хотя по большинству показателей они оставались ниже пиков 2020 г.; это указывает на то, что волатильность и риски сохранялись, но система торгового финансирования оставалась устойчивой благодаря мерам банков и международных институтов.

Цифровизация и технологические тренды. Пандемия COVID-19 ускорила переход от бумажных процессов к цифровым платформам; отчёты SWIFT и аналитика отрасли фиксируют прорыв в применении цифровых стандартов, е-документы, платформ синдицированного финансирования и решений на основе блокчейн/распределённых реестров. В 2020–2024 гг. активизировались пилоты и коммерческие платформы по цифровым аккредитивам, цифровому факторингу и интеграции KYC/LEI-решений — это сокращало время обработки сделок и операционные риски, но одновременно создавало потребность в унифицированных стандартах и правовом признании цифровых документов.

Региональные особенности и уязвимые группы. Главным образом дефицит финансирования и снижение доступности коснулись малого и среднего бизнеса и экспортеров из низко- и средне-доходных стран. Развивающиеся рынки сильнее ощущали ужесточение условий кредитования в 2021–2022 гг., что отсрочило их восстановление по сравнению с развитым сектором⁵⁴. Институты (ADB, ICC, национальные экспортные агентства) в ответ расширяли программы гарантий и линии финансирования для МСП, однако масштаб мер пока недостаточен для ликвидации разрыва.

⁵³ FCI releases 2024 factoring annual review: receivables volumes growing to €3.66 trillion // Trade Treasury Payments. — 2024. — С. 15–18.

⁵⁴ Global trade finance gap expands to \$2.5 trillion in 2022 // Asian Development Bank. — Manila: ADB, 2022. — С. 4–6.

Краткая сводная таблица ключевых индикаторов (2020–2024, международно-агрегированные ориентиры)

- Мировая торговля (товары+услуги): падение в 2023 → восстановление +4% в 2024 (≈32,2 трлн \$).

- Дефицит торгового финансирования: ≈1,7 трлн \$ в 2020 → ≈2,5 трлн \$ в 2022 (рост дефицита).

- Факторинг (глобально): рост объёмов, общие оценки 2023–2024 ≈€3.6–3.8 трлн (ФСИ).

- Дефолты по продуктам trade finance: рост в 2022 - 2021, но в целом ниже пиков 2020 по большинству мер (ИСС Trade Register).

- Цифровизация: ускорение внедрения е-документы, блокчейн-пилотов, цифровых аккредитивов и платформ SCF; ключевые барьеры — стандартизация и правовая база (SWIFT, ИСС/ИССWBO).

Интерпретация результатов и практические выводы. За 2020–2024 гг. произошёл сдвиг в сторону более гибких инструментов финансирования оборота (факторинг, SCF), при этом сохраняется значимый структурный дефицит в финансировании торговли, который в первую очередь затрагивает МСП и развивающиеся экономики. Цифровая трансформация доказала свою эффективность в повышении скорости и прозрачности операций, однако широкая коммерциализация цифровых решений требует единых технических стандартов и лёгкой правовой приемлемости электронных торговых документов. Для снижения разрыва в финансировании необходимы комплексные меры: государственно-частные гарантии, стимулирование работы банков с малыми экспортёрами, поддержка цифровых платформ и международная координация стандартов.

Ограничения анализа. Представленные оценки опираются на доступную публичную статистику и профильные отраслевые обзоры; тяжело получить полностью сопоставимые год-к-году данные по всем типам торгового финансирования из-за различий в методологиях отчётности (банковские экспозиции, факторинг, SCF, гарантии). Кроме того, влияние событий конца 2024–2025 гг. (новые санкции, торговая политика отдельных стран) может смещать тренды, поэтому для публикации рекомендуется проверить и обновить ключевые цифры перед финальной версией статьи.

Таблица 1. Международные показатели торгового финансирования и мировой торговли (2020–2024 гг.)⁵⁵

Показатель	2020	2021	2022	2023	2024
Мировая торговля (товары+услуги), трлн \$	~28,5	~30,7	~31,4	~30,9 (снижение)	~32,2 (+4%)
Дефицит торгового финансирования, трлн \$	~1,7	~2,1	~2,5	~2,4	~2,3–2,4 (по оценкам)
Объёмы факторинга, трлн €	~2,9	~3,2	~3,4	~3,6	~3,8
Дефолты по продуктам торгового финансирования (ИСС Trade Register), %	выше нормы (пик COVID)	Снижение	рост по сравнению с 2021	умеренные	Стабилизация
Цифровизация (e-docs, blockchain, SCF)	начало ускорения (COVID)	активные пилоты	Широкое внедрение	рост использования	Закрепление тренда

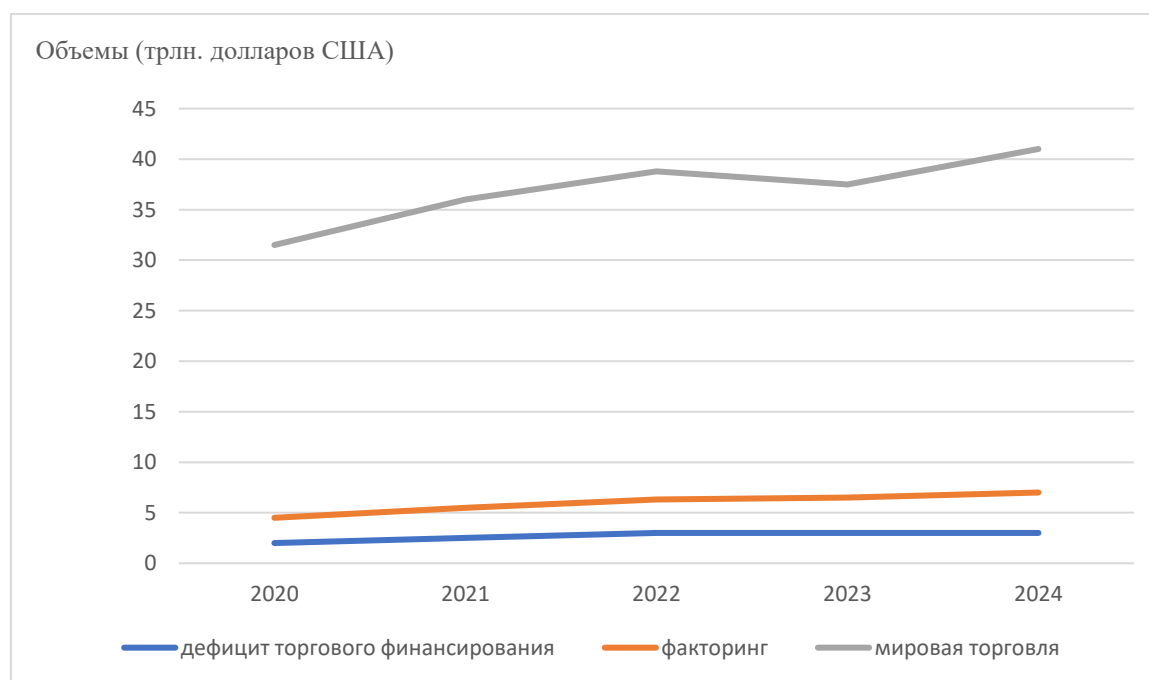


График 1. Динамика международных показателей торгового финансирования (2020 - 2024 гг.)⁵⁶

⁵⁵ Составлено по данным Всемирной торговой организации (WTO), Международной торговой палаты (ICC Trade Register), Азиатского банка развития (ADB) и Международной факторинговой ассоциации (FCI) [10; 11; 13; 14].

⁵⁶ Построено по данным Всемирной торговой организации (WTO), Международной торговой палаты (ICC Trade Register), Азиатского банка развития (ADB) и Международной факторинговой ассоциации (FCI) [10; 11; 13; 14].

Заключение. В ходе проведенного исследования стало очевидно, что финансирование международной торговли остается одним из ключевых факторов устойчивого развития мировой экономики и поддержания конкурентоспособности национальных хозяйств. Анализ зарубежной практики показал, что современные инструменты и механизмы, включая документарное аккредитивное финансирование, факторинг, форфейтинг и государственные программы поддержки экспортеров, активно трансформируются под влиянием цифровизации, глобализации финансовых рынков и роста международных рисков. Цифровые платформы и финтех-решения постепенно становятся неотъемлемой частью торговых операций, упрощая процессы, снижая транзакционные издержки и расширяя доступ к финансовым ресурсам даже для малых и средних предприятий.

В период 2020–2024 годов динамика международного финансирования отчетливо продемонстрировала, что глобальные кризисы, такие как пандемия и геополитическая нестабильность, одновременно выступают вызовом и стимулом для модернизации инструментов поддержки торговли. Усилилась роль международных финансовых организаций и банковских консорциумов, которые обеспечивали ликвидность и страхование рисков в условиях высокой неопределенности. В то же время рост значимости цифровых технологий подтвердил необходимость адаптации традиционных схем финансирования к новым условиям, что открывает перспективы для дальнейшего развития гибридных моделей и международного сотрудничества.

Можно утверждать, что эффективность системы финансирования международной торговли в ближайшие годы будет напрямую зависеть от скорости интеграции цифровых решений, развития транснациональных партнерств и способности стран адаптироваться к изменяющимся глобальным вызовам. Это подчеркивает важность комплексного подхода, сочетающего лучшие практики зарубежного опыта и стратегические приоритеты национальной экономики.

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РОЛЬ ПЕДАГОГИЧЕСКИХ МЕТОДОВ В ПОВЫШЕНИИ УЧЕБНОЙ АКТИВНОСТИ СЛУШАТЕЛЕЙ В ПРОЦЕССЕ ПОВЫШЕНИЯ КВАЛИФИКАЦИИ

***Аннотация.** Статья посвящена исследованию применения образовательных методов с целью повышения учебной активности слушателей в процессе профессиональной переподготовки и повышения квалификации.*

***Ключевые слова.** Повышение квалификации, переподготовка, слушатель, непрерывное образование, методы активного обучения, методы игрового обучения.*

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THE ROLE OF PEDAGOGICAL METHODS IN ENHANCING LEARNERS' ACADEMIC ACTIVITY IN THE PROCESS OF PROFESSIONAL DEVELOPMENT

***Abstract:** This article discusses the use of educational methods to increase the activity of students in the process of advanced training.*

***Keywords:** Advanced training, retraining, student, continuous education, active learning methods, game-based learning methods.*

В современный период педагог должен не только уметь применять полученные знания и обладать определёнными профессиональными навыками, но и быть способен адаптироваться к стремительно изменяющимся условиям современного производства и образовательного процесса, ориентироваться в динамично развивающемся информационном пространстве и системе новых социальных отношений.

В решении столь сложных задач и в обеспечении высокого уровня профессиональной компетентности особую роль играет система повышения квалификации и переподготовки кадров. Данная система выступает ключевым механизмом обновления профессиональных знаний педагогов, освоения ими инновационных методов обучения и воспитания, а также

поддержания их конкурентоспособности в условиях модернизации образования.

Повышение квалификации и переподготовка кадров являются важнейшими элементами системы непрерывного профессионального образования. Они функционируют на основе компетентного подхода, андрагогики и принципов профессиональной мобильности. Эффективность данной системы определяется уровнем профессиональной компетентности педагогов, их готовностью к саморазвитию, адаптации к изменениям образовательной среды и внедрению инновационных технологий [1].

Высокий профессионализм преподавателей, их рефлексивная позиция, инициативность и способность осваивать новые методики выступают ключевыми факторами повышения качества образования. Таким образом, система повышения квалификации служит инструментом обновления профессиональных знаний и формирования педагогов, соответствующих требованиям современного образовательного пространства.

Повышение квалификации представляет собой целенаправленный и непрерывный процесс обновления теоретических знаний, совершенствования практических навыков и развития профессиональных компетенций профессорско-преподавательского состава, обусловленный необходимостью освоения современных форм, технологий и методик образовательного процесса [2].

Непрерывное образование способствует решению ключевых педагогических задач: развитию профессионально-педагогического мастерства профессорско-преподавательского состава, обеспечению их профессиональной готовности в процессе повышения квалификации, определению дидактических условий, повышающих эффективность каждого занятия и организации процесса повышения квалификации на научно обоснованной основе.

Совершенствование системы переподготовки и повышения квалификации педагогических кадров требует обоснованного поиска эффективных средств и методов их профессиональной подготовки, обеспечивающих готовность к современным требованиям педагогической деятельности.

В настоящее время в системе повышения квалификации последовательно осуществляется обновление профессиональных знаний слушателей. В этом процессе особое значение приобретает использование инновационных педагогических технологий, в том числе игровых методов обучения, которые способствуют формированию профессиональной готовности педагогических кадров к практической деятельности, развитию их творческого потенциала и способности самостоятельно проектировать дальнейшую профессиональную траекторию.

Игровые методы обучения, относимые к группе активных педагогических технологий, направлены на усиление познавательной активности слушателей и совершенствование их профессиональных знаний.

Применение данных методов позволяет моделировать элементы реальной профессиональной деятельности и её типичные ситуации, что обеспечивает более глубокую практико-ориентированную подготовку слушателей. Таким образом, игровые технологии выступают эффективным инструментом формирования профессиональной компетентности в условиях имитационного образовательного процесса.

Известно, что программа курсов повышения квалификации включает теоретические лекции, практические занятия, выездные мероприятия (обмен опытом) и самостоятельную работу слушателей. Эффективная организация каждого учебного модуля требует от педагога устойчивой профессиональной компетентности, опыта и высокого уровня педагогического мастерства.

Это объясняется тем, что организация каждого занятия включает теоретические, методологические, методические и дидактические аспекты, игнорирование которых препятствует формированию у педагога навыков самостоятельного планирования и проведения урока.

В рамках системы повышения квалификации педагогических кадров целесообразно учитывать дидактические аспекты и ключевые закономерности организации образовательного процесса:

- рассматривается обучающийся как равноправный субъект образовательного процесса на всех его этапах;
- педагог способствует выявлению и проявлению опыта обучающегося;
- организация занятий осуществляется через дискуссии, решение практических задач и игровые методы обучения;
- учебные цели формулируются с учетом развития интереса обучающегося к обучению;
- содержание образования строится на повышении применимости знаний обучающегося в профессиональной деятельности [4].

При применении активных методов обучения в системе повышения квалификации следует учитывать такие факторы, как содержание занятия, организационные условия, отведённое время, форма и тип занятия, уровень профессиональных знаний и возрастные особенности слушателей, а также другие релевантные условия.

Одним из современных методов обучения, направленных на активизацию слушателей, является использование игровых методов с целью [3]:

- усвоения ключевых понятий по учебному модулю;
- глубокого понимания темы;
- повышения качества образовательного процесса;
- формирования представлений о методах обучения;
- эффективного использования учебного времени;
- активизации познавательной деятельности слушателей;
- практического применения теоретических знаний и навыков.

Для эффективного применения игровых методов обучения в процессе повышения квалификации необходима тщательная профессиональная подготовка преподавателя.

При подготовке и проведении учебных игр преподавателю следует руководствоваться следующими педагогическими принципами:

Игровая образовательная среда создает условия для преодоления страха перед ошибками, интеллектуального раскрепощения и активизации творческого потенциала личности. Эффективность деловой (профессиональной) игры обеспечивается оптимальным соотношением реальных и условных компонентов учебной ситуации [5].

Несмотря на многообразие активных и игровых методов обучения, их организация должна осуществляться в соответствии с установленной педагогической последовательностью действий [6]:

Название игры должно быть ясным, кратким и запоминающимся, точно отражать содержание педагогической ситуации.

Учебная цель формулируется четко и ориентирована на развитие конкретных компетенций и профессиональной активности слушателей.

Условия игры включают место и время проведения, события с их конкретными характеристиками, участников и их роли, а также информацию для анализа педагогической ситуации. Полнота и обоснованность условий повышают реалистичность и точность учебной деятельности участников.

Состав участников определяется количеством, функциональными обязанностями, сферой деятельности и уровнем подготовки к игре.

Сценарий игры регламентирует вступление участников в игровое взаимодействие, постановку объективных условий и последовательность игрового процесса.

Проведение игры осуществляется с соблюдением установленных правил и педагогических требований.

Подведение итогов и заключение предполагает самостоятельное выполнение каждым участником учебных задач и рефлексию полученных результатов.

Учитель может вносить корректировки в последовательность организации игры, исходя из собственного творческого подхода, педагогических целей и специфики слушателей.

Таким образом, в процессе повышения квалификации критически важно непрерывно обновлять теоретические знания и практические навыки участников, а также использовать активные методы обучения, направленные на формирование и развитие их профессиональной компетентности и педагогического мастерства.

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СОВРЕМЕННЫЕ ПОДХОДЫ К ВЫБОРУ И ДЛИТЕЛЬНОСТИ ДВОЙНОЙ АНТИТРОМБОЦИТАРНОЙ ТЕРАПИИ ПОСЛЕ ЧРЕСКОЖНОГО КОРОНАРНОГО ВМЕШАТЕЛЬСТВА ПРИ ОСТРОМ КОРОНАРНОМ СИНДРОМЕ

Резюме: Современные исследования подтверждают эффективность индивидуального подхода к антиагрегантной терапии после стентирования коронарных артерий у пациентов с острым инфарктом миокарда, особенно при высоком риске кровотечений. В рандомизированном исследовании [1] было показано, что сокращённый до одного месяца курс двойной антитромбоцитарной терапии (ДАТ) с последующим переходом на монотерапию ингибитором $P2Y_{12}$ не увеличивает частоту ишемических событий, но существенно снижает риск кровотечений. Подобные выводы подтверждаются данными регистра SHARP-MI [2], где досрочная отмена ДАТ (после ≥ 1 месяца) оказалась сопоставимой по клинической эффективности с её стандартной продолжительностью. Кроме того, исследование [3] показало, что переход на монотерапию просугрелом спустя 3 месяца после ЧКВ снижает как частоту крупных кровотечений, так и общую частоту осложнений. Эти данные обосновывают целесообразность персонализированной и адаптивной стратегии ведения ДАТ для оптимизации баланса между тромботическими и геморрагическими рисками.

Ключевые слова: острый инфаркт миокарда, двойная антитромбоцитарная терапия, стентирование коронарных артерий, риск кровотечений, ингибиторы $P2Y_{12}$, просугрел.

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MODERN APPROACHES TO THE SELECTION AND DURATION OF DUAL ANTIPLATELET THERAPY AFTER PERCUTANEOUS CORONARY INTERVENTION IN ACUTE CORONARY SYNDROME

Abstract: *Current literature data indicate the appropriateness of individualizing antiplatelet therapy in patients with acute myocardial infarction after coronary artery stenting, particularly in those with a high risk of bleeding complications.*

One randomized clinical trial [1] demonstrated that shortening the duration of dual antiplatelet therapy (DAPT) to one month followed by P2Y₁₂ inhibitor monotherapy does not increase the incidence of ischemic events but significantly reduces the risk of major bleeding. Similar conclusions were confirmed in the SHARP-MI registry [2], where early discontinuation of DAPT (after ≥ 1 month) showed comparable clinical efficacy to the standard 12-month regimen. Furthermore, another study [3] reported that switching to prasugrel monotherapy three months after percutaneous coronary intervention reduces both the rate of major bleeding and the overall incidence of adverse clinical outcomes.

These findings support the relevance of personalized and adaptive DAPT strategies aimed at optimizing the balance between thrombotic and hemorrhagic risks in patients after acute coronary syndrome and stenting.

Keywords: *acute myocardial infarction, dual antiplatelet therapy, coronary artery stenting, bleeding risk, P2Y₁₂ inhibitors, prasugrel.*

Введение: Сегодня среди населения нашей страны растет число сердечно-сосудистых заболеваний, инфаркта миокарда и ишемической болезни сердца. Известно, что первоначально пациент поступает в стационар с диагнозом синдром ОКС, а затем на основании лабораторных и инструментальных исследований ставится диагноз инфаркта миокарда или нестабильной стенокардии, а также определяются принципы дальнейшего лечения. Оптимизация эффективности антиагрегантной терапии после стентирования коронарных артерий при остром инфаркте миокарда является одной из важнейших задач современной кардиологии, поскольку правильный баланс между профилактикой тромботических осложнений и снижением риска кровотечений напрямую влияет на исходы лечения. Традиционно двойная антитромбоцитарная терапия (ДАТ) с применением аспирина и ингибиторов P2Y₁₂ (клопидогрела, прасугрела или тикагрелора) рекомендовалась на срок до 12 месяцев, однако недавние исследования ставят под вопрос универсальность такой схемы. Так, в работе An J [4] показано, что сокращение длительности ДАТ до трёх месяцев позволяет сохранить защиту от ишемических событий при существенном снижении частоты крупных кровотечений. Дополнительно, результаты исследования [5] продемонстрировали, что переход на менее агрессивную терапию на основании тестирования функции тромбоцитов не ухудшает клинические исходы. В поддержку этих данных, исследование [6] показало, что

прекращение аспирина после трёх месяцев ДАТ с продолжением монотерапии тикагрелором снижает риск кровотечений без увеличения частоты ишемических осложнений. Эти работы подчеркивают необходимость персонализированного подхода к антиагрегантной терапии после стентирования, что позволяет добиться оптимального баланса между эффективностью и безопасностью лечения.

Тромбоз коронарного стента встречается примерно у 0,87–2,2% пациентов и обычно развивается в течение первого года после установки стента.

Цель исследования: повысить эффективность антиагрегантной терапии в период после стентирования коронарных артерий у больных, перенесших острый инфаркт миокарда, с клинической и прогностической точки зрения.

Материалы и методы: В исследование были включены 28 пациентов, перенесших чрескожное коронарное вмешательство (ЧКВ) с имплантацией стентов по поводу острого инфаркта миокарда. Все пациенты были отобраны на основании четких критериев: возраст от 40 до 75 лет, отсутствие тяжелых сопутствующих заболеваний (например, онкологических процессов, хронической почечной недостаточности стадии IV–V), отсутствие в анамнезе геморрагических осложнений. В качестве антиагрегантной терапии был использован новый препарат прасугрел, назначаемый в нагрузочной дозе 60 мг с последующим переходом на поддерживающую дозу 10 мг в сутки. Продолжительность наблюдения составила 12 месяцев. В процессе терапии оценивались такие параметры, как частота ишемических событий (повторный инфаркт миокарда, тромбоз стента), случаи крупных и клинически значимых кровотечений.

Результаты: Проведенное исследование показало, что использование прасугрела в качестве антиагрегантной терапии после стентирования коронарных артерий обеспечивает значительное снижение частоты повторного тромбоза по сравнению с традиционной профилактической терапией клопидогрелем. В частности, в основной группе, получавшей прасугрел, частота повторного тромбоза коронарных артерий снизилась на 36,5% по сравнению с контрольной группой пациентов, получавших клопидогрель. Динамическое наблюдение за состоянием системы гемостаза, включающее коагулограмму, проводилось на 1-й, 3-й, 7-й день и через 1 месяц после начала терапии. По результатам анализа коагулограммы, положительная динамика в виде нормализации основных показателей гемостаза (укорочение времени свертывания крови, стабилизация уровня фибриногена и D-димера) была зарегистрирована у 44,5% пациентов исследуемой группы, получавших прасугрел, что существенно превосходило аналогичные показатели в контрольной группе.

Различия между группами были статистически значимыми ($p < 0,05$). Также в основной группе отмечено снижение уровня спонтанной агрегации тромбоцитов и увеличение ингибирования активности рецепторов P2Y₁₂, что

коррелировало с улучшением клинических исходов. Отмечено, что прасугрел обеспечивал более стабильный антитромбоцитарный эффект без значимого увеличения риска крупных кровотечений в течение периода наблюдения.

Обсуждение. Результаты настоящего исследования свидетельствуют о высокой эффективности прасугрела в профилактике тромбозов стента и повторных ишемических событий у пациентов после чрескожного коронарного вмешательства при остром инфаркте миокарда. Снижение частоты тромбоза на 36,5% по сравнению с применением клопидогреля соответствует данным крупных международных исследований, где прасугрел продемонстрировал более выраженный антитромбоцитарный эффект благодаря быстрому и стабильному ингибированию рецепторов P2Y₁₂. Повышенная положительная динамика коагулограммы у 44,5% пациентов исследуемой группы также подтверждает способность прасугрела эффективно стабилизировать параметры системы гемостаза в ранние сроки после ЧКВ. Эти данные согласуются с результатами исследования, где применение прасугрела сопровождалось снижением риска крупных сердечно-сосудистых осложнений без существенного увеличения числа серьезных кровотечений у пациентов с острым коронарным синдромом. Несмотря на это, необходимо учитывать индивидуальные особенности пациентов, такие как возраст, масса тела и наличие факторов риска кровотечений, при выборе антиагрегантной терапии, что подчёркивается современными рекомендациями по лечению острого коронарного синдрома. Таким образом, полученные результаты подтверждают перспективность использования прасугрела как эффективного средства для оптимизации антиагрегантной терапии в постстентинговом периоде.

Использование прасугрела обеспечивает более эффективное ингибирование активности рецепторов P2Y₁₂ без существенного увеличения риска развития крупных кровотечений в течение 12 месяцев наблюдения.

Полученные данные подтверждают целесообразность персонализированного подхода к выбору антиагрегантной терапии у пациентов высокого риска, с учётом индивидуальных характеристик пациента и потенциальных рисков кровотечений.

Практическая реализация оптимизированной стратегии применения прасугрела может способствовать улучшению отдалённых клинических исходов у пациентов после чрескожных коронарных вмешательств при остром инфаркте миокарда.

Заключение. Результаты исследования показали, что эффективность различных препаратов неодинакова у пациентов, перенесших острый инфаркт миокарда и получающих антиагрегантную терапию после стентирования коронарных артерий. Однако результаты исследования также показали, что алгоритм эффективной антиагрегантной терапии после стентирования коронарных артерий до конца не разработан. Из-за различий между пациентами, индивидуальной реакции на препараты и побочных эффектов возникает необходимость в оптимизации терапии. Поэтому в будущих

исследованиях необходимо будет проанализировать эффективность различных антиагрегантных препаратов на большей группе пациентов, разработать оптимальный терапевтический алгоритм и учесть индивидуальные особенности пациентов.

Результаты текущего исследования показывают, что прасутгрел может быть более эффективным, чем клопидогрель, однако необходимы дальнейшие крупномасштабные исследования, прежде чем его можно будет рекомендовать в качестве универсального средства для всех пациентов.

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ҲАВЗАВИЙ ЁНДАШУВ АСОСИДА ҚИШЛОҚ ХЎЖАЛИГИНИ ХУДУДИЙ ТАШКИЛ ЭТИШНИНГ ИЛМИЙ-НАЗАРИЙ АСОСЛАРИ

***Аннотация:** Мақолада ҳавзавий ёндашув асосида қишлоқ хўжалиги тармоқларини ҳудудий ташкил этиш ҳақида сўз боради. Бу борада етакчи олимларнинг тадқиқотлари таҳлил қилинган. Қишлоқ хўжалиги тармоқларининг жойлашуви ва иқтисослашувига табиат компонентларининг ҳавзавий ўзгариши бевосита таъсир қилиши асосланган.*

***Калим сўзлар:** дарё ҳавзаси, ҳавзавий ёндашув, қишлоқ хўжалиги, ер усти сув оқими, ҳудудий ташкил этиш, иқтисослашув, табиий шароит.*

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SCIENTIFIC AND THEORETICAL BASIS OF TERRITORIAL ORGANIZATION OF AGRICULTURE ON THE BASIS OF BASIN APPROACH

***Abstract:** The article deals with the territorial organization of agricultural sectors based on the basin approach. Researches of leading scientists have been analyzed in this regard. It is based on the fact that the location and economicization of agricultural sectors are directly affected by the basin change of natural components.*

***Key words:** river basin, basin approach, agriculture, surface water flow, regional organization, specialization, natural conditions.*

Қишлоқ хўжалиги тармоқларининг жойлашуви ва ривожланишида табиий шароит муҳим аҳамият касб этади. Ушбу тармоқларни ҳавзавий ёндашув асосида ҳудудий ташкил этилишини такомиллаштириш мақсадга мувофиқ ҳисобланади. Буни бир қатор олимлар ўзларининг тадқиқот ишлари орқали асослаб берган. Хусусан, Л.М.Корытныйнинг “Дарё ҳавзасини геотизим сифатида” тадқиқ қилиш ғоясини илгари суради. Олимнинг фикри бўйича ҳар бир дарё ҳавзаси ўзига хос геотизим бўлиб, унинг чегараси сув айирғичларнинг чегарасига тўлиқ мос келади, яъни геотизимнинг чегарасини

тизим ҳосил қилувчи ер усти сув оқимларининг йўналишлари белгилаб беради. Олимнинг “Табиатдан фойдаланишда ҳавзавий концепция, (2001)” ва “Ҳавзавий концепция: гидрологиядан табиатдан фойдаланишгача, (2017)” асарларида дарё ҳавзалари бир бутун табиий-хўжалик тизими сифатида қаралади, яъни дарё ҳавзасидаги хўжалик тизимининг жойланиши энг аввало табиий тизимнинг структурасига боғлиқ ҳолда ривожланиши таъкидланади. Л.М.Корытнийнинг фикрига кўра, ҳар бир дарё ҳавзаси табиатда объектив мавжуд бўлиб, у ўз навбатида табиатдан фойдаланишда табиий асос яратади. Демак, табиатдан фойдаланишда ҳавзавий концепцияни қўллашнинг аҳамияти юқори экан, бу борада ҳавзаларининг ички структурасини татқиқ қилиш катта илмий-амалий аҳамият касб этади. Шу билан бирга, Л.М.Корытний дарё ҳавзаларини яхлит табиий хўжалик тизими сифатида тадқиқ қилишни таклиф қилган ва ҳавзавий карталаштиришга ҳам катта аҳамият берган. Чунончи, дарё ҳавзасининг ҳудудий яхлитлик сифатида ўрганиш ва унинг илмоқларини элемент сифатида қарашни илгари сурган ҳамда ўз навбатида, табиатдан фойдаланишда ҳавзавий концепциянинг асосини ҳавзавий карталаштиришни ташкил этади, дея таъкидлаган [3; 4].

XX-асрнинг 20-йилларида И.Г.Александров районлаштириш бўйича олиб борган тадқиотларида дарё ҳавзаларини ҳисобга олиш зарурлигини таъкидлаган. У дарё ҳавзаси нафақат мамлакат гидрографиясини акс эттиради, балки бир томондан ҳудудлар геологик тузилишининг асосий хусусиятларини ўзида мужассам этса, иккинчи томондан эса аҳоли жойлашуви билан чамбарчас боғлиқлигини изоҳлаган. Дарё ҳавзаси ўрганилаётган ҳудудининг барча табиий ва тарихий хусусиятларини ўзида тўлиқ акс эттирувчи макон сифатида тан олиниши кераклигини қайд этган. Олимнинг бу методологик кўрсатмасига биноан собиқ Иттифоқ давлати Туркистон иқтисодий районида қуйидаги: Чу, Арес-Талас, Қуйи Сирдарё, Юқори Амударё, ўрта Амударё, Қуйи Амударё кичик районлари ажратилган. Ҳақиқатдан ҳам бу кичик районлар ўзининг табиий ва иқтисодий географик, социал-тарихий ва бошқа хусусиятлари билан ажралиб туради. Умуман олганда, иқтисодий-географик районлаштиришда ҳам дарё ҳавзалари асос сифатида олиниши мумкин, яъни дарё ҳавзалари геотизим сифатида табиий ва иқтисодий географик тадқиқотларнинг объекти сифатида татқиқ қилиниши муҳим илмий-амалий аҳамият касб этади.

Таъкидлаш ўринлики, машҳур географ олим В.С.Жекулин ўзининг “Географияга кириш, (1989)” номли асарида “Ўзаро алоқадорлик ва ўзаро боғлиқлик” география фанининг асосий тадқиқот предмети бўлиши кераклигини уқтиради [2]. Шу илмий ғояга таянган ҳолда айтиш мумкинки, қишлоқ хўжалиги тармоқларини жойлаштиришда дарё ҳавзасининг ички тузилиши ва табиат компонентлари билан қишлоқ хўжалик тармоқларининг ўзаро алоқадорлигини тадқиқ қилиш иқтисодий география илмининг долзарб вазифалар сирасига киради. Умуман олганда, дарё ҳавзасида қишлоқ хўжалик тармоқларининг жойлашуви ва иқтисослашуви ҳавзанинг табиий шароити билан чамбарчас боғлиқ. Бу алоқадорлик ва боғлиқликда ер усти сув оқими

алоҳида роль ўйнайди, яъни бу омилнинг фаолияти натижасида қишлоқ хўжалик экинлари учун зарур бўлган ер ресурсларининг таркиби ва сифати шаклланади [7].

Қишлоқ хўжалиги географиясининг етакчи мутахассисларидан бири А.Н.Ракитников ўзининг “Қишлоқ хўжалиги географияси (муаммолар ва тадқиқот усулари), (1970)” асарида қишлоқ хўжалигининг табиий шароит билан муносабатига катта аҳамият берган. У “Ер ресурсларидан қишлоқ хўжалигининг тармоқлари учун фойдаларнишда ер типлари (хиллари) алоҳида роль ўйнайди. Ер типларининг ҳар-хил бўлишида эса ҳудуднинг рельеф типлари табиий географик омиллар ичида энг асосийсидир”, дея таъкидлаган. Шу билан бир қаторда, олим ер ресурсларида фойдаланишни карталаштирилишга ҳам катта аҳамият қаратган. Ер ресурсларидан фойдаланишда ҳудуднинг табиий ландшафтларини карталаштириш муҳимгини, табиий ландшафт контурларини карталаштиришда эса рельеф типларининг контурлари асосий ролни бажаришини айтиб ўтади. Бошқача айтганда, рельеф типларининг ҳар-хил бўлиши натижасида ўзига хос ландшафт типлари ҳосил бўлади, яъни рельеф типларига боғлиқ ҳолда ландшафтни ҳосил қилувчи барча табиат компонентлари қонуний ўзгаради [8].

Ўзбекистон қишлоқ хўжалиги географияси илмий мактабининг асосчиси З.М.Акрамов ва бошқа муаллифлар томонидан ёзилган “Самарқанд ва Бухоро вилоятлари қишлоқ хўжалик географияси, (1961)” монографиясида қишлоқ хўжалигининг ҳудудий табақаланишини тадқиқ қилишда асосий эътиборини тармоқ хўжаликларининг табиий муҳит билан алоқадорлигига қаратилган. Муаллифлар айниқса, қишлоқ хўжалигининг воҳа типини ажратишда Зарафшон водийсининг юқори, ўрта ва қуйи қисмларидаги рельеф типларнинг у ёки бу даражадаги таъсирига эътибор қаратади [1].

Ўзбекистон қишлоқ хўжалиги иқтисодиёти етакчи олимларидан бири, академик К.И.Лапкин ўзининг “Ўзбекистон ССР зона ва районлари бўйича қишлоқ хўжалик ишлаб чиқаришини жойлаштириш ва ихтисослаштириш, (1966)” номли монографиясида тармоқларнинг жойлашуви ва ихтисослашувидаги омилларни икки қисмга ажратади: табиий ва иқтисодий. Бу ўринда олим табиий шароитнинг баландлик минтақалари бўйича табақаланиши ўз навбатида қишлоқ хўжалигининг жойлашувига ва ихтисослашувига тўғридан-тўғри таъсир этади, деган хулосага келади. Олим қишлоқ хўжалиги тармоқлари учун табиий шароитнинг қулайлик даражаларини баҳолашда табиат компонентларининг (иқлим, рельеф, тупроқ ва бошқ.) экологик ҳолатига ҳам катта эътибор қаратади, яъни табиат компонентларининг экологик ҳолати қишлоқ хўжалик тармоқларининг ривожланиш даражаларини белгилаб беришини таъкидлаб ўтади. Шунингдек, олим қишлоқ хўжалик ишлаб чиқаришининг жойлашувида ва ихтисослашувида иқтисодий омилларга, яъни ирригация ва мелиорация тизимларининг жойлашувига, қишлоқ ва сув хўжаликларининг алоқадорлигига, меҳнат ресурсларига, ер ресурсларининг ўлчови ва

структурасига (рельеф билан ўзаро муносабатига) ва бошқа иқтисодий омилларга ҳам катта эътибор беради [5]. Умуман олганда, К.И.Лапкиннинг бу тадқиқотлари Ўзбекистонда қишлоқ хўжалик тармоқларининг жойлашувини ва иқтисослашувини баландлик минтақалари бўйича таҳлил қилишда фундаментал асос ҳисобланади.

А.М.Носонов ҳам ўзининг “Қишлоқ хўжалигининг ҳудудий тизимлари, (2001)” номли асарида қишлоқ хўжалигининг ҳудудий тизимларини тадқиқ қилишда тизимли ёндашувни қўллашни илгари суради. Жумладан, у қишлоқ хўжалигининг ҳудудий тизимлари қуйидаги хусусиятларга эгаллигини келтиради [5]:

- яхлитлик (ягона мақсад ва функциянинг мавжудлиги);
- структуравий тузилиши (tizim ўзининг таркибий компонентлари билан ўзаро боғлиқлиги);
- автономлик (ички тартибликни вужудга келтириш ва уни юқори даражада сақлаб туриш);
- тизим ва муҳитнинг ўзаро алоқадорлиги (tizim ўзининг хоссасини фақат ташқи муҳит билан ўзаро боғлиқлигида ҳосил қилди ва намоён бўлади);
- иерархиялик (tizim элементларининг бўйсунганлиги);
- бошқарувчанлик (бошқаришнинг ташқи ва ички тизимларининг мавжудлиги);
- барқарорлик (ўзининг структурасини сақлашга интилиш);
- ҳудудийлик (tizimнинг жойлашуви);
- динамиклик (tizimнинг ривожланиши).

Таъкидлаш жоизки, айниқса, қишлоқ хўжалигининг ҳудудий тизимлари шаклланишида дарё ҳавзаларининг ўрни юқори ҳисобланади. Ҳавзадаги табиат компонентларининг горизонтал ва вертикал ўзгариши қишлоқ хўжалиги тармоқларининг ҳудудий ташкил этилишига етакчи аҳамият касб этади.

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КЛИНИЧЕСКИЕ АСПЕКТЫ ИСПРАВЛЕНИЯ ЗУБОЧЕЛЮСТНЫХ АНОМАЛИЙ В ОРТОДОНТИИ

Аннотация: Неправильный прикус является одной из наиболее распространённых стоматологических проблем современного общества и затрагивает пациентов всех возрастных групп. Он оказывает влияние не только на эстетику лица и улыбки, но и на жевательную функцию, речь, состояние височно-нижнечелюстного сустава, а также общее качество жизни. Ортодонтия как раздел стоматологии занимается диагностикой, профилактикой и коррекцией зубочелюстных аномалий с применением современных научно обоснованных методов. В статье рассмотрены основные причины формирования неправильного прикуса, современные ортодонтические методы его исправления, а также представлены результаты клинико-аналитического исследования эффективности различных ортодонтических подходов.

Ключевые слова: ортодонтия, неправильный прикус, зубочелюстные аномалии, брекет-системы, элайнеры, ортодонтическое лечение.

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CLINICAL ASPECTS OF CORRECTION OF DENTAL ANOMALIES IN ORTHODONTICS

Annotation: Malocclusion is one of the most common dental problems in modern society and affects patients of all age groups. It affects not only the aesthetics of the face and smile, but also chewing function, speech, the condition of the temporomandibular joint, as well as the overall quality of life. Orthodontics as

a branch of dentistry deals with the diagnosis, prevention and correction of dental anomalies using modern scientifically based methods. The article discusses the main causes of malocclusion, modern orthodontic methods for its correction, and presents the results of a clinical and analytical study of the effectiveness of various orthodontic approaches.

Keywords: *orthodontics, malocclusion, dental anomalies, braces, aligners, orthodontic treatment.*

Введение

Проблема неправильного прикуса занимает важное место в современной стоматологии и имеет не только медицинское, но и социальное значение. По данным эпидемиологических исследований, различные формы зубочелюстных аномалий выявляются у 60–80 % детей и подростков, а также у значительной части взрослого населения. Нарушения прикуса могут приводить к преждевременному стиранию твёрдых тканей зубов, развитию кариеса и заболеваний пародонта, функциональным расстройствам жевательных мышц и височно-нижнечелюстного сустава, а также нарушению дикции и осанки.

Следует отметить, что зубочелюстные аномалии нередко формируются ещё в раннем детском возрасте под влиянием наследственных факторов, вредных привычек, особенностей вскармливания и соматических заболеваний. При отсутствии своевременной коррекции данные нарушения имеют тенденцию к прогрессированию и усложнению клинической картины, что значительно затрудняет лечение во взрослом возрасте.

Современная ортодонтия располагает широким спектром диагностических и лечебных возможностей, позволяющих эффективно исправлять неправильный прикус в разные возрастные периоды. Внедрение цифровых технологий, телерентгенометрического анализа, компьютерного моделирования и индивидуализированных ортодонтических конструкций существенно повысило точность диагностики и прогнозируемость результатов лечения.

Кроме того, в условиях возросших эстетических требований общества правильный прикус и гармоничная улыбка рассматриваются как важные компоненты психоэмоционального благополучия пациента и его социальной адаптации. В связи с этим ортодонтическое лечение приобретает междисциплинарное значение, сочетая медицинские, функциональные и эстетические аспекты.

Актуальность данной работы обусловлена необходимостью комплексного анализа современных методов ортодонтического лечения и оценки их клинической эффективности с учётом возраста пациентов, степени выраженности аномалий и индивидуальных особенностей зубочелюстной системы.

Актуальность исследования

Актуальность исследования обусловлена высокой распространённостью зубочелюстных аномалий среди населения, их тенденцией к росту и значительным влиянием на стоматологическое и общее здоровье пациентов. Неправильный прикус рассматривается не только как эстетический дефект, но и как фактор риска развития кариеса, заболеваний пародонта, дисфункций височно-нижнечелюстного сустава и нарушений жевательной эффективности.

Несмотря на наличие большого количества ортодонтических методик, выбор оптимального способа лечения остаётся сложной клинической задачей и требует учёта возраста пациента, стадии формирования зубочелюстной системы, степени выраженности аномалии и индивидуальных морфофункциональных особенностей. В практической ортодонтии сохраняется необходимость объективной оценки эффективности различных лечебных подходов и их отдалённых результатов.

Дополнительную значимость проблеме придаёт активное внедрение современных технологий — цифровой диагностики, трёхмерного моделирования и индивидуализированных ортодонтических конструкций, что требует научного анализа их клинической целесообразности и эффективности. В условиях повышенных эстетических запросов пациентов исследование современных методов коррекции неправильного прикуса приобретает особую медико-социальную и практическую значимость.

Цель и задачи исследования

Цель исследования — изучить современные ортодонтические методы исправления неправильного прикуса и оценить их эффективность на основе анализа клинических данных.

Задачи исследования:

Проанализировать основные этиологические факторы формирования неправильного прикуса.

Изучить классификацию и клинические проявления зубочелюстных аномалий.

Рассмотреть современные методы ортодонтического лечения.

Оценить результаты применения различных ортодонтических конструкций.

Сформулировать выводы о наиболее эффективных подходах к коррекции прикуса.

Материалы и методы исследования

В основу исследования положен анализ данных научной литературы, клинических рекомендаций и результатов наблюдений за пациентами, проходившими ортодонтическое лечение. В исследование были включены данные 60 пациентов в возрасте от 12 до 35 лет с различными формами неправильного прикуса.

Применялись следующие методы исследования:

- клинический осмотр полости рта;
- антропометрический анализ лица;

ортопантомография и телерентгенография;
анализ диагностических моделей челюстей;
фотопротокол до и после лечения;
сравнительный анализ эффективности ортодонтических аппаратов.

Пациенты были разделены на группы в зависимости от применяемого метода лечения: съёмные ортодонтические аппараты, несъёмные брекет-системы и прозрачные элайнеры.

Современные методы исправления неправильного прикуса

Съёмные ортодонтические аппараты

Съёмные аппараты преимущественно применяются в детском и подростковом возрасте, когда продолжается рост челюстей. Они способствуют нормализации положения зубов, коррекции ширины зубных дуг и устранению вредных привычек. Основными преимуществами данных аппаратов являются относительная простота использования и возможность гигиенического ухода.

Несъёмные брекет-системы

Брекет-системы остаются «золотым стандартом» ортодонтического лечения. Они позволяют осуществлять точное и контролируемое перемещение зубов в трёх плоскостях. Современные брекет-системы подразделяются на металлические, керамические, сапфировые и лингвальные. Их выбор зависит от клинической ситуации и эстетических требований пациента.

Прозрачные элайнеры

Элайнеры представляют собой инновационный метод ортодонтического лечения, основанный на использовании серии индивидуально изготовленных прозрачных кап. Данный метод отличается высокой эстетичностью и комфортом, однако имеет ограничения при лечении сложных форм прикуса.

Результаты исследования

В ходе исследования была проведена сравнительная оценка эффективности различных ортодонтических методов лечения у 60 пациентов с неправильным прикусом. Анализ проводился по следующим критериям: степень коррекции окклюзии, продолжительность лечения, стабильность полученного результата и субъективная удовлетворённость пациентов.

У пациентов, проходивших лечение с применением несъёмных брекет-систем, выраженное улучшение окклюзионных взаимоотношений зубных рядов было достигнуто в 93 % случаев. Средняя продолжительность лечения в данной группе составила 18–24 месяца. По данным контрольных осмотров через 6 месяцев после завершения активной фазы лечения рецидивы выявлены лишь у 7 % пациентов, что свидетельствует о высокой стабильности результата при соблюдении ретенционного периода.

В группе пациентов детского и подросткового возраста, использовавших съёмные ортодонтические аппараты, положительная динамика отмечена в 85 % случаев. Наиболее выраженный эффект наблюдался при раннем начале лечения (в возрасте 7–10 лет), когда

сохраняется активный рост челюстей. Средняя продолжительность лечения составила 12–18 месяцев. Недостаточная эффективность в отдельных случаях была связана с нерегулярным ношением аппаратов.

Использование прозрачных элайнеров показало эффективность в 88 % случаев у пациентов с лёгкими и среднетяжёлыми формами неправильного прикуса. Отмечено значительное повышение уровня комплаентности пациентов благодаря эстетичности и комфорту метода. Средняя продолжительность лечения составила 14–20 месяцев. При этом в 12 % случаев потребовалась дополнительная коррекция с применением несъёмных ортодонтических конструкций.

Функциональные показатели жевательного аппарата улучшились у 90 % обследованных пациентов, что проявлялось нормализацией жевательной нагрузки и снижением жалоб на утомляемость жевательных мышц. Эстетическая оценка улыбки по данным фотопротоколов показала положительную динамику у 95 % пациентов.

Таким образом, результаты исследования подтверждают высокую клиническую эффективность современных ортодонтических методов при условии индивидуального подбора лечебной тактики и соблюдения рекомендаций врача-ортодонта.

Обсуждение

Полученные результаты подтверждают данные современной литературы о высокой эффективности ортодонтического лечения при условии своевременной диагностики и правильного выбора лечебной тактики. Особое значение имеет возраст пациента, степень выраженности аномалии и соблюдение рекомендаций врача-ортодонта.

Перспективным направлением развития ортодонтии является внедрение цифровых технологий, трёхмерного моделирования и индивидуализированных ортодонтических систем.

Выводы

Неправильный прикус является многофакторной патологией, требующей комплексного подхода к диагностике и лечению.

Современная ортодонтия располагает эффективными методами коррекции зубочелюстных аномалий.

Несъёмные брекет-системы остаются наиболее универсальным и результативным методом лечения.

Съёмные аппараты и элайнеры эффективны при определённых клинических показаниях и раннем начале лечения.

Индивидуализация ортодонтического лечения обеспечивает высокие функциональные и эстетические результаты.

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СОЗДАНИЕ МОДЕЛИ И ЭКОНОМИЧЕСКИЙ АНАЛИЗ ПРОЦЕССА ПРОИЗВОДСТВА СЕЛЬСКОХОЗЯЙСТВЕННОЙ ПРОДУКЦИИ

***Аннотация.** В статье сформулированы модели взаимосвязи стоимости производства молока и мяса, ветеринарных услуг, заработной платы, затрат на единицу корма в Самаркандской области в 2006-2023 годах. Рассмотрены вопросы определения параметров эконометрической модели, определения существенности модели, значимости модельных коэффициентов. Эконометрический анализ модели исследовал такие исследования, как проверка наличия и отсутствия гетероскедастичности и гомоскедастичности.*

Теоретически и практически исследовано влияние вышеуказанных факторов на производство молока и мяса, а также построена модель взаимосвязи между их взаимодействием. Была проведена работа по прогнозированию проблемы по структурированной модели.

***Ключевые слова:** модель, моделирование, регрессия, уравнение регрессии, эконометрический анализ, гетероскедастичность, гомоскедастичность, корреляционно-регрессионная модель, мультиколлинеарность.*

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CREATION OF A MODEL AND ECONOMIC ANALYSIS OF THE AGRICULTURAL PRODUCTION PROCESS

***Abstract.** The article concluded in the Samarkand region in 2006-2023 models of interdependence of the cost of milk and meat production, Veterinary Services, wages, expenses per unit of food. The issues of determining the parameters of the econometric model, determining the essence of the model, the importance of model coefficients are considered. In the econometric analysis of the model, works such as the investigation of the existence and non-existence of heteroscedateness and homoscedateness have been researched.*

The influence of the above factors on milk and meat production has been studied theoretically-practically, and a linkage model of their interaction has been established. Predictive work has been carried out on the structured model of the issue.

Keywords: *model, modeling, regression, regression equation, econometric analysis, heteroskedom, homoskedom, correlation-regression model, multicollinearity.*

Введение

Объем произведенной сельскохозяйственной продукции в январе-марте 2024 года составил 179,7 млрд долл. 103,2% к соответствующему периоду 2023 года. Доля продукции сельского хозяйства в общем объеме произведенной сельскохозяйственной продукции составила 3,2%.

В январе-марте 2024 года объем производства животноводческой продукции составил 5 352,2 млрд долл. Объем произведенной сельскохозяйственной продукции в январе-марте 2024 года составил 179,7 млрд долл. 103,2% к соответствующему периоду 2023 года. Доля продукции сельского хозяйства в общем объеме произведенной сельскохозяйственной продукции составила 3,2%.

Самаркандской области в январе-марте 2024 года объем производства животноводческой продукции составил 5 352,2 млрд долл. 103,5% к соответствующему периоду 2023 года. Доля продукции животноводства в общем объеме произведенной сельскохозяйственной продукции составила 96,8%.

Анализ использованных литературы

Научно-исследовательская и научно-исследовательская работа проводилась отечественными и зарубежными учеными по вопросам производства сельскохозяйственной продукции, в частности животноводческой. Зарубежные ученые с. Грилликс, и.тинберген, научно-исследс-исследовательская и научно-исследовательская работа проводилась отечественными и зарубежными учеными по вопросам производства сельскохозяйственной продукции, в частности животноводческой. Зарубежные ученые с.в. грилликс, и.тинберген, в.н.афанасьев, с.а. айвазян, а.м.гатаулин, н.м.гореева, т.а.дуброва, л.н.демидова, о.п.крастин, н.ш.кремер, н.р.тихомиров, и.и.елисеева и другие. Из ученых, проводивших исследования по вопросам оптимизации в нашей республике узбекистан с.с.гулямов, б.ю.ходиев, б.а.бегалов, б.беркинов, т. Ш. Шодиев, й.абдуллаев, н.в.ашурова, с.к.салаев, н.г. муродова, и.с.абдуллаев и.т.д.

Методика исследования

На основе метода научной абстракции, наблюдения, сравнения, регрессионный и дисперсионного анализа.

Материалы и методы

При выборе типа математической модели исследователь руководствуется принципами простоты модели и возможности

Другими словами, $x_1, x_2, \dots, x_n$ факторы практически не влияют на у результирующую производительность.

Фактическое значение по F-критерию рассчитывается по этой формуле:

$$F = \frac{MS_{\text{омил}}}{MS_{\text{goldiq}}} = \frac{R^2}{1-R^2} \cdot \frac{n-p-1}{p}, \quad (5)$$

где n – число наблюдений; p – число факторов, участвующих в модели; R^2 – коэффициент детерминации.

Теперь из таблицы квантального распределения Фишера (приложение 2) найдено значение $F_{\text{haq}}(\alpha, k_1, k_2)$, где $k_1 = 3$ и $k_2 = n-p-1$.

Для оценки адекватности модели используется следующее правило:

$$F_{\text{haq}} > 4 \cdot F_{\text{jad}}, \quad (6)$$

Многофакторный коэффициент детерминации находится по формуле:

$$R^2 = \frac{\sum (\tilde{y} - \bar{y})^2}{\sum (y - \bar{y})^2}, \quad (7)$$

a_j определяет значимость параметра, а x_j выдвигает гипотезу, что факторы не зависят от результирующего показателя:

$$H_0: a_1 = a_2 = a_3 = \dots = a_p = 0$$

Значение частного критерия F-Фишера определяется:

$$F_{xj} = \frac{R^2_{y x_1 x_2 \dots x_n} - R^2_{y x_j x_1 \dots x_{j-1} x_{j+1} \dots x_p}}{1 - R^2_{y x_1 x_2 \dots x_p}} \cdot \frac{n-p-1}{1}, \quad (8)$$

Если $F_{a_j} \leq F_{\text{tab}}(\alpha, 1, n-p-1)$ или $|t_{a_j}| \leq t_{\text{tab}}(\alpha, n-p-1)$ неравенство выполняется, то гипотеза подтверждается, т. е. коэффициенты регрессии a_j равны 0, а гипотеза H_0 подтверждается. В этом случае связь между регрессорами x_j и y не будет существовать.

РЕЗУЛЬТАТЫ

5.1. Линейная регрессия. В качестве исходных данных возьмем четыре различных основных показателя хозяйств Самаркандской области как факторов, влияющих на производство мяса в течение восемнадцати лет, тогда уравнение регрессии будет следующим:

$$\tilde{y} = a_0 + a_1 x_1 + a_2 x_2 + a_3 x_3 + a_4 x_4, \quad (9)$$

где $\tilde{y}$ -- производство мяса. тыс. сум;

a_0 - неизвестные до сих пор коэффициенты регрессии. x_1 - цена на мясо, тыс. сум;

x_2 - ветеринарные услуги тыс. сум;

x_3 - зарплата, тыс. сум;

x_4 - затраты на единицу корма, В тыс. руб. за тонну;

a_0 - неизвестные до сих пор коэффициенты регрессии.

СВЕДЕНИЕ О ПРОИЗВОДСТВЕ МЯСА ПО ХОЗЯЙСТВАМ САМАРКАНДСКОЙ ОБЛАСТИ

№	год	у, тонна	Цена на мясо, тонна-тысяча сум, x_1	ветеринарная служба, тысяча сум, x_2	заработная плата, в тыс. сумов, x_3	Затраты на единицу корма, сум,, x_4
1	2006	104561	7654	34	4560	19600
2	2007	112465	7865	45	5678	19760
3	2008	112378	7975	43	6900	18757
4	2009	134561	7868	45	7680	20340
5	2010	146545	8767	45	8000	20045
6	2011	151380	12164	45	8000	20078
7	2012	156658	14578	45	8000	20087
8	2013	164037	15668	50	8500	25076
9	2014	171610	21128	50	8500	25090
10	2015	179835	22879	50	9000	25230
11	2016	189106	22465	55	9000	30234
12	2017	185725	26928	60	9500	30564
13	2018	178883	35838	65	9500	35450
14	2019	195799	43122	75	11000	35000
15	2020	213456	57423	78	12300	43900
16	2021	257654	61374	81	14600	51500
17	2022	288912,6	70135	95	15645	53480
18	2023	313064,9	74654	123	17890	64520

Используем программе Excel.

- 1) Параметры уравнения регрессии: $a_0 = 24789,75$;
 $a_1 = -0,12281$; $a_2 = -614,046$; $a_3 = 16,19056$; $a_4 = 1,285927$.

Подставляя найденные значения в формулу (1), составляем уравнение регрессии:

$$\tilde{y} = 24789,75 - 0,12281 x_1 - 614,046 x_2 + 16,19056 x_3 + 1,285927 x_4, \quad (10)$$

Следовательно, $F_{рас} = 113,788$. Теперь значение $F_{кр}$ квантового распределения Фишера $F(\alpha, k_1, k_2)$ найдено с помощью электронной таблицы Microsoft Excel. Следовательно, из того факта, что $F_{рас} > F_{кр}(0,05; 4; 18-4-1) = F_{ОБР}(0,05; 4; 13) = 3,179$, следует уравнения регрессии значим.

То есть $R^2 = \frac{\sum (\bar{y} - \tilde{y})^2}{\sum (y - \bar{y})^2} = 0,9722$. Оказывается, коэффициент корреляции равен $R = 0,986$.

5.2. Степенная модель. Выбираем модель в представлении:

$$\tilde{y} = a_0 \cdot x_1^{a_1} \cdot x_2^{a_2} \cdot x_3^{a_3} \cdot x_4^{a_4}$$

Параметры уравнения регрессии: $a_0 = 29,29$; $a_1 = 0,09486$; $a_2 = -0,35198$; $a_3 = 0,7484$; $a_4 = 0,2274$.

Подставляя найденные значения в формулу (2), составляем уравнение регрессии:

$$\tilde{y} = 29,29 \cdot x_1^{0,09486} \cdot x_2^{-0,35198} \cdot x_3^{0,7484} \cdot x_4^{0,2274}.$$

То есть $R^2 = \frac{\sum (\bar{y} - \tilde{y})^2}{\sum (y - \bar{y})^2} = 0,7925$. Оказывается, коэффициент корреляции равен $R=0,7925$.

ВЫВОДЫ

Линейная модель. и линейная модель.

$$\tilde{y} = 24789,75 - 0,12281 x_1 - 614,046 x_2 + 16,19056 x_3 + 1,285927 x_4$$

Эта модель важна, поскольку критерий Фишера $F_{рас} = 113,788$. Получается, что коэффициент корреляции $R=0,986$, $a=4,38\%$. Поскольку это количество составляет менее 8-10%, качество построенной модели значимый.

По данным структурированной линейной модели, степенной модели, следует, что наиболее важной, согласно выполнению уравнения, является линейная модель. Согласно этим данным, производство мяса прогнозируется следующим образом:

годы	2024	2025	2026	2027	2028
Производство мяса	330171,6	351466,1	372760,5	394055	415349,4

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ГЛИКОЗИДЫ: ХИМИЧЕСКАЯ СТРУКТУРА, ТИПЫ И МЕДИЦИНСКОЕ ПРИМЕНЕНИЕ

***Аннотация:** В данной статье подробно освещены химическое строение, биосинтез и классификация гликозидов, а также их фармакологическое и клиническое значение. Раскрыта роль и значение гликозидов в лечении заболеваний сердечно-сосудистой системы, органов пищеварения, дыхательной и нервной систем.*

***Ключевые слова:** гликозиды, агликон, гликон, фармакогнозия, сердечные гликозиды, биологически активные вещества.*

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GLYCOSIDES: CHEMICAL STRUCTURE, TYPES, AND MEDICAL APPLICATIONS

***Annotation:** This article provides a detailed overview of the chemical structure, biosynthesis, and classification of glycosides, as well as their pharmacological and clinical significance. The role and importance of glycosides in the treatment of diseases of the cardiovascular, digestive, respiratory, and nervous systems are highlighted.*

***Keywords:** glycosides, aglycone, glycone, pharmacognosy, cardiac glycosides, biologically active substances.*

Сегодня в современной медицине и фармации растёт интерес к биологически активным веществам природного происхождения. Это объясняется, прежде всего, тем, что синтетические препараты имеют множество побочных эффектов, а природные вещества относительно хорошо усваиваются организмом. К таким природным соединениям относятся гликозиды.

Гликозиды — широко распространенные вторичные метаболиты в растительном мире, играющие важную роль в физиологической активности растений и их адаптации к внешней среде. С точки зрения воздействия на организм человека, гликозиды обладают высокой биологической активностью и лежат в основе многих лекарственных препаратов. В частности, сердечные гликозиды имеют большое значение в кардиологической практике.

Основная цель данной статьи — научно осветить химические и биологические свойства гликозидов, всесторонне проанализировать их типы и области применения в медицине.

Гликозиды — сложные органические соединения, молекулы которых состоят из двух основных частей:

1. Гликон — сахарная часть
2. Агликон (генин) — несахарная часть

Эти две части соединены друг с другом гликозидной связью. В качестве гликокона чаще всего встречаются глюкоза, галактоза, рамноза или фруктоза. Агликон имеет другую химическую природу, и именно эта часть определяет биологическую и фармакологическую активность гликозида. В зависимости от типа гликозидной связи гликозиды делятся на О-гликозиды, N-гликозиды и S-гликозиды. В процессе ферментативного гидролиза в организме гликозиды расщепляются, высвобождается активный агликон, и проявляется терапевтический эффект.

Ранее весьма распространённая ботаническая классификация используется в настоящее время лишь для гликозидов неустановленного строения. Фармакологическая классификация, основанная на биологическом действии гликозидов, также не удержалась. Наиболее целесообразна химическая классификация, основанная на химическом строении агликонов или сахаров, образующихся при гидролизе гликозидов. В этом случае гликозиды получают название сахаров с прибавлением суффикса «ид». Так, гликозиды, отщепляющие пентозу, называются пентозидами, отщепляющие гексозу — гексозидами. Последние, в свою очередь, делятся на подгруппы, например, отщепляющие глюкозу называются глюкозидами, отщепляющие фруктозу или галактозу — фруктозидами, галактозидами и так далее.

В растениях гликозиды синтезируются как вторичные продукты метаболизма. Их основная биологическая функция — защита растения от вредных насекомых, микроорганизмов и внешних стрессовых факторов. Некоторые гликозиды обладают токсическими свойствами и защищают растение от гниения.

Гликозиды также служат запасным веществом в растительных клетках. Они накапливаются в вакуолях и гидролизуются при необходимости. Этот процесс обеспечивает стабильное и длительное хранение гликозидов.

Гликозиды делятся на несколько основных групп в зависимости от природы агликона:

Сердечные гликозиды — эта группа гликозидов имеет стероидную структуру и оказывает сильное воздействие на активность миокарда. Их получают из растений *Digitalis purpurea*, *Strophanthus* и *Convallaria majalis*. Сердечные гликозиды увеличивают силу сердечных сокращений и используются при лечении сердечной недостаточности.

Антрагликозиды — эти гликозиды, обладающие слабительным действием, содержатся в сенне, алоэ и валериане. Они усиливают перистальтику кишечника.

Сапониновые гликозиды — обладают поверхностно-активными свойствами, оказывают отхаркивающее, противовоспалительное и иммуностимулирующее действие.

Флавоноидные гликозиды — характеризуются антиоксидантным, капилляроукрепляющим и противовоспалительным действием.

Что касается фармакологических свойств гликозидов, то они влияют на многие физиологические процессы в организме. Сердечные гликозиды блокируют фермент Na^+/K^+ -АТФазу, вызывая накопление ионов кальция внутри клетки. В результате увеличивается сила сокращения сердца. Флавоноидные гликозиды борются со свободными радикалами и защищают клетки от окислительного стресса. Сапониновые гликозиды усиливают активность секреторных желез.

Гликозиды различно относятся к химическим агентам. В отличие от алкалоидов они обычно не дают специфических реакций; они не восстанавливают ни раствора Фелинга, ни аммиачного раствора окиси серебра. Исключение составляют те гликозиды, агликоны которых содержат редуцирующие группы. После гидролиза гликозида кипячением водного раствора с разбавленным раствором серной кислоты образующийся сахар обнаруживают по редуцирующей способности раствором Фелинга.

Цветные реакции гликозидов обычно пригодны лишь при отсутствии свободных сахаров. Так, многие гликозиды с очищенной бычьей желчью и серной кислотой дают красное окрашивание, равным образом спиртовой 20%-ный раствор α -нафтола с концентрированной серной кислотой даёт синее, фиолетовое или красное окрашивание. Подобная окраска возникает и в случае применения β -нафтола или резорцина. Гликозиды, содержащие в качестве агликона фенол или соединения с фенольным гидроксилом, дают окраску с хлорным железом. С некоторыми гликозидами реакция протекает более отчётливо при применении спиртовых растворов реактива.

Гликозиды, агликоны которых содержат карбонильную группу, идентифицируют в виде гидразонов, семикарбазонов или оксимов. При осторожном ацетилировании уксусным ангидридом многие гликозиды дают характерные ацетильные производные. Действие ацетилирующей смеси иногда используют и для открытия глюкозы как сахарного компонента гликозида. Открытие её основано на превращении полученной при ацетилировании пентаацетилглюкозы в пентаацетилглюкозил-п-толуидид

при действии п-толуидина. Это соединение не растворимо в спирте, имеет левое вращение и обладает резкой температурой плавления.

В современной медицине гликозиды широко используются в следующих областях:

1. В кардиологии (сердечная недостаточность, аритмии);
2. В гастроэнтерологии (запоры);
3. В пульмонологии (бронхит, кашель);
4. В общей терапии и фитотерапии.

Гликозиды в фитопрепаратах относительно безопасны для длительного лечения.

В медицине часто применяются сердечные гликозиды. Общее свойство всех сердечных гликозидов – способность влиять на концентрацию натрия, калия и кальция в сердечной мышце и замедлять электрические сигналы в синусовом и атриовентрикулярном узле, которые отвечают за частоту сердцебиения. За счет этого сердечные гликозиды могут усиливать сокращения сердечной мышцы, увеличивать объем крови, которое сердце выбрасывает с каждым ударом, и снижать частоту сердечных сокращений^{1,2}.

Специалисты выделяют несколько основных эффектов сердечных гликозидов²:

- замедление ритма сердечных сокращений;
- повышение сократительной функции и тонуса миокарда;
- угнетение проводимости;
- повышение возбудимости (в токсических дозах);
- более быстрое и глубокое диастолическое расслабление, увеличение времени диастолы (промежутка между двумя сердечными сокращениями);
- увеличение почечного кровотока.

Сердечные гликозиды – это лекарства, которые могут назначить людям с сердечной недостаточностью, мерцательной аритмией и некоторыми другими нарушениями ритма¹.

Еще 30 лет назад сердечные гликозиды очень широко применялись в клинической практике. Сегодня эти лекарства не относятся к первой линии терапии, обычно их назначают, если другие препараты пациенту не помогли¹. Сердечные гликозиды могут быть в виде инъекций и препаратов для приема внутрь: таблеток и капсул.

Сердечные гликозиды улучшают сердечный выброс у людей с сердечной недостаточностью и помогают замедлить слишком быстрый сердечный ритм. Исследования показали, что эти препараты могут уменьшить симптомы сердечной недостаточности и тахикардии и снизить риск госпитализации пациентов с этими заболеваниями¹.

Главные минусы сердечных гликозидов: узкое терапевтическое окно в сочетании с большим периодом полувыведения². Узкое терапевтическое окно означает, что разница между минимальной эффективной и минимальной токсической дозой у этих препаратов очень небольшая, а значит, высока вероятность передозировки. Из-за большого периода полувыведения

сердечные гликозиды долго остаются в организме, что может усилить их токсический эффект.

Гликозиды — это природные соединения с высокой биологической активностью, имеющие большое значение в медицине и фармации. Углубленное изучение их химической структуры, классификации и фармакологических свойств служит важной научной основой для создания новых лекарственных средств. Препараты на основе гликозидов останутся актуальными в медицине будущего.

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МЕХАНИЗМЫ ФИЗИОЛОГИЧЕСКОЙ АДАПТАЦИИ ДЕТЕЙ ПРИАРАЛЬЯ К ШКОЛЬНОЙ ОБРАЗОВАТЕЛЬНОЙ СРЕДЕ

***Аннотация:** В работе изучены особенности физиологической адаптации детей Приаралья к школьной образовательной среде в условиях экологического стресса. Показано, что у школьников формируется комплекс кардиореспираторных, метаболических и нейропсихологических адаптаций, обеспечивающих устойчивость к учебной нагрузке. У детей сельской местности адаптационные реакции выражены сильнее, чем у городских. Полученные результаты подтверждают необходимость мониторинга здоровья и оптимизации образовательного процесса в регионе.*

***Ключевые слова:** Приаралье, дети, школьная адаптация, физиологические механизмы.*

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MECHANISMS OF PHYSIOLOGICAL ADAPTATION OF CHILDREN IN THE ARAL SEA REGION TO THE SCHOOL EDUCATIONAL ENVIRONMENT

***Abstract:** This study examines the features of physiological adaptation of children in the Pre-Aral region to the school educational environment under conditions of ecological stress. It was shown that schoolchildren develop a set of cardiopulmonary, metabolic, and neuropsychological adaptations that ensure resilience to educational load. Children from rural areas exhibit stronger adaptive responses compared to urban peers. The results emphasize the need for health monitoring and optimization of the educational process in the region.*

***Key words:** Aral Sea region, children, school adaptation, physiological mechanisms*

Введение

Приаралье — регион Центральной Азии с выраженными экологическими и социальными нагрузками, включая высыхание Аральского моря, засоление почв, дефицит пресной воды и нестабильные климатические условия, оказывающие существенное влияние на здоровье и развитие детей. В этих условиях школьная образовательная среда предъявляет повышенные требования к когнитивной и психофизиологической активности учащихся, что усиливает необходимость формирования эффективных механизмов адаптации. Цель исследования заключалась в выявлении особенностей физиологической адаптации детей Приаралья к условиям школьного обучения и оценке влияния экологических и образовательных факторов на их здоровье и учебную деятельность.

Материалы и методы

В исследовании применялся комплекс методов для оценки физиологической и функциональной адаптации школьников. Антропометрические измерения определяли рост, массу тела, индекс массы тела и соматотипические показатели. Функциональное состояние сердечно-сосудистой и дыхательной систем оценивалось кардиореспираторными тестами, а нейропсихофизиологическое состояние — тестами скорости реакции, внимания и когнитивной продуктивности. Лабораторные методы включали анализ крови с определением гемоглобина, глюкозы, электролитов и маркеров стрессовой адаптации. Дополнительно использовались анкеты родителей и педагогов для выявления поведенческих особенностей и уровня учебной мотивации. Такой подход позволил оценить адаптационные реакции организма на учебную нагрузку и устойчивость к стрессу.

Результаты и обсуждение

Анализ полученных данных показал, что дети Приаралья в условиях школьного обучения формируют специфические адаптивные реакции организма, направленные на поддержание функционального равновесия и устойчивости к учебным и экологическим нагрузкам. Ведущую роль в процессе адаптации играет кардиореспираторная перестройка, проявляющаяся у большинства обследованных умеренным повышением частоты сердечных сокращений и уровня артериального давления в начальный период обучения. Данные изменения отражают включение компенсаторных механизмов, обеспечивающих поддержание гомеостаза при возрастании функциональной нагрузки.

Наряду с этим отмечается метаболическая адаптация, характеризующаяся активацией ферментных систем, регулирующих энергетический обмен, а также изменениями показателей углеводного и электролитного баланса крови в условиях учебной деятельности. Эти сдвиги свидетельствуют о мобилизации энергетических и пластических ресурсов организма в ответ на возрастающие требования образовательной среды.

Важным компонентом адаптационного процесса является нейропсихологическая адаптация, выражающаяся в постепенном снижении

утомляемости, повышении устойчивости внимания и когнитивной продуктивности по мере включения детей в регулярную учебную деятельность. Данный эффект усиливается при соблюдении рационального режима труда и отдыха, а также при использовании адаптивных физических упражнений. При этом показатели иммунобиологической устойчивости у большинства детей сохраняются в пределах возрастной нормы, что указывает на формирование эффективных компенсаторных механизмов защиты даже в условиях неблагоприятной экологической обстановки региона.

Сравнительный анализ учащихся городских и сельских школ выявил различия в выраженности адаптационных реакций: дети, проживающие в сельской местности, чаще демонстрируют более выраженные кардиореспираторные и метаболические адаптации. Вероятно, это связано с более высоким уровнем повседневной физической активности и длительной адаптацией к условиям повышенного экологического стресса.

Полученные результаты подтверждают, что дети Приаралья развивают комплекс физиологических адаптаций, позволяющих им сохранять работоспособность и обучаемость в экстремальных экологических условиях. Кардиореспираторные и метаболические изменения отражают мобилизацию функциональных ресурсов организма для поддержания гомеостаза. Нейропсихологическая адаптация демонстрирует способность к когнитивной компенсации и уменьшению влияния учебного стресса на психическую деятельность.

Высокая экологическая нагрузка региона способствует формированию уникального набора адаптивных механизмов, однако без системного мониторинга здоровья, корректировки учебной нагрузки и организации физкультурной деятельности возможны хроническая усталость, снижение иммунной устойчивости и развитие функциональных нарушений.

Таким образом, результаты исследования имеют важное практическое значение для педагогов и медицинских специалистов: знание физиологических особенностей адаптации детей позволяет разрабатывать адаптивные программы обучения, корректировать режим занятий и внедрять профилактические мероприятия, направленные на поддержание здоровья школьников.

Заключение

Дети Приаралья формируют комплекс физиологических механизмов адаптации к условиям школьного образования, включающих кардиореспираторную, метаболическую, нейропсихологическую и иммунобиологическую перестройку организма. Эти адаптации обеспечивают устойчивость к учебной нагрузке и экстремальным экологическим условиям, но требуют системного мониторинга и комплексного подхода к организации образовательного процесса. Дальнейшие исследования должны быть направлены на оценку долгосрочных последствий адаптации и разработку стратегий поддержания здоровья и учебной эффективности школьников региона.

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ИСПОЛЬЗОВАНИЕ РАДИОИЗОТОПОВ В ЯДЕРНОЙ МЕДИЦИНЕ

Аннотация. Ядерная медицина является одной из наиболее динамично развивающихся областей современной клинической медицины, основанной на использовании радиоактивных изотопов для диагностики и лечения различных заболеваний. В статье рассматриваются основные принципы применения радиоизотопов в ядерной медицине, их физико-химические свойства, механизмы взаимодействия с биологическими тканями, а также диагностические и терапевтические возможности радионуклидных методов. Особое внимание уделяется таким методам, как сцинтиграфия, однофотонная эмиссионная компьютерная томография и позитронно-эмиссионная томография. Проанализированы преимущества и ограничения использования радиоизотопов, вопросы радиационной безопасности, а также перспективы дальнейшего развития ядерной медицины.

Ключевые слова: ядерная медицина, радиоизотопы, радионуклидная диагностика, ПЭТ, ОФЭКТ, радиофармацевтические препараты, радиационная безопасность.

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USE OF RADIOISOTOPES IN NUCLEAR MEDICINE

Abstract. Nuclear medicine is one of the most dynamically developing fields of modern clinical medicine, based on the use of radioactive isotopes for the diagnosis and treatment of various diseases. This article discusses the basic principles of radioisotope application in nuclear medicine, their physicochemical properties, mechanisms of interaction with biological tissues, as well as diagnostic and therapeutic capabilities of radionuclide methods. Particular attention is paid to scintigraphy, single-photon emission computed tomography, and positron emission tomography. The advantages and limitations of radioisotope use, radiation safety issues, and prospects for further development of nuclear medicine are analyzed.

Keywords: nuclear medicine, radioisotopes, radionuclide diagnostics, PET, SPECT, radiopharmaceuticals, radiation safety.

Введение

Ядерная медицина занимает особое место в системе здравоохранения, поскольку сочетает в себе достижения физики, химии, биологии и клинической медицины. В отличие от традиционных методов визуализации, радионуклидные технологии позволяют не только получать анатомическую информацию, но и оценивать функциональное состояние органов и тканей на молекулярном уровне. Это делает их незаменимыми при ранней диагностике онкологических, кардиологических, эндокринных и неврологических заболеваний.

Использование радиоизотопов в медицине началось в середине XX века и с тех пор претерпело значительную эволюцию. Современные методы ядерной медицины основаны на применении радиофармацевтических препаратов, которые избирательно накапливаются в определённых органах или патологических очагах. Регистрация излучения, испускаемого радионуклидами, позволяет получать высокоинформативные изображения и объективно оценивать биологические процессы в организме.

Актуальность данной темы обусловлена постоянным расширением спектра клинических показаний к применению радиоизотопов, развитием новых радиофармацевтических средств и совершенствованием аппаратных технологий. В условиях роста онкологических и хронических заболеваний значение ядерной медицины как высокоточного и малоинвазивного метода диагностики и лечения продолжает возрастать.

Материалы и методы

В работе использованы данные научных публикаций, клинических рекомендаций и аналитических обзоров, посвящённых применению радиоизотопов в ядерной медицине. Анализ охватывает современные методы радионуклидной диагностики и терапии, используемые в клинической практике.

Применялись следующие методы исследования: – анализ научной литературы и международных клинических протоколов; – сравнительный анализ диагностической эффективности различных радионуклидных методов; – обобщение клинического опыта применения радиофармацевтических препаратов; – оценка вопросов радиационной безопасности и дозовой нагрузки на пациента.

Особое внимание уделялось наиболее распространённым радиоизотомам, таким как технеций-99m, йод-123, йод-131, фтор-18 и галлий-68, которые широко используются в диагностике и терапии различных заболеваний.

Результаты и обсуждение

анализ показал, что радионуклидные методы диагностики обладают высокой чувствительностью и специфичностью при выявлении функциональных нарушений на ранних стадиях заболевания. Сцинтиграфия остаётся одним из базовых методов ядерной медицины, позволяя оценивать функцию щитовидной железы, почек, печени, костной системы и миокарда.

Однофотонная эмиссионная компьютерная томография обеспечивает трёхмерную визуализацию распределения радиофармацевтического препарата, что значительно повышает диагностическую точность по сравнению с планарной сцинтиграфией. Позитронно-эмиссионная томография, особенно в сочетании с компьютерной томографией, считается «золотым стандартом» в онкологической диагностике, позволяя выявлять опухолевые очаги, оценивать метастатическое распространение и эффективность проводимого лечения.

Терапевтическое применение радиоизотопов также занимает важное место в ядерной медицине. Радиойодтерапия с использованием йода-131 широко применяется при лечении дифференцированных форм рака щитовидной железы и тиреотоксикоза. Развитие таргетной радионуклидной терапии открывает новые возможности в лечении злокачественных новообразований, обеспечивая селективное воздействие на опухолевые клетки при минимальном повреждении здоровых тканей.

Несмотря на очевидные преимущества, использование радиоизотопов требует строгого соблюдения принципов радиационной безопасности. Рациональный выбор радиофармацевтического препарата, оптимизация дозы и соблюдение регламентов работы с источниками ионизирующего излучения являются обязательными условиями безопасного применения методов ядерной медицины.

Заключение

Использование радиоизотопов в ядерной медицине представляет собой высокоэффективное направление современной клинической практики, позволяющее решать широкий круг диагностических и терапевтических задач. Результаты анализа подтверждают, что радионуклидные методы обеспечивают раннюю диагностику заболеваний, объективную оценку функционального состояния органов и высокую эффективность лечения при ряде патологий.

Дальнейшее развитие ядерной медицины связано с созданием новых радиофармацевтических препаратов, совершенствованием визуализирующих технологий и внедрением персонализированных подходов к лечению. Комплексное использование достижений науки и техники позволит повысить качество медицинской помощи и расширить возможности применения радиоизотопов в клинической практике.

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ПРИМЕНЕНИЕ ИНФРАЗВУКА В МЕДИЦИНЕ

Аннотация. Инфразвук представляет собой область акустических колебаний с частотой ниже порога слышимости человека (менее 20 Гц), однако его биологическое и физиологическое воздействие на организм человека является значительным и многообразным. В данной статье подробно рассмотрены физические характеристики инфразвука, механизмы его взаимодействия с биологическими тканями, а также возможности практического применения в современной медицине. Проанализированы экспериментальные и клинические данные, отражающие влияние инфразвука на нервную, сердечно-сосудистую и опорно-двигательную системы. Показано, что при рациональном подборе параметров инфразвук может использоваться как эффективный и неинвазивный метод физиотерапии и медицинской реабилитации.

Ключевые слова: инфразвук, медицинская физика, биомеханическое воздействие, физиотерапия, нервная система, микроциркуляция, механические колебания.

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APPLICATION OF INFRASOUND IN MEDICINE

Abstract. Infrasound is a range of acoustic vibrations with a frequency below the human hearing threshold (less than 20 Hz). However, its biological and physiological effects on the human body are significant and diverse. This article examines in detail the physical characteristics of infrasound, the mechanisms of its interaction with biological tissue, and the potential for practical application in modern medicine. Experimental and clinical data reflecting the effects of infrasound on the nervous, cardiovascular, and musculoskeletal systems are analyzed. It is demonstrated that with the appropriate selection of parameters, infrasound therapy can be used as an effective and non-invasive method of physiotherapy and medical rehabilitation.

Keywords: infrasound, medical physics, biomechanical effects, physiotherapy, nervous system, microcirculation, mechanical vibrations.

Введение

Современная медицина активно использует физические факторы для диагностики, лечения и реабилитации пациентов. Одним из таких факторов

является инфразвук — низкочастотные механические колебания, которые не воспринимаются органом слуха, но оказывают выраженное влияние на функциональное состояние организма. В естественных условиях инфразвук возникает при землетрясениях, извержениях вулканов, атмосферных процессах и работе крупных технических объектов.

Интерес к медицинскому применению инфразвука обусловлен его высокой проникающей способностью и способностью воздействовать на глубокие структуры тканей и органов. В отличие от ультразвука, инфразвук вызывает преимущественно макромеханические и резонансные эффекты, что делает его перспективным средством воздействия на физиологические процессы. В последние годы инфразвуковая терапия рассматривается как часть комплексного подхода к лечению хронических заболеваний и функциональных расстройств.

Материалы и методы

В работе использовались методы аналитического обзора научных публикаций, экспериментальных исследований и клинических наблюдений, посвящённых инфразвуковому воздействию на биологические объекты. Анализировались основные параметры инфразвука: частота, амплитуда, интенсивность и длительность воздействия.

Интенсивность инфразвуковой волны определяется выражением:

$$I = \frac{1}{2} \rho c \omega^2 A^2$$

где:

ρ — плотность среды,

c — скорость распространения звуковой волны,

$\omega = 2\pi f$ — циклическая частота,

A — амплитуда колебаний.

При оценке биологического воздействия учитывались резонансные частоты органов человека, при которых механическое воздействие инфразвука приводит к максимальному физиологическому эффекту. Методы включали сравнительный анализ результатов до и после инфразвукового воздействия.

Результаты и обсуждение

Результаты проведённого анализа показывают, что инфразвук оказывает выраженное влияние на различные физиологические системы организма. Основным механизмом его действия является механическое колебательное воздействие, приводящее к микродеформациям тканей и изменению внутритканевого давления.

Воздействие на нервную систему

Инфразвуковые колебания способны модулировать активность центральной и вегетативной нервной системы. При воздействии в диапазоне 1–5 Гц наблюдается седативный эффект, нормализация вегетативных функций и снижение уровня психоэмоционального напряжения.

Воздействие на сердечно-сосудистую систему

Инфразвук способствует расширению сосудов, улучшению микроциркуляции и венозного оттока. Это особенно важно при лечении хронических сосудистых нарушений и застойных явлений.

Воздействие на опорно-двигательный аппарат

Инфразвуковая терапия снижает мышечный спазм, уменьшает болевой синдром и способствует восстановлению подвижности суставов за счёт улучшения кровоснабжения и лимфодренажа.

Таблица – Биологические эффекты инфразвука в зависимости от частоты

Частота инфразвука (Гц)	Основной биологический эффект
1–3	Седативное воздействие
3–7	Нормализация вегетативных функций
7–12	Улучшение микроциркуляции
12–20	Миорелаксирующее действие

Обсуждение результатов показывает, что положительный эффект инфразвука достигается при строгом контроле параметров воздействия. Превышение допустимых уровней может приводить к утомлению и дискомфорту, что подчёркивает необходимость индивидуального подхода.

Клиническое применение инфразвука

В клинической практике инфразвук используется в составе физиотерапевтических процедур при заболеваниях нервной системы, хронических болевых синдромах, патологиях опорно-двигательного аппарата и в программах медицинской реабилитации. Его неинвазивность и глубинное воздействие делают инфразвуковую терапию перспективным направлением восстановительной медицины.

Заключение

Инфразвук является эффективным физическим фактором, способным оказывать комплексное воздействие на биологические объекты за счёт механических и резонансных эффектов. Его влияние реализуется на уровне тканей, органов и функциональных систем организма. При рациональном использовании инфразвуковая терапия может значительно повысить эффективность лечения и реабилитации пациентов.

Дальнейшие исследования, направленные на уточнение механизмов действия и оптимизацию параметров инфразвукового воздействия, являются актуальными и перспективными для развития современной медицинской физики и физиотерапии.

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ДЕЙСТВИЕ МАГНИТНЫХ ПОЛЕЙ НА БИОЛОГИЧЕСКИЕ ОБЪЕКТЫ

Аннотация. В настоящей статье всесторонне рассмотрено влияние магнитных полей на биологические объекты различного уровня организации—от молекулярного и клеточного до тканевого и системного. Проанализированы физические характеристики магнитных полей, основные биофизические механизмы их взаимодействия с живыми системами, а также экспериментальные данные, подтверждающие их биологическую активность. Особое внимание уделено воздействию низкочастотных и слабых магнитных полей, широко применяемых в медицинской практике. Представлены количественные зависимости, математические модели и обобщённые результаты исследований, демонстрирующие как стимулирующее, так и ингибирующее влияние магнитных полей на биологические процессы. Полученные данные подтверждают перспективность дальнейшего изучения магнитных факторов для разработки эффективных методов диагностики и терапии.

Ключевые слова: магнитное поле, биологические объекты, биофизика, магнитотерапия, клеточные мембраны, микроциркуляция, электромагнитное воздействие.

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EFFECT OF MAGNETIC FIELDS ON BIOLOGICAL OBJECTS

Abstract. This article comprehensively examines the influence of magnetic fields on biological objects at various levels of organization—from molecular and cellular to tissue and systemic. It analyzes the physical characteristics of magnetic fields, the main biophysical mechanisms of their interaction with living systems, and experimental data confirming their biological activity. Particular attention is paid to the effects of low-frequency and weak magnetic fields, which are widely used in medical practice. Quantitative relationships, mathematical models, and summarized research results are presented, demonstrating both the stimulating and inhibitory effects of magnetic fields on biological processes. The data obtained confirm the promise of further study of magnetic factors for the development of effective diagnostic and therapeutic methods.

Keywords: magnetic field, biological objects, biophysics, magnetotherapy, cell membranes, microcirculation, electromagnetic effects.

Введение

Магнитные поля являются фундаментальным физическим фактором окружающей среды и оказывают непрерывное воздействие на живые организмы. Естественное магнитное поле Земли сопровождало биологическую эволюцию на протяжении миллионов лет, что способствовало формированию адаптационных механизмов у живых систем. В условиях современного технологического развития человек всё чаще подвергается воздействию искусственно создаваемых магнитных полей различной интенсивности и частоты, источниками которых являются медицинское оборудование, промышленные установки и бытовые устройства.

Интерес к изучению влияния магнитных полей на биологические объекты значительно возрос в последние десятилетия, особенно в связи с развитием магнитотерапии, магнитно-резонансной томографии и других медицинских технологий. Несмотря на большое количество экспериментальных и клинических исследований, механизмы биологического действия магнитных полей до настоящего времени остаются не до конца изученными, что обуславливает актуальность данной работы.

Материалы и методы

В рамках исследования были проанализированы данные экспериментальных и теоретических работ, посвящённых воздействию магнитных полей на биологические системы. Использовались методы биофизического моделирования, сравнительного анализа и обобщения результатов лабораторных экспериментов.

Физическое воздействие магнитного поля на биологические объекты описывается законом Лоренца:

$$\vec{F} = q(\vec{v} \times \vec{B})$$

где q — заряд иона, $\vec{v}$ — скорость его движения, $\vec{B}$ — вектор магнитной индукции.

Для оценки энергетического взаимодействия магнитного поля с биомолекулами применялась формула магнитной энергии:

$$E = -\vec{\mu} \cdot \vec{B}$$

где $\vec{\mu}$ — магнитный момент молекулы или иона. Экспериментальные данные классифицировались в зависимости от интенсивности поля, частоты и времени воздействия.

Результаты и обсуждение

Результаты анализа показали, что воздействие магнитных полей на биологические объекты носит дозозависимый и нелинейный характер. При низких и средних значениях магнитной индукции наблюдается выраженный стимулирующий эффект, проявляющийся в активации метаболических процессов, улучшении микроциркуляции и ускорении регенерации тканей.

Таблица – Биологические эффекты магнитных полей

Интенсивность магнитного поля	Биологический эффект
0,1–1 мТл	Активация клеточного дыхания
1–10 мТл	Улучшение кровотока, снижение воспаления
>10 мТл	Возможное торможение клеточной активности

На клеточном уровне магнитные поля влияют на проницаемость мембран и активность ионных каналов, в частности кальциевых, что приводит к изменению внутриклеточных сигнальных каскадов. На тканевом уровне наблюдается снижение отёка и нормализация тонуса сосудов.

Полученные результаты согласуются с данными клинических исследований, подтверждающих эффективность магнитотерапии при заболеваниях опорно-двигательного аппарата, сердечно-сосудистой и нервной систем.

Заключение

Проведённый анализ показывает, что магнитные поля оказывают многоуровневое и комплексное воздействие на биологические объекты. Их влияние реализуется через изменение физических, биохимических и физиологических процессов, что обуславливает как положительные, так и потенциально негативные эффекты в зависимости от параметров воздействия.

Рациональное использование магнитных полей в медицине требует строгого учёта интенсивности, частоты и продолжительности воздействия. Дальнейшие фундаментальные и прикладные исследования в области биомagnetизма являются перспективным направлением для разработки новых безопасных и эффективных методов диагностики и лечения.

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ФАКТОРЫ, ВЛИЯЮЩИЕ НА ПОВЫШЕНИЕ ПРОФЕССИОНАЛЬНЫХ ЗНАНИЙ БУДУЩЕГО УЧИТЕЛЯ

Аннотация. В статье рассматриваются ключевые факторы, влияющие на повышение профессиональных знаний будущего учителя в условиях модернизации высшего педагогического образования. Анализируются педагогические, организационные и личностные условия формирования устойчивой профессиональной подготовки, ориентированной на современные требования образовательной практики.

Ключевые слова: профессиональная подготовка, будущий учитель, педагогическое образование, образовательная среда, профессиональные знания, педагогическая деятельность.

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FACTORS INFLUENCING THE INCREASE OF PROFESSIONAL KNOWLEDGE OF FUTURE TEACHER

Abstract. This article examines key factors influencing the improvement of professional knowledge of future teachers in the context of the modernization of higher pedagogical education. It analyzes the pedagogical, organizational, and personal conditions for the development of sustainable professional training oriented toward the modern requirements of educational practice.

Keywords: professional training, future teacher, pedagogical education, educational environment, professional knowledge, teaching activities.

Введение. Современный этап развития системы высшего образования характеризуется повышенными требованиями к качеству подготовки педагогических кадров. Будущий учитель рассматривается не только как носитель предметных знаний, но и как профессионал, способный к непрерывному саморазвитию, критическому мышлению, педагогическому анализу и эффективному взаимодействию с обучающимися. В этих условиях особую актуальность приобретает проблема выявления и научного осмысления факторов, влияющих на повышение профессиональных знаний будущего учителя в процессе вузовской подготовки.

Профессиональные знания педагога формируются в сложном взаимодействии теоретического обучения, практической деятельности и

личностного развития. Традиционный подход, ориентированный преимущественно на передачу информации, уже не отвечает современным запросам образовательной системы. Возникает необходимость перехода к моделям подготовки, основанным на интеграции научных знаний, педагогического опыта и инновационных образовательных технологий. Это требует создания особой образовательной среды, стимулирующей познавательную активность студентов, их профессиональную мотивацию и готовность к педагогической деятельности.

Важную роль в формировании профессиональных знаний играет содержание образовательных программ, их соответствие актуальным тенденциям педагогической науки и практики. Обновление учебных планов, внедрение междисциплинарных курсов, ориентация на компетентностный и практико-ориентированный подходы способствуют более глубокому усвоению профессионально значимых знаний. Одновременно возрастает значение педагогической практики, которая позволяет будущему учителю осмыслить теоретические положения через реальную образовательную деятельность.

Таким образом, анализ факторов повышения профессиональных знаний будущего учителя представляет собой важную научно-педагогическую задачу, решение которой напрямую связано с повышением качества педагогического образования и подготовкой конкурентоспособных специалистов.

Основная часть. Повышение профессиональных знаний будущего учителя обусловлено совокупностью взаимосвязанных факторов, которые можно рассматривать в контексте образовательной среды высшего учебного заведения. Одним из ключевых факторов является качество педагогического процесса, включающего методы обучения, формы организации учебной деятельности и характер взаимодействия преподавателя и студента. Использование активных и интерактивных методов обучения способствует развитию аналитического мышления, умения применять знания в профессиональных ситуациях и формированию устойчивого интереса к педагогической профессии.

Значительное влияние на профессиональный рост будущего учителя оказывает научно-исследовательская деятельность. Участие студентов в научных проектах, конференциях, подготовке научных публикаций формирует навыки работы с источниками, умение анализировать педагогические явления и делать обоснованные выводы. Это способствует углублению профессиональных знаний и развитию исследовательской культуры, которая является важным компонентом педагогической деятельности.

Не менее важным фактором является уровень профессиональной компетентности преподавателей вуза. Личность преподавателя, его педагогический стиль, научный кругозор и практический опыт оказывают прямое влияние на формирование профессиональных установок будущего

учителя. Преподаватель выступает не только источником знаний, но и образцом профессионального поведения, что усиливает воспитательный и мотивационный потенциал образовательного процесса.

Особое значение имеет организация педагогической практики, которая обеспечивает связь теории и практики. В ходе практики студенты получают возможность применять полученные знания, анализировать собственную деятельность и корректировать профессиональные действия. Рефлексия педагогического опыта способствует осознанию значимости теоретических знаний и стимулирует потребность в их дальнейшем углублении.

Кроме того, существенную роль играют личностные факторы, такие как профессиональная мотивация, ответственность за результаты обучения, готовность к самообразованию и саморазвитию. Формирование установки на непрерывное профессиональное развитие является важным условием повышения профессиональных знаний будущего учителя и его успешной адаптации к изменениям в образовательной системе.

Заключение. Повышение профессиональных знаний будущего учителя представляет собой многоаспектный процесс, зависящий от совокупности педагогических, организационных и личностных факторов. В условиях современного высшего педагогического образования особое значение приобретает создание образовательной среды, ориентированной на активное включение студентов в учебно-профессиональную и исследовательскую деятельность.

Их взаимосвязанное и системное воздействие позволяет сформировать у будущего учителя целостное представление о педагогической деятельности и обеспечить прочное усвоение профессионально значимых знаний.

Особое внимание должно уделяться формированию у студентов установки на непрерывное профессиональное развитие. В условиях динамично меняющейся образовательной среды именно способность к обновлению знаний, критическому осмыслению педагогического опыта и внедрению инноваций определяет успешность профессиональной деятельности учителя.

Таким образом, учет и целенаправленное развитие факторов, влияющих на повышение профессиональных знаний будущего учителя, являются необходимым условием повышения качества педагогического образования. Реализация данного подхода способствует подготовке педагогических кадров, способных эффективно решать современные образовательные задачи и обеспечивать устойчивое развитие системы образования.

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**ИССЛЕДОВАНИЯ ПОТОКОВ ТЕПЛА В КРЕМНИЕВЫХ МОП-
ТРАНЗИСТОРАХ**

Аннотация: В статье предложена методика определения распределения тепла, позволяющая с высокой надежностью оценивать этот ключевой параметр на основе данных исследования теплопереноса поперек нанопленки в баллистическом режиме. Рассмотрены взаимосвязь тепловых характеристик с параметрами токовых шнуров и их роль в диагностике надежности полупроводниковых транзисторов, функционирующих в условиях рассеяния фононов на границе раздела. Представленные результаты имеют практическое значение для разработки методов повышения надежности и эффективности современных полупроводниковых устройств.

Ключевые слова: баллистический перенос тепла, фононного теплопереноса, квантовых проволок, распределение температуры, нагрев прибора.

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**RESEARCH OF HEAT FLUXES IN SILICON MOSFET
TRANSISTORS**

Abstract: The article proposes a method for determining heat distribution, which allows for a highly reliable assessment of this key parameter based on data from a study of heat transfer across a nanofilm in a ballistic mode. The relationship between thermal characteristics and parameters of current cords and their role in diagnosing the reliability of semiconductor transistors operating under conditions of phonon scattering at the interface are considered. The presented results are of practical importance for developing methods for increasing the reliability and efficiency of modern semiconductor devices.

***Key words:** ballistic heat transfer, phonon heat transfer, quantum wires, temperature distribution, device heating.*

В последнее время предпринимаются попытки создания термоэлектрических преобразовательных элементов с высоким показателем эффективности путем избирательного снижения теплопроводности при сохранении электропроводности с использованием наноструктур. В частности, реализация высокотермоэлектрических материалов с использованием кремниевых (Si) квантовых проволок [1,2] является одной из областей, привлекающих наибольшее внимание с точки зрения совместимости с интегральными схемами. Например, создав его на кристалле, его можно использовать для охлаждения Пельтье и отвода тепла, выделяемого схемами.

Сообщалось о многих детальных исследованиях влияния эффектов короткого канала на вольт-амперные характеристики вновь структурированных МОП-транзисторов [3-5]. С другой стороны, текущая ситуация такова, что свойств теплопроводности проведено мало. Поскольку напрямую измерить распределение температуры в таких структурах наноустройств очень сложно, особенно важно моделирование распространения тепла, которое точно предсказывает характеристики теплопроводности устройств. методы анализа характеристик теплопроводности в приборных конструкциях в основном основывались на уравнениях теплопроводности и моделях тепловых цепей [6–7]. Они основаны на фундаментальном законе теплопроводности, называемом законом Фурье, который предполагает, что при наличии разницы температур внутри объекта поток тепла, передаваемый из области с высокой температурой в область с низкой температурой, пропорционален градиенту температуры при это место.

В частности, в новейших устройствах с новыми структурами, такими как UTB-MOSFET и FinFET, мы стремимся к миниатюризации длин затворов 20 нм или меньше, поэтому важно использовать высокоточные значения к при прогнозировании эффектов самовоздействия.

FinFET – это транзисторы, выполненные по определенной технологии. Будучи транзистором, он может выполнять функции как усилителя, так и ключа. По Fin-технологии изготавливаются микрочипы, используемые в домашних компьютерах, ноутбуках, планшетах, смартфонах, различных носимых устройствах, сетевых устройствах, автомобильной промышленности, а также во многих других. В основе конструкции транзистора лежит кремниевое ребро, которое образует основу его корпуса. Поэтому своё название - Fin (англ. ребро, плавник) технология получила как раз из-за формы. Управление проводимостью канала осуществляется электрическим полем, поэтому FinFET транзисторы также являются полевыми. Из-за своей конструкции планарные МОП-транзисторы

демонстрируют различные нежелательные эффекты короткого канала. Так, например, уменьшение длины затвора (L_{GATE}) ниже 90 нм приводит к значительному росту тока утечки, а при достижении 28 нм утечка является чрезмерной настолько, что делает транзистор бесполезным. Таким образом, основной задачей, при уменьшении длины затвора между полупроводниками, является снижение тока утечки в запертом состоянии. Благодаря своему объемному исполнению FinFET устройства имеют хорошие характеристики при коротком канале. Также, по сравнению с классическими MOSFET элементами, они имеют значительно меньшее время переключения и более высокую плотность тока. Конструктивно Fin-ячейки имеют узкий вертикальный токопроводящий канал. Его размеры сопоставимы с длиной волны де Бройля, что создает размерный эффект, а также вызывает квантование энергии носителей заряда (электронов). Поэтому при их конструировании требуется учитывать не только линейные размеры канала, но и их соотношение. Планарная конструкция MOSFET не позволила масштабироваться бесконечно, столкнувшись с серьезными проблемами в нанометровом пространстве. Так, при длине затвора менее 30 нм оксид под ним уже не справляется с изолированием и возникают проблемы с управлением каналом. Даже при использовании под затвором идеального диэлектрика с нулевой толщиной управление будет возможно только в области непосредственно под самим затвором. При этом током утечки управлять уже будет невозможно, поскольку он находится слишком на большом расстоянии от затвора. Всё это ведет к значительному росту выходного тока, а также ухудшению подпорогового размаха и затруднением выключения транзистора.

Однако, как показано на рис 2, сообщения об измеренном значении κ в тонких пленках Si [12–13] ограничены областью $l_{Si} > 20$ нм, а сообщений о свойствах теплопроводности в ультратонких пленках мало. область пленки, используемая в наноустройствах. Реальность такова, что еще много неизвестного.

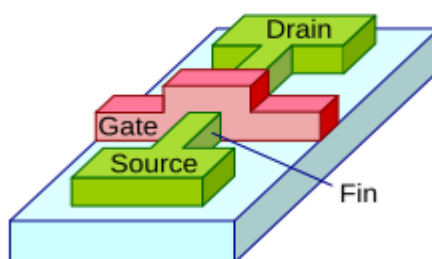


Рисунок-1 Устройство FinFET с двойным затвором

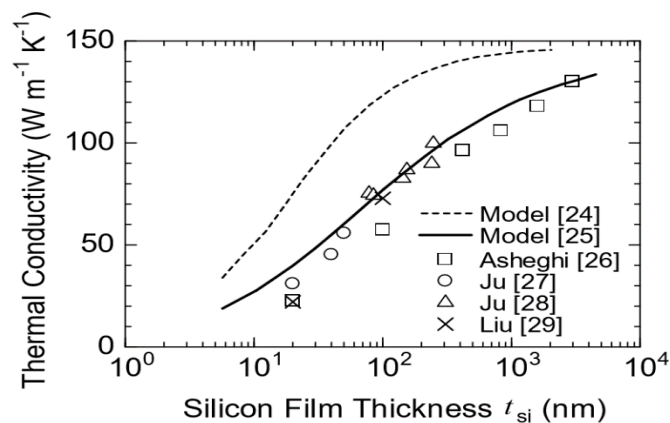


Рисунок 2: Сравнение модельной формулы теплопроводности κ в тонкой пленке Si [8,9] и экспериментальных значений [10–11]. l_{Si} — толщина пленки кремниевого полупроводника.

Уменьшение κ по мере уменьшения размера системы обусловлено эффектом так называемого рассеяния на границе фононов, при котором фононы сталкиваются с границей раздела, становясь все более очевидными. Исследования рассеяния фононов на границе раздела — слаборазвитая область, многие аспекты которой остаются неясными. На данный момент мы разработали модель акустического несоответствия [14], которая использует эквивалент отражения в соответствии с законом Снелла для рассеяния фононов на границе раздела, и модель диффузионного несоответствия [15], которая эмпирически рассматривает диффузионные интерфейсы, игнорируя при этом направленность фононов. Было предложено несколько моделей, все они являются феноменологическими моделями и далеки от фундаментального понимания механизма межфазного рассеяния.

Преломление тепловой волн это изменение направления волны, возникающее на границе двух сред, через которые этот тепловой волна проходит, или в одной среде, но с меняющимися свойствами, в которой скорость распространения волны неодинакова.

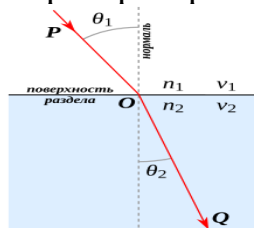


Рисунок-3 Преломление фононов на границе раздела двух сред с показателями преломления n_1 и n_2 (на рисунке $n_1 < n_2$)

Феномен преломления объясняется законами сохранения энергии и сохранения импульса. При изменении *передающей среды* изменяется скорость волны, а её частота остаётся такой же. В общем случае эффект преломления описывается законом Снеллиуса (Снелла).

Чтобы выполнить термический анализ, описанный выше, в масштабе практического устройства, это исследование было сосредоточено на методе расчета, который обеспечивает высокоточный анализ распространения тепла. Анализ переноса фононов с использованием уравнения переноса Больцмана не требует такой большой вычислительной нагрузки, как метод молекулярной

динамики, поэтому легко расширить целевую структуру до реалистичного масштаба, а также можно проанализировать различные физические механизмы, связанные с движением фононов. Поскольку его легко внедрить, можно легко повысить точность анализа. Таким образом, можно сказать, что это метод анализа распространения тепла, который имеет большие надежды на практичность из-за баланса точности и масштабируемости. Метод Монте-Карло (МК) — это метод прямого решения уравнения переноса Больцмана. Например, чтобы узнать методом Монте-Карло, какое в среднем будет расстояние между двумя случайными точками в круге, нужно взять координаты большого числа случайных пар точек в границах заданной окружности, для каждой пары вычислить расстояние, а потом для них посчитать среднее арифметическое.

В определенный интервал времени физические величины частиц, такие как направление движения, время путешествия, энергия и т. д., определяются и назначаются с использованием случайных чисел в соответствии с желаемой функцией распределения вероятностей. Более того, повторяя этот процесс, можно отслеживать случайное поведение частиц с течением времени. Таким образом, транспортные характеристики могут быть рассчитаны на основе статистических средних значений. Интерес к характеристикам распространения тепла в наноразмерных устройствах возрастает по мере того, как устройства становятся меньше, и ожидается, что в будущем их полезность увеличится.

В моделировании МК фононы моделировались как частицы, а транспортные характеристики анализировались путем отслеживания броуновского движения группы. В данной работе мы предполагаем, что все частицы МК несут одинаковую тепловую энергию E^* . Тогда число частиц МК N^* равно

$$N^* = \frac{U}{E^*} \quad (1)$$

Это выражается следующим образом. Здесь U — полная энергия фононов, включенная в систему моделирования, а с использованием DOS:

$$U = V \sum_p \int d\omega \hbar \omega D_p(\omega) n(\omega) \quad (2)$$

Оно дается следующим образом. Здесь V — объем моделирующей системы. Каждой частице МК была дана информация о векторе направления u , который представляет направление движения фонона, и о состоянии фонона, то есть ω , p и положении r . В данном исследовании направление движения u в начальном состоянии определялось из следующего уравнения, предполагающего, что кристалл ведет себя изотропно, без учета анизотропии кристалла (см. рисунок 4(б)).

$$u = (\sin\theta\cos\phi, \sin\theta\sin\phi, \cos\theta) \quad (3)$$

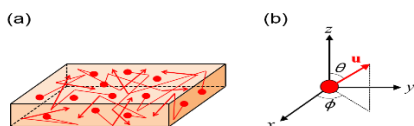


Рисунок 4: (а) Концептуальная схема моделирования фононного МК. Кружочки — это МК-частицы, каждая из которых представляет $W(\omega)$ -фононы. (б) Определение направления движения u частицы МК в исходном состоянии. Оно определялось с помощью уравнения (3).

Здесь $\sin\theta = R_1$, $\cos\theta = 2R_1 - 1$, $\varphi = 2\pi R_2$, а R_1 и R_2 — равномерные случайные числа в $[0,1]$. Энергия E^* одной частицы МК не обязательно должна быть равна фактической энергии фонона $\hbar\omega$, она считается виртуальной частицей, представляющей собой комбинацию нескольких фононов; Число фононов, существующих в кристалле, огромно, и добиться однозначного соответствия между фононами и МК-частицами нереально, поскольку это требует большой вычислительной нагрузки. Поэтому, предположив, что одна частица МК таким образом представляет собой совокупность нескольких фононов, мы значительно снизили вычислительную нагрузку. Число фононов в каждой частице МК выражается с помощью следующей весовой функции.

$$W(\omega) = \frac{E^*}{\hbar\omega} \quad (4)$$

Определив весовую функцию, которая обратно пропорциональна частоте фононов ω , как показано в этом уравнении, энергию всех частиц МК можно установить на постоянное значение E^* . Кроме того, в предыдущих отчетах по моделированию фононных МК [2,6–17] веса рассматривались как постоянные значения, но причина определения выше упомянутых весовых функций в этом исследовании.

Важную роль играет рассеяние на границах. По мере роста температуры все больше продуцируется коротковолновых фононов (большие значения q). Возрастает роль рассеяния таких фононов на дефектах.

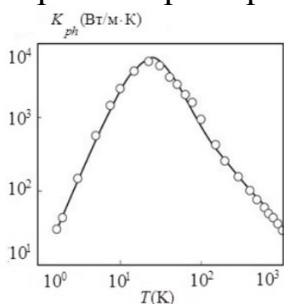


Рисунок 5 — Температурная зависимость решеточной теплопроводности кремния: экспериментальные точки по [17], расчетная кривая по [16].

По мере приближения температуры к дебаевской заселяются все фононные моды и дальнейшее увеличение температуры уже не увеличивает числа мод. Более того, высокие температуры порождают U-процессы рассеяния и теплопроводность начинает падать.

Первое отличие касается ширины зон. В случае электронов ширина зон намного превышает kT и при комнатной температуре заселены лишь уровни вблизи дна зоны проводимости. Ширина фононных дисперсий всего лишь

порядка kT и при комнатной температуре все акустические моды в пределах всей зоны Бриллюэна практически заселены. В результате дебаевская модель для акустических мод далеко не столь успешно работает по сравнению с широкой применимостью параболической дисперсии для электронов.

Второе существенное различие связано с тем, что в случае электронов заселенность мод проводимости, контролируемая фермиевским окном проводимости, зависит не только от температуры, как это имеет место в случае фононов, но и от положения уровня Ферми. Именно по этой причине электронная проводимость различных материалов может изменяться в очень широких пределах, тогда как теплопроводность изменяется в очень узких пределах всего на несколько порядков.

Таким образом, предложенная методика определения распределения тепла позволяет достаточно надежно определить этот ключевой параметр по данным исследования переноса тепла поперёк наноплёнки в баллистическом режиме и, соответственно, параметры токовых шнуров, что играет большую роль в диагностики надежности полупроводниковых транзисторов, работающих в режиме рассеяния фононов на границе раздела.

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ПЕРСОНАЛИЗИРОВАННАЯ НУТРИТИВНАЯ СТРАТЕГИЯ ПРИ ХРОНИЧЕСКИХ ВОСПАЛИТЕЛЬНЫХ ЗАБОЛЕВАНИЯХ ОРГАНОВ ДЫХАНИЯ

Аннотация: Хронические заболевания органов дыхания сопровождаются системными метаболическими нарушениями, формированием нутритивного дефицита и снижением функционального резерва пациента. В последние годы нутритивный статус рассматривается не только как следствие тяжёлого течения заболевания, но и как самостоятельный модифицируемый прогностический фактор. Целью настоящего обзора является анализ современных представлений о роли персонализированной нутритивной стратегии в пульмонологии, с акцентом на переход от симптомоориентированного подхода к прогностически значимой клинической модели. В обзоре обобщены данные о патогенезе нутритивных нарушений, клинических фенотипах, прогностической ценности нутритивных показателей и перспективах персонализации нутритивной поддержки.

Ключевые слова: нутритивный статус, персонализированная медицина, прогноз, хронические воспалительные заболевания лёгких.

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PERSONALIZED NUTRITIONAL STRATEGY IN CHRONIC INFLAMMATORY DISEASES OF THE RESPIRATORY SYSTEM

Abstract: *Chronic respiratory diseases are accompanied by systemic metabolic disturbances, the development of nutritional deficiency, and a reduction in the patient's functional reserve. In recent years, nutritional status has been considered not only as a consequence of severe disease progression but also as an independent, modifiable prognostic factor. The aim of this review is to analyze current concepts regarding the role of a personalized nutritional strategy in pulmonology, with an emphasis on the transition from a symptom-oriented approach to a prognostically meaningful clinical model. The review summarizes data on the pathogenesis of nutritional disorders, clinical phenotypes, the prognostic value of nutritional indicators, and the prospects for personalization of nutritional support.*

Keywords: *nutritional status, personalized medicine, prognosis, chronic inflammatory lung diseases.*

Современная пульмонология в последние годы всё более активно рассматривает хронические заболевания лёгких не только как локальную патологию респираторной системы, но и как системное состояние, сопровождающееся выраженными метаболическими, нутритивными и функциональными нарушениями. Хроническая обструктивная болезнь лёгких (ХОБЛ), бронхиальная астма (БА) и туберкулёз лёгких являются яркими примерами заболеваний, при которых системные эффекты во многом определяют клиническое течение, прогноз и социально-экономические последствия.

Нутритивный дефицит у пациентов с хроническими заболеваниями лёгких ассоциирован с увеличением частоты и тяжести обострений, снижением эффективности проводимой терапии, ростом потребности в стационарном лечении и удлинением сроков госпитализации. Кроме того, ухудшение нутритивного статуса приводит к снижению физической работоспособности, ограничению повседневной активности и утрате трудового потенциала, что формирует значимое социально-экономическое бремя как для системы здравоохранения, так и для общества в целом [1, 7, 12].

Несмотря на накопленные доказательства прогностической значимости нутритивного статуса при ХОБЛ, БА и туберкулёзе, в реальной клинической практике до настоящего времени преобладает унифицированный подход к нутритивной поддержке. Он, как правило, ограничивается оценкой индекса массы тела и назначением стандартных рекомендаций по питанию без учёта индивидуальных метаболических, воспалительных и клинических особенностей пациента [2, 11]. Это обстоятельство подчёркивает необходимость пересмотра существующих подходов и внедрения персонализированных нутритивных стратегий в пульмонологию.

Формирование нутритивного дефицита при хронических заболеваниях лёгких является многофакторным процессом, в основе которого лежит сочетание хронического системного воспаления, гиперметаболизма и преобладания катаболических процессов. У пациентов с ХОБЛ, БА и туберкулёзом отмечается стойкая активация провоспалительных цитокинов (фактор некроза опухоли- α , интерлейкины-1 и -6), которые оказывают прямое влияние на белковый и энергетический обмен [3].

Хроническое воспаление способствует усиленному распаду скелетной мускулатуры, снижению синтеза мышечного белка и истощению белковых резервов организма. Развивающаяся саркопения усугубляет дыхательную недостаточность за счёт вовлечения дыхательной мускулатуры, снижает толерантность к физической нагрузке и ухудшает качество жизни пациентов [8].

Важную роль в развитии нутритивного дефицита играет гиперметаболизм, связанный с повышенными энергозатратами на дыхание, активацией иммунного ответа и репаративными процессами. При недостаточном поступлении нутриентов энергетический дефицит быстро трансформируется в отрицательный азотистый баланс и прогрессирующее истощение.

Дополнительным неблагоприятным фактором являются лекарственно-индуцированные гастроинтестинальные нарушения. У пациентов с туберкулёзом лёгких длительная противотуберкулёзная терапия нередко сопровождается диспепсическими расстройствами, гепатотоксичностью и снижением аппетита, что ограничивает адекватное поступление макро- и микронутриентов и снижает приверженность лечению [4].

Многочисленные клинические исследования подтверждают, что показатели нутритивного статуса обладают самостоятельной

прогностической ценностью при хронических заболеваниях лёгких. Низкий индекс массы тела, потеря массы тела в динамике и гипоальбуминемия рассматриваются как независимые предикторы неблагоприятных исходов, включая увеличение летальности, частоты обострений и риска госпитализации у пациентов с ХОБЛ, БА и туберкулёзом лёгких [10, 12].

В последние годы особое внимание уделяется использованию интегральных нутритивных индексов, таких как прогностический нутритивный индекс (PNI) и шкала CONUT. Эти инструменты позволяют комплексно оценить состояние белкового обмена, иммунного статуса и энергетических резервов организма. Их применение способствует более точной стратификации риска осложнений и летальности, а также может использоваться для мониторинга эффективности проводимой терапии [5].

С клинко-экономической точки зрения нутритивный дефицит ассоциирован с увеличением длительности стационарного лечения, ростом затрат на медикаментозную терапию и реабилитационные мероприятия. Таким образом, нарушение нутритивного статуса следует рассматривать не только как медицинскую проблему, но и как важный фактор, влияющий на экономическую эффективность системы здравоохранения [6, 7].

Персонализированная нутритивная стратегия: концепция и практическое значение. Персонализированный подход к нутритивной поддержке предполагает переход от унифицированных рекомендаций к индивидуализированной оценке и коррекции нутритивных нарушений. В рамках данной концепции предлагается выделение нутритивных фенотипов, отражающих доминирующие патогенетические механизмы: воспалительно-катаболический, гипопротеинемический, саркопенический и смешанный [3, 9].

Выделение нутритивных фенотипов позволяет более точно определить цели и объём нутритивной поддержки, оптимизировать соотношение белков, жиров и углеводов, а также обоснованно использовать специализированные нутритивные смеси и микронутриенты. Такой подход способствует не только коррекции нутритивного дефицита, но и потенциальному влиянию на течение основного заболевания.

Персонализация нутритивной стратегии в пульмонологии - не индивидуальный рекомендации по питанию, а клиническая стратификация риска с последующей фенотип-ориентированной коррекцией. Ключевое отличие от унифицированного подхода - замена единичного показателя (ИМТ) на многокомпонентный профиль, включающий динамику массы тела, композицию тела, маркеры воспаления и функциональный резерв. В клинической реальности именно несовпадение ИМТ и истинного состава тела формирует диагностические ошибки: пациент с "нормальным" ИМТ при ХОБЛ нередко имеет саркопению и низкий функциональный резерв, тогда как при "избыточной массе" возможно саркопеническое ожирение с тем же неблагоприятным прогнозом.

1. РАСШИРЕННАЯ НУТРИТИВНАЯ ОЦЕНКА КАК СТАРТ ПЕРСОНАЛИЗАЦИИ.

Для практической персонализации целесообразно выделить минимального набора параметров, доступного амбулаторно и стационарно:

- Динамика массы тела (потеря за 3-6 месяцев), аппетит/пищевое потребление, наличие тошноты/диспепсии (особенно при противотуберкулёзной терапии) [4].

- Композиция тела: биоимпеданс/антропометрия окружностей, при возможности - оценка мышечной массы; дополнительно - кистевой динамометрический показатель как быстрый маркер мышечной функции (саркопенический компонент) [8].

- Лабораторный профиль: альбумин, общий лимфоцитарный показатель, С-реактивный белок; на их основе - PNI/CONUT для интегральной прогностической оценки [5, 10].

- Функциональные маркеры: переносимость нагрузки, ограничение повседневной активности, косвенно - дыхательная мышечная “стоимость” (высокие энергозатраты на вентиляцию) как фактор гиперметаболизма [3].

Такое “профилирование” создаёт основу для решения главного вопроса: перед нами преимущественно дефицит энергии, дефицит белка, воспалительно-катаболический сдвиг, саркопения или смешанный вариант [3, 9].

2. ФЕНОТИПИРОВАНИЕ КАК КЛИНИЧЕСКАЯ ОСНОВА ПЕРСОНАЛИЗАЦИИ.

С практической точки зрения полезно фенотип-ориентированное деление, где каждый фенотип получает собственную цель и инструмент контроля:

- Воспалительно-катаболический фенотип: системное воспаление, прогрессирующая потеря массы, быстрый спад функционального резерва; приоритет - ранняя энергетико-белковая коррекция и мониторинг воспаления как фона катаболизма [3].

- Гипопротеинемический фенотип: лабораторное снижение белковых маркеров/низкий PNI; приоритет - белковая плотность рациона и контроль азотистого баланса косвенными маркерами, с учётом воспалительных и печёночных факторов (актуально при туберкулёзе и лекарственной нагрузке) [4, 5].

- Саркопенический фенотип: относительная масса тела сохранена, при этом мышечная масса и сила снижены; приоритет - сочетание белковой поддержки и реабилитации, поскольку без тренировочного стимула нутритивный эффект часто остаётся не эффективным [8].

- Смешанный фенотип: одновременное наличие воспаления, саркопии и нутритивного дефицита; приоритет - поэтапная коррекция с короткими циклами контроля и изменением стратегии по ответу [3, 9].

3. ИНДИВИДУАЛИЗАЦИЯ ЦЕЛЕЙ: НЕ БОЛЬШЕ КАЛОРИЙ, А НУЖНАЯ СТРУКТУРА.

Персонализированная цель включает:

1. Энергетическую достаточность (с поправкой на гиперметаболизм, тяжесть одышки и стоимость дыхания).
2. Белковую адекватность (как ключевой ресурс для мышечной ткани, включая дыхательную мускулатуру).
3. Коррекцию переносимости (тошнота, раннее насыщение, гастроинтестинальные осложнения терапии) [4].

На практике предпочтение получает пищевой план высокой нутритивной плотности: меньший объём - большая энергетико-белковая ценность, дробность, использование специализированных смесей при невозможности закрытия потребностей обычным рационом. Важно подчеркнуть: при выраженной воспалительной активности альбумин и масса тела могут “отставать” от клинического улучшения, поэтому оценка динамики требует комбинации лабораторных и функциональных маркеров [3, 5, 10].

4) МОНИТОРИНГ КАК ПРОВЕРКА ПЕРСОНАЛИЗАЦИИ: КРИТЕРИИ ОТВЕТА И ТОЧКИ ПЕРЕСМОТРА.

Персонализация без контроля имеет низкую эффективность. Поэтому целесообразны заранее заданные точки оценки:

- 2-4 недели: переносимость, пищевое потребление, динамика веса/силы, субъективная утомляемость; первичный сигнал эффективности.
- 6-12 недель: стабилизация/рост массы, улучшение функциональных параметров, тенденция PNI/CONUT; оценка прогностической траектории [5, 10].
- При отсутствии ответа: пересмотр фенотипа (часто - недооценка воспалительно-катаболического компонента или саркопении), коррекция объёма/формы нутритивной поддержки, усиление реабилитационной части [3, 8, 9].

ПРЕДЛАГАЕМЫЙ КЛИНИЧЕСКИЙ АЛГОРИТМ ПЕРСОНАЛИЗАЦИИ:

1. Скрининг нутритивного риска при первичном визите/госпитализации.
2. Профилирование: динамика веса + композиция тела + PNI/CONUT + функциональный маркер.
3. Фенотипирование (1 из 4 вариантов) и постановка цели (энергия/белок/мышцы/переносимость).
4. Выбор формы поддержки (диета высокой плотности → пероральные смеси → энтеральная поддержка при показаниях).
5. Контроль-петля: 2–4 недели (коррекция переносимости и объёма) → 6–12 недель (оценка прогностической динамики) [5, 9, 10].

В перспективе именно такой формат - фенотип + измеряемые цели + контроль-петля - создаёт основу для прогностической модели ведения

пациента, где нутритивный статус выступает не “фоном болезни”, а управляемым ресурсом клинического исхода и экономической эффективности [6, 7].

Ранняя положительная динамика нутритивных показателей рассматривается как маркер эффективности терапии и может служить инструментом мониторинга клинических и социально-экономических исходов. Улучшение нутритивного статуса ассоциировано с повышением толерантности к физической нагрузке, снижением частоты обострений и улучшением качества жизни пациентов [5, 10].

Заключение.

Персонализированная нутритивная стратегия в пульмонологии представляет собой перспективное направление, объединяющее клиническую, прогностическую и социально-экономическую значимость. Интеграция расширенной нутритивной оценки в стандартные маршруты ведения пациентов с хроническими заболеваниями лёгких может способствовать ранней идентификации групп высокого риска, снижению частоты осложнений, оптимизации затрат на лечение и повышению качества жизни пациентов.

Внедрение персонализированных нутритивных подходов требует междисциплинарного взаимодействия пульмонологов, диетологов и специалистов по медицинской реабилитации, а также дальнейших клинических и клинико-экономических исследований, направленных на обоснование их эффективности в реальной клинической практике.

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ЭКОЛОГИЧЕСКИЕ ПОСЛЕДСТВИЯ ЭВТРОФИКАЦИИ ДЛЯ ВОДНЫХ ЭКОСИСТЕМ

***Аннотация:** Статья посвящена анализу экологических последствий эвтрофикации водных экосистем, особенно в аридных и полуаридных регионах. Эвтрофикация приводит к избыточному росту фитопланктона, колебаниям кислородного режима, деградации биологических сообществ, снижению биоразнообразия и ухудшению качества воды. Особое внимание уделено влиянию высокой температуры воды, слабого водообмена и антропогенной нагрузки. Результаты исследования подчеркивают необходимость системного подхода к управлению водными ресурсами, снижения биогенной нагрузки и внедрения экосистемно-ориентированных мер охраны.*

***Ключевые слова:** эвтрофикация, водные экосистемы, кислородный режим, биоразнообразие, фитопланктон, аридные регионы, экологический мониторинг.*

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ECOLOGICAL CONSEQUENCES OF EUTROPHICATION FOR AQUATIC ECOSYSTEMS

***Abstract:** The article is devoted to the analysis of the ecological consequences of eutrophication in aquatic ecosystems, particularly in arid and semi-arid regions. Eutrophication leads to excessive phytoplankton growth, fluctuations in oxygen*

levels, degradation of biological communities, a decrease in biodiversity, and deterioration of water quality. Special attention is paid to the effects of high water temperatures, low water exchange, and anthropogenic pressure. The results of the study emphasize the need for a systematic approach to water resource management, reduction of biogenic load, and implementation of ecosystem-oriented conservation measures.

Key words: *eutrophication, aquatic ecosystems, oxygen regime, biodiversity, phytoplankton, arid regions, ecological monitoring.*

Введение

Эвтрофикация водных экосистем является одной из наиболее актуальных экологических проблем современности, особенно в условиях интенсивного антропогенного воздействия. Она представляет собой процесс избыточного обогащения водоёмов биогенными элементами, прежде всего соединениями азота и фосфора, что приводит к глубоким структурно-функциональным изменениям в экосистемах. В аридных и полуаридных регионах, к которым относится Южное Приаралье, процессы эвтрофикации протекают особенно интенсивно вследствие высокой температуры воды, слабого водообмена, повышенной минерализации и значительного поступления сельскохозяйственных и коллекторно-дренажных стоков.

Экологические последствия эвтрофикации проявляются на всех уровнях организации водных экосистем — от изменения химического состава воды до деградации биологических сообществ и утраты экосистемных услуг. Изучение этих последствий имеет важное значение для оценки экологического состояния водных объектов и разработки мер по их охране и восстановлению.

Целью настоящей работы является анализ основных экологических последствий эвтрофикации для водных экосистем.

Материалы и методы

В работе использованы методы аналитического обзора научной литературы, а также обобщение данных экологического мониторинга водных объектов аридных регионов. Анализ проводился на основе публикаций отечественных и зарубежных исследователей, посвящённых процессам эвтрофикации, изменениям гидрохимических показателей и биологических компонентов водных экосистем. Для оценки экологических последствий эвтрофикации рассматривались следующие группы показателей:

- концентрации биогенных элементов (нитраты, аммоний, фосфаты);
- показатели кислородного режима воды;
- изменения структуры фитопланктона, зоопланктона и бентоса;
- данные о биоразнообразии и устойчивости экосистем.

Применялся системный и экосистемный подходы, позволяющие выявить взаимосвязи между химическими, физическими и биологическими процессами в водоёмах.

Результаты и обсуждение

Анализ показал, что эвтрофикация вызывает комплекс негативных экологических последствий для водных экосистем. Одним из наиболее выраженных эффектов является интенсивное развитие фитопланктона, включая массовое «цветение» воды. Это приводит к увеличению мутности, снижению прозрачности и ухудшению светового режима, что ограничивает фотосинтез высших водных растений.

В условиях повышенной биопродукции происходит резкое колебание концентрации растворённого кислорода. В дневное время возможно его перенасыщение, тогда как в ночные часы и при разложении органического вещества наблюдается дефицит кислорода вплоть до гипоксических и анаэробных условий. Это отрицательно сказывается на гидробионтах, особенно на чувствительных видах рыб и беспозвоночных.

Установлено, что эвтрофикация сопровождается упрощением структуры биологических сообществ. Снижается видовое разнообразие зоопланктона и бентоса, возрастает доля эврибионтных и толерантных к загрязнению видов. Нарушается трофическая структура экосистем, ослабляются механизмы саморегуляции и устойчивости водоёмов.

Кроме того, в эвтрофированных водных объектах усиливаются процессы вторичного загрязнения, связанные с высвобождением фосфора из донных отложений и накоплением токсичных продуктов разложения органического вещества.

Полученные результаты согласуются с данными многочисленных исследований, подтверждающих, что эвтрофикация является одним из ключевых факторов деградации водных экосистем. В аридных регионах негативные последствия усугубляются высокой температурой воды и замедленным водообменом, что ускоряет биохимические процессы и способствует застойным явлениям.

Особую экологическую опасность представляет потеря биоразнообразия, так как она снижает адаптационный потенциал экосистем и их способность противостоять дополнительным нагрузкам. Ухудшение качества воды вследствие эвтрофикации ограничивает её использование для питьевых, хозяйственно-бытовых и ирригационных целей, а также повышает санитарно-гигиенические риски.

Таким образом, эвтрофикация следует рассматривать не только как локальную проблему отдельных водоёмов, но и как фактор региональной экологической нестабильности, требующий системного подхода к управлению водными ресурсами.

Заключение

Эвтрофикация водных экосистем приводит к глубоким и многоуровневым экологическим последствиям, включая нарушение кислородного режима, деградацию биологических сообществ, снижение биоразнообразия и ухудшение качества воды. В условиях аридных регионов данные процессы протекают особенно интенсивно и приобретают

устойчивый характер. Для предотвращения дальнейшей деградации водных объектов необходимы меры по снижению антропогенной биогенной нагрузки, совершенствованию систем экологического мониторинга и внедрению экосистемно-ориентированных подходов к управлению водными ресурсами. Результаты исследования могут быть использованы при разработке природоохранных программ и стратегий устойчивого водопользования.

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КУЧМАС МУЛКЛАРИГА КАПИТАЛ ИНВЕСТИЦИЯЛАР ХИСОБИНИ ЮРИТИШ УСЛУБИЯТИНИ МҲХС ТАЛАБЛАРИ АСОСИДА ТАКОМИЛЛАШТИРИШ

Аннотация: Ушбу мақолада кучмас мулкларига капитал инвестициялар ва улар моҳияти ҳамда хисобини юритиш услубиятини мҲХС талаблари асосида алоҳида хусусийатлари очиб берилган.

Калим сўзлар: капитал инвестициялар, модернизация, кучмас мулк, хисоб, таҳлил, кучмас мулк хисоби.

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IMPROVEMENT OF CAPITAL INVESTMENT ACCOUNTING IN REAL ESTATE IN ACCORDANCE WITH THE REQUIREMENTS OF MHXS

Abstract: This article describes capital investments in real estate and their nature and special features based on the requirements of mhxs.

Keywords: capital investment, modernization, real estate, account, analysis, real estate accounting.

Kirish. Республикамизда «Ҳаракатлар стратегиясидан-Тараққиёт стратегияси сари» тамойилига асосан ишлаб чиқилган 2022 - 2026 йилларга мулжалланган Янги Ўзбекистоннинг тараққиёт стратегиясида корхоналар моддий техника базасини тубдан яхшилаш, чунончи куриш ва харид қилиш йўли билан янги замонавий кучмас мулк объектларини шакллантириш, мавжуд ишлаб чиқариш қувватларини модернизация қилиш, техник ва технологик жиҳатдан янгилаш, кенгайтириш, реновациялаш, рақамлаштириш ва яшиллаштириш асосида мукаммаллаштириш муҳим вазифалар сифатида белгиланган⁵⁷. Республикамизда охириги йилларда ушбу стратегик вазифаларни бажариш борасида иқтисодиётнинг турли соҳаларига катта

⁵⁷ Ўзбекистон Республикаси Президентининг Фармони, 28.01.2022 йилдаги ПФ-60-сон, <https://lex.uz/docs/5841063>

миқдордаги капитал инвестициялар киритилмоқда. Чунончи, республикамиз статистика кумитаси маълумотларига кура, биргина 2025 йил январ–сентябр ойларида мамлакатимизда қурилиш соҳасига киритилган капитал инвестициялар таркибий тузилиши бўйича қуйидагилардан иборат бўлди

- бино ва иншоотлар қурилишига инвестициялар - 154,7 трлн сўм;
- фуқаролик объектлари қурилишига инвестициялар - 46,7 трлн сўм;
- ихтисослаштирилган қурилиш ишларига инвестициялар - 23,2 трлн сўм.

Жами қурилиш ишларига инвестициялар ҳажми тахминан 224,6 трлн сўмга тенг бўлди, бунда бино ва иншоотлар улуши - 68,9 фоиз, фуқаролик объектлари улуши - 20,8 фоиз, ихтисослаштирилган ишлар улуши - 10,3 фоизни ташкил этди. Бажарилган қурилиш ишларининг 68,9 фоизи бино ва иншоотлар қурилиши ҳиссасига тўғри келди. Бу кўрсаткич ўтган йилнинг шу даврига нисбатан 6,1 фоизга ўсди.⁵⁸ Макон ва замонда турли мақсадларга мулжалланган кучмас мулк объектларига кенг қўламда ва катта ҳажмда амалга оширилаётган капитал инвестициялар улар тугрисидаги атрофлича ва ишончли ахборотларга ташқи ва ички инвесторлар, мулк эгалари, таъсисчилар ва давлат бошқарув органлари талабларини борган сари ошиб боришига олиб келмоқда. Бу, ўз навбатида, ҳар бир корхона олдида улар томонидан кучмас мулк объектларини шакллантириш ва мукамаллаштиришга йўналтирилаётган капитал инвестицияларни ҳалқаро норма ва стандартлар талабларига мос равишда ҳисоб ва ҳисобот да акс эттиришдек муҳим вазифаларни қўймоқда.

Mavzuga oid adabiyotlar tahlili. Биз “капитал қўйилмалар” атамаси ўнига Президентимиз томонидан таъкидланган “иктисодиёт драйвери, ўзбекча айтганда, иқтисодиётнинг юраги” сифатида эътироф этилган “капитал инвестициялар”⁵⁹ атамасини қўллаш мақсадга мувофиқ деб ўйлаймиз. Шунга асосан 21-сон БҲМСда “капитал инвестициялар” таърифини қуйидагича беришни мақсадга мувофиқ, деб биламиз: “капитал инвестициялар – бу кучар ва кучмас мулк объектларини қуриш, харид қилиш, яратиш, парваришlash, шакллантириш, шунингдек уларни яхшиланиши (ободонлаштириш, модернизацияlash, кенгайтириш, реконструкцияlash, реновацияlash, капитал таъмирлаш) билан боғлиқ сарфлар”.

Бухгалтерия ҳисоби объекти сифатида капитал инвестицияларни айнан ушбу илмий ном билан аталишини бошқа олимлар⁶⁰ ҳам эътироф этган. Чунончи, россиялик иқтисодчи олим А.Д.Шеремет капитал инвестициялар ҳисобига жуда катта эътибор қаратган. Унинг фикрича, капитал инвестициялар ҳисоби ҳамда аудитини мустақил фан сифатида тан олиш,

⁵⁸ <https://kun.uz/kr/news/2025/10/29/qurilish-tarmogida-bino-va-inshootlar-segmenti-yetakchilik-qilmoqda>

⁵⁹ Ўзбекистон Республикаси Президенти Ш.М. Мирзиёевнинг 2019 йил учун мўлжалланган энг муҳим устувор вазифалар ҳақидаги Олий Мажлисга Мурожаатномаси. Халқ сўзи, 2018 йил, 29 декабрь

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унинг предмети ва объектларини аниқлаштириш ва фаннинг янги қирраларини тадқиқ этиш ўта долзарб⁶¹.

Бухгалтерия ҳисоби бошқарув воситаси сифатида кучмас мулкка қилинаётган капитал инвестицияларнинг барча турлари тугрисида тизимли ахборотларни бериши лозим. Ушбу вазифани тўғри ва ўз вақтида бажарилишини таъминлаш учун, фикримизча, республикамизнинг 21-сон БҲМС “Хужалик юритувчи субъектларнинг молия-хужалик фаолияти бухгалтерия ҳисоби счётлари режаси ва уни қўллаш бўйича йўриқнома” да⁶² корхоналар кучмас мулк объектларига килинган капитал инвестициялар таркибини қуйидагича белгилашни тавсия қиламиз (1-расмга қаранг).



1.-расм. Корхоналар кучмас мулк объектларига киритиладиган капитал инвестициялар таркиби

Шунингдек, 21-сон БҲМСга корхоналар кучмас мулк объектларига киритиладиган капитал инвестицияларга қуйидагича таърифларни беришни тавсия қиламиз (1-жадвалга қаранг).

⁶¹ Шеремет А.Д., Суйц В.П. Аудит. Учебник. -М.: ИНФРА-М, 2009. -456 с

⁶² Ўзбекистон Республикаси Бухгалтерия ҳисобининг миллий стандарти (21-сон БҲМС) “Хўжалик юритувчи субъектларнинг молия-хўжалик фаолияти бухгалтерия ҳисоби счётлари режаси ва уни қўллаш бўйича йўриқнома”. Ўзбекистон Республикаси молия вазирининг 09.09.2002 йилдаги 103-сонли буюриғи.

Кучмас мулк объектларига капитал инвестицияларнинг турлари ва уларнинг мазмуни (тавсия)⁶³

№	Кучмас мулк объектларига капитал инвестициянинг тури	Кучмас мулк объектларига капитал инвестиция турининг мазмуни
1	Кучмас мулк объектини куриш	янги бино ва иншоотларни яратилиши билан боглик жараёнлар (лойихалаштириш, куришга тайёргарлик, таъминот, куриш, фойдаланишга топшириш каби жараёнлар) мажмуаси
2	Кучмас мулк объектини харид килиш (сотиб олиш)	Тайёр бино ва иншоотларни сотувчилардан шартномалар асосида сотиб олиш
3	Кучмас мулк объектини реконструкция килиш	корхонанинг ҳаракатдаги асосий, ёрдамчи ва хизмат курсатувчи объектларини дастлабки ҳолатини кенгайтмасдан қайта ўзгартириб чиқиш
4	Кучмас мулк объектини модернизация килиш (янгилаш)	корхонанинг ҳаракатдаги асосий, ёрдамчи ва хизмат курсатувчи объектларини, техника ва технологик линияларини энг замонавий илмий ва техник ютуқлар асосида янгилаш ҳамда алмаштириш
5	Кучмас мулк объектини кенгайтириш	корхонанинг ҳаракатдаги бино ва иншоотларига қўшимча ишлаб чиқариш объектларини куриш, асосий, ёрдамчи ва хизмат курсатувчи цехларнинг майдончаларини ишлаб чиқариш кувватини ошириш мақсадида кенгайтириш билан боглик ишлар
6	Кучмас мулк объектини шакллантириш	Куп йиллик ўсимликларни, яшил майдонларни экиш ва ҳосилга киргунга қадар парваришлаш
7	Кучмас мулк объектини реновация килиш	корхоналарнинг турли мақсад ва йўналишларда (ўзи томонидан фойдаланиш, инвестиция сифатида киритиш, ижарага бериш ва сотиш учун) куллашга мулжалланган кучмас мулк объектларини замонавий шаҳарсозлик архитектураси талабларидан келиб чиқиб ташқи кўриниши, жозибадорлиги, эстетикасини тубдан яхшилаш, реставрациялаш ва капитал таъмирлаш жараёни.
8	Кучмас мулк объектини ободонлаштириш	Корхонада фойдаланишда бўлган ер майдончаларининг кўринишини яхшилаш, ер ости ўтказмаларини куриш, транспорт воситаларини тўхтаб туриш жойларини ташкил килиш, ер майдончаларини темир панжаралар билан ўраш, юриш йўлкаларини куриш каби ишлар
9	Кучмас мулк объектини капитал таъмирлаш	Корхонанинг асосий, ёрдамчи ва хизмат курсатишга мулжалланган объектларни техник-ишлаб чиқариш имкониятларини тубдан яхшилаш мақсадларида бажарилган ишлар

⁶³ Муаллиф ишланмаси

21-сон БҲМСда корхоналар кучар ва кучмас мулк объектларига капитал инвестициялар ҳисоби учун назарда тутилган счётлар тизимлари номланиши ва мақоми буйича ушбу мулк объектларига киритилган капитал инвестициялар тугрисида атрофлича ахборотларни шакллантириш талабларига тулиқ жавоб бермайди. Бизнингча, терминларни замонавийлаштириш заруратидан келиб чиқиб, 21-сон БҲМСда капитал инвестициялар ҳисоби учун назарда тутилган 0800 «Капитал қўйилмаларни ҳисобга олувчи счётлар» тизими номини «Кучар ва кучмас мулк объектларига капитал инвестицияларни ҳисобга олувчи счётлар» деб ўзгартириш тўғрироқ бўлар эди.

Бизнинг фикримизча, корхоналар кучмас мулк объектларини яхшилаш ва такомиллаштиришнинг барча турлари, яъни уларни қуриш, модернизациялаш, реновациялаш, реконструкция қилиш, кенгайтириш, капитал таъмирлаш жараёнларининг бориши ҳамда ушбу жараёнларга киритилган капитал инвестициялар яхлит битта счётлар тизимида ҳисобга олиниши лозим. Ушбу счётлар тизими таркибида кучмас мулк объектларини яхшилаш ва такомиллаштиришнинг ҳар бир тури - қуриш, модернизациялаш, реновациялаш, реконструкция қилиш, кенгайтириш, капитал таъмирлаш жараёнларининг бориши ҳамда уларнинг ҳар бирига киритилган капитал инвестициялар алоҳида счётлар очилиши лозим, деб ҳисоблаймиз.

Корхоналар кучмас мулк объектларига капитал инвестициялар ҳисоби услубиятини такомиллаштириш учун амадаги 0810 Тугалланмаган қурилиш” счётини номини ўзгартириб, уни “Кучмас мулк объектларини қуриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга капитал инвестициялар ҳисоби учун мулжалланган счётлар”деб номлаб 0810 “Кучмас мулк объектларини қуриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга капитал инвестициялар ҳисоби учун мулжалланган счётлар” тизими таркибида қуйидаги счётларни очиш (2-жадвал);

**0810 “Кучмас мулк объектларини куриш, модернизациялаш,
реновациялаш, реконструкциялаш, кенгайтириш ва капитал
таъмирлашга капитал инвестициялар хисоби учун мулжалланган
счётлар” тизимига киритилиши
тавсия этилаётган счётлар**

Амалдаги 21-сон БХМС буйича		Тавсия	
Счет	Счетнинг номи	Счет	Счетнинг номи
0810	Тугалланмаган курилиш	0811	Кучмас мулк объектларини куришга капитал инвестициялар
		0812	Кучмас мулк объектларини модернизациялашга капитал инвестициялар
		0813	Кучмас мулк объектларини реновациялашга капитал инвестициялар
		0814	Кучмас мулк объектларини реконструкциялашга капитал инвестициялар
		0815	Кучмас мулк объектларини кенгайтиришга капитал инвестициялар
		0816	Кучмас мулк объектларини ободонлаштиришга капитал инвестициялар
		0817	Кучмас мулк объектларини капитал таъмирлашга капитал инвестициялар

Корхоналар кучмас мулк объектларига капитал инвестициялар хисоби учун биз томонимиздан тавсия этилаётган счётлар (0811, 0812, 0813, 0814, 0815, 0816, 0817) мақомига кура актив, доимий, баланс счётлар бўлиб хисобланади, шунингдек уларнинг барчасини юритиш қуйидаги методологик тартибга асосланади (2-расмга қаранг).

Давр бош қолдик (Бк)	Кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга доир тугалланмаган капитал инвестицияларнинг давр бошига қолдиғини билдиради ва у мазкур счётнинг дебетида биринчи қаторда акс эттирилади
Дебет оборот (До)	Хисобот даврида кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга киритилган капитал инвестициялар суммаси мазкур счётнинг дебетида тегишли тасдиқловчи хужжатлар асосида акс эттирилади. Ушбу счётнинг дебет оборот суммаси хисобот даврида амалга оширилган жами капитал инвестициялар суммасини билдиради
Кредит оборот (Ко)	Хисобот даврида куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга капитал инвестицияларни кирим килинган кучмас мулк объектлари кийматига киритилган суммаси мазкур счётнинг кредитида тегишли тасдиқловчи хужжатлар асосида акс эттирилади. Ушбу счётнинг кредит оборот суммаси Хисобот даврида тегишли кучмас мулк тури бошланғич кийматига киритилган жами капитал инвестициялар суммасини билдиради
Давр охирига қолдик (Ок)	Кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга доир тугалланмаган капитал инвестицияларнинг давр охирига қолдиғини билдиради ва у мазкур счётнинг дебетида охири қаторда акс эттирилади.

2-расм. Корхоналар кучмас мулк объектларига капитал инвестициялар хисоби учун тавсия этилаётган 0811, 0812, 0813, 0814, 0815, 0816, 0817 счётларни юритишнинг умумметодологик тартиби

Амалий жиҳатдан кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлаш, одатда, иккита усулларнинг бирида амалга оширилади: (1) пудрат усул; (2) хужалик усули. Ушбу усуллар асосида кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга доир капитал инвестициялар хисобини корхоналарда, ўз навбатида, (1) алохида-алохида ҳамда (2) умумий тарзда юритиш тавсия этилади.

Кучмас мулк объектларига киритилган капитал инвестициялар хисобини алохида-алохида юритиш усули. Ушбу усулда кучмас мулк объектларига капитал инвестицияларнинг ҳар бири тури хисоби кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлаш ишлари бўйича улар хисоби учун тавсия этилган счётларда алохида юритилади. Бу усулда кучмас мулк объектларига капитал инвестицияларнинг ҳар бири тури хисоби учун тавсия этилган счётларнинг бошқа счётлар билан боғланишини (корреспонденцияланишини) куйидагича тартибларда корхоналар ҳисоб сиёсатига киритишни лозим деб ҳисоблаймиз (3-жадвал).

3-жадвал

Корхоналар кучмас мулк объектларига капитал инвестициялар хисоби учун тавсия этилаётган 0811, 0812, 0813, 0814, 0815, 0816, 0817 счётларни бошқа счётлар боғланиши⁶⁴

Т/р	Операциянинг мазмуни	Дебет Счёт	Кредит счёт	Асос бўлувчи ҳужжат
1. Пудрат усул бўйича (капитал инвестициялар йўналишларининг ҳар бир тури алохида юритилганда)				
1.	Кучмас мулк объектларини куришга капитал инвестициялар	0811	6010	Кучмас мулк объектларини қабул қилиш-топшириш далолатномаси
2.	Кучмас мулк объектларини модернизациялашга капитал инвестициялар	0812	6010	Кучмас мулк объектларини модернизациялаш тугрисида далолатнома
3.	Кучмас мулк объектларини реновация қилишга капитал инвестициялар	0813	6010	Кучмас мулк объектларини реновация қилиш тугрисида далолатнома
4.	Кучмас мулк объектларини реконструкция қилишга капитал инвестициялар	0814	6010	Кучмас мулк объектларини реконструкция қилиш тугрисида далолатнома
5.	Кучмас мулк объектларини кенгайтиришга капитал инвестициялар	0815	6010	Кучмас мулк объектларини кенгайтириш тугрисида далолатнома
6.	Кучмас мулк объектларини ободонлаштиришга капитал инвестициялар	0816	6010	Кучмас мулк объектларини ободонлаштириш тугрисида далолатнома
7.	Кучмас мулк объектларини капитал таъмирлашга капитал инвестициялар	0817	6010	Кучмас мулк объектларини капитал таъмирлаш тугрисида далолатнома
2.Хужалик усули бўйича (капитал инвестициялар йўналишларининг ҳар бир тури алохида юритилганда)				
1.	Кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва	0811, 0812, 0812, 0814, 0815,	1010-1090	Кучмас мулк объектларига капитал инвестициялар турлари тугрисидаги далолатномалар ва уларга илова қилинган материаллар

⁶⁴ Муаллиф ишланмаси

	капитал таъмирлашга сарфланган материаллар	2816, 0817		сарфини тасдиқловчи ҳужжатлар
2.	Кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга сарфланган меҳнат ҳақи ва ижтимоий солиқ	0811, 0812, 0812, 0814, 0815, 2816, 0817	6710, 6520	Кучмас мулк объектларига капитал инвестициялар турлари тугрисидаги далолатномалар ва уларга илова килинган меҳнатга ҳақ тўлаш ва ижтимоий солиқни тасдиқловчи ҳужжатлар
3.	Кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашда фойдаланилган АВ ва НАларга хисобланган амортизация харажатлари	0811, 0812, 0812, 0814, 0815, 2816, 0817	0200, 0500	Кучмас мулк объектларига капитал инвестициялар турлари тугрисидаги далолатномалар ва уларга илова килинган ёрдамчи Хужаликлар ва умум Хужалик харажатларини тасдиқловчи ҳужжатлар
4.	Кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга сарфланган хизматлар (коммунал, транспорт, геодезик-топографик, лойиҳалаш, экспертиза, демонтаж ва шу кабилар)	0811, 0812, 0812, 0814, 0815, 2816, 0817	6010, 6990	Кучмас мулк объектларига капитал инвестициялар турлари тугрисидаги далолатномалар ва уларга илова килинган хизматлар ҳақларини тасдиқловчи ҳужжатлар
5.	Кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга сарфланган ёрдамчи хужаликлар ва умум хужалик харажатлари	0811, 0812, 0812, 0814, 0815, 2816, 0817	2310, 2510	Кучмас мулк объектларига капитал инвестициялар турлари тугрисидаги далолатномалар ва уларга илова килинган ёрдамчи хужаликлар ва умум хужалик харажатларини тасдиқловчи ҳужжатлар

Хулоса ва таклифлар.

Татқиқотлар натижасида куйидагиларни таклиф қиламиз:

✓ корхоналар кучмас мулк объектларига килинган капитал инвестициялар таркибини куйидагича белгилаш(1-расмга қаранг).

✓ 21-сон БҲМСга корхоналар кучмас мулк объектларига киритиладиган капитал инвестицияларга куйидагича таърифларни киритиш(1-жадвалга қаранг)

✓ 0810 “Кучмас мулк объектларини куриш, модернизациялаш, реновациялаш, реконструкциялаш, кенгайтириш ва капитал таъмирлашга капитал инвестициялар хисоби учун мулжалланган счётлар” тизими таркибида куйидаги счётларни очиш (2-жадвал);

✓ кучмас мулк объектларига капитал инвестицияларнинг ҳар бири тури ҳисоби учун тавсия этилган счётларнинг бошқа счётлар билан боғланишини (корреспонденцияланишини) куйидагича тартибларда бериш(3-жадвал).

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ОСОБЕННОСТИ МУЛЬТИМОДАЛЬНОГО ОБУЧЕНИЯ СОВРЕМЕННОЙ МОЛОДЁЖИ: ТЕОРЕТИЧЕСКИЕ ОСНОВЫ И МЕТОДИКА ПОСТРОЕНИЯ УРОКА

Аннотация: рассматриваются особенности мультимодального обучения поколений Z и Alpha в условиях цифровой трансформации. Анализируются теоретические основания и основные средства (текст, видео, визуализация) и предлагается методика конструирования интегрированного урока. Показано, что мультимодальный подход повышает мотивацию, снижает когнитивную нагрузку и улучшает усвоение материала.

Ключевые слова: мультимодальное обучение; цифровая педагогика; визуализация; видео-образование; когнитивная нагрузка; поколение Z (зумеры); поколение Alpha (альфа).

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FEATURES OF MULTIMODAL LEARNING FOR MODERN YOUTH: THEORETICAL FOUNDATIONS AND LESSON DESIGN METHODOLOGY

Annotation: This paper examines the characteristics of multimodal education for Generations Z and Alpha within the context of digital transformation. It critically surveys the theoretical foundations and principal resource modalities (text, video, visualization) and proposes a structured method for designing integrated lessons. Empirical and theoretical evidence indicates that a multimodal approach enhances learner motivation, mitigates cognitive load, and positively impacts learning outcomes.

Keywords: multimodal learning; digital pedagogy; visualization; video-based education; cognitive load; Generation Z (Zoomers); Generation Alpha (Alpha)

Введение

В последние десятилетия образовательная практика всё чаще обращается к мультимодальным подходам, объединяющая визуальные, аудиальные и интерактивные ресурсы. Рост влияния цифровых технологий на образовательную среду обуславливает необходимость переосмысления традиционных моделей обучения, основанных преимущественно на

линейном текстовом представлении информации. Современная молодёжь, относящаяся к поколению Alpha и Z, демонстрирует высокую восприимчивость к мультимодальным форматам обучения. Для поколения зумеров и поколения альфа, чья социализация с ранних лет связана с экранными устройствами, социальными сетями и короткими видеоформатами, характерны иные стратегии восприятия и переработки учебного материала по сравнению с предшествующими когортами. Это усиливает запрос на такие дидактические решения, которые сохраняют академическую глубину содержания, но при этом опираются на привычные для учащихся средства коммуникации.

Цель данной статьи — обосновать целесообразность теоретических основ мультимодального подхода в обучении и предложить практическую методику построения урока.

В современной педагогике мультимодальность трактуется как использование в учебном процессе совокупности вербальных, визуальных, аудиальных и интерактивных ресурсов, обеспечивающих многоканальную передачу смысла для усиления образовательного эффекта [1]. Согласно исследованиям Gunther Kress и Theo van Leeuwen, мультимодальность формирует новые формы грамотности, выходящие за рамки текста [2]. В педагогической литературе отмечается, что мультимодальные подходы способствуют развитию критического мышления и межкультурной компетенции [3]. Современные студенты характеризуются клиповым мышлением, высокой скоростью переключения внимания и потребностью в визуальной информации.

Исследования показывают, что поколение Alpha лучше усваивает материал через комбинацию текста, видео и интерактивных заданий [4]. Таким образом, мультимодальные уроки становятся не только актуальными, но и необходимыми для повышения мотивации вовлечённости.

Работы в области когнитивной психологии и мультимедийного обучения демонстрируют, что перераспределение информации между визуальным и вербальным каналами при соблюдении принципов структурирования и дозирования снижает риск перегрузки рабочей памяти. Сочетание текста, изображений и звука способствует формированию устойчивых ассоциативных связей и осмысленному запоминанию, особенно при работе со сложными теоретическими категориями. Для представителей поколений Alpha и Z, привыкших к параллельной обработке разнообразных стимулов, мультимодальные учебные материалы создают условия для более гибкого выбора стратегий понимания и позволяют направлять внимание в соответствии с дидактическими целями [5].

Анализ научных публикаций позволяет выделить ряд принципов, определяющих эффективность мультимодального обучения: активное участие учащихся, рефлексия, своевременная обратная связь и систематический контроль усвоения. Отмечается, что цифровые ресурсы оказываются результативными лишь при их включении в продуманный

сценарий учебной деятельности, предполагающий постепенный переход от мотивационного этапа к аналитической работе и осмыслению собственного опыта. Важно также учитывать ограничения мультимодальности: чрезмерное насыщение урока медиа-элементами может приводить к сенсорной перегрузке и снижению концентрации, что требует аккуратного проектирования объёма и интенсивности зрительных и слуховых стимулов [6].

Предложенная методика может быть адаптирована для разных возрастных групп и дисциплин. Особое значение она имеет для билингвального обучения, где мультимодальные ресурсы помогают преодолеть языковые барьеры и способствуют формированию межкультурной компетенции.

Предлагаемая модель мультимодального урока строится на последовательном задействовании различных модальностей: от первичного погружения к аналитической проработке и рефлексии. На первом этапе используется краткий видеоматериал, задающий тематический и эмоциональный контекст занятия. На втором этапе организуется работа с текстом, направленная на выделение ключевых понятий, интерпретацию аргументации и формулирование вопросов. Третий этап предполагает создание визуального продукта (схемы, инфографики, карты понятий), фиксирующего результаты переработки информации. Завершающий этап посвящён обсуждению эффективности использованных форматов и осмыслению собственного учебного опыта учащихся.

Такое сочетание форматов соотносится с рекомендациями исследователей, подчёркивающих значимость постепенного усложнения учебной деятельности и перехода от восприятия к продуктивным видам активности. При этом важным условием является согласованность всех компонентов урока с целями и задачами конкретной темы, а также учёт возрастных и когнитивных особенностей обучающихся [7].

В качестве иллюстрации можно рассмотреть занятие по теме «Язык и культура», ориентированное на старшеклассников или студентов. На вводном этапе демонстрируется короткий видеосюжет, отражающий связь языковых изменений с культурными процессами, что позволяет актуализировать личный опыт учащихся и задать проблемное поле обсуждения. Далее обучающимся предлагается текстовый фрагмент (научно-популярный или учебный), в ходе анализа которого они выделяют ключевые идеи, примеры и формулируют вопросы к содержанию. На этапе визуализации учащиеся в малых группах создают цифровой постер или карту понятий, отражающую взаимосвязь языковых и культурных явлений, используя онлайн-сервисы для совместной работы. Итогом занятия становится рефлексивное обсуждение того, как каждый из использованных форматов повлиял на понимание темы и какие трудности возникли при работе с материалом. Подобные сценарии рассматриваются в литературе как один из перспективных способов развития как предметных, так и мета когнитивных навыков обучающихся.

Таким образом, мультимодальное обучение отвечает потребностям современной молодёжи и способствует формированию новых образовательных практик. Теоретическая основа статьи опирается на исследования в области мультимодальной грамотности, а методика построения урока демонстрирует практическую применимость в условиях цифровой эпохи. В дальнейшем целесообразно расширить эмпирическую базу и провести сравнительные исследования эффективности мультимодальных уроков в разных образовательных контекстах.

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ТЕРРИТОРИАЛЬНОЕ РАСПРОСТРАНЕНИЕ МОЧЕКАМЕННОЙ БОЛЕЗНИ И ЗАБОЛЕВАНИЙ МОЧЕВЫВОДЯЩИХ ПУТЕЙ В РЕСПУБЛИКЕ КАРАКАЛПАКСТАН И ИХ СВЯЗЬ С ЭКОЛОГИЧЕСКИМИ ФАКТОРАМИ

Аннотация: Данная статья посвящена актуальным проблемам охраны здоровья населения в условиях сложной экологической обстановки в Приаральском регионе. В статье с медико-географической точки зрения проанализирована динамика заболеваемости мочекаменной болезнью и заболеваниями мочевыводящих путей (уровень инцидентности) в различных медико-географических зонах Республики Каракалпакстан за период 2009-2021 гг. В исследовании связь между загрязнением питьевой воды (из открытых водоемов, водопровода и колодцев) и атмосферного воздуха с показателями заболеваемости была доказана с помощью корреляции Пирсона и t-теста Стьюдента. Результаты показывают, что химическое загрязнение водоемов и колодезных вод оказывает прямое сильное влияние на уровень заболеваемости.

Ключевые слова: Медицинская география, Приаралье, мочекаменная болезнь (уролитиаз), нозоэкология, уровень заболеваемости (инцидентность), корреляционный анализ, минерализация воды.

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TERRITORIAL DISTRIBUTION OF UROLITHIASIS AND URINARY TRACT DISEASES IN THE REPUBLIC OF KARAKALPAKSTAN AND THEIR CORRELATION WITH ENVIRONMENTAL FACTORS

Abstract: This article is devoted to topical issues of public health protection in the context of the complex environmental situation in the Aral Sea region. The article analyzes the dynamics of urolithiasis and urinary tract diseases (incidence rate) in various medical-geographical zones of the Republic of Karakalpakstan for the period 2009-2021 from a medical-geographical perspective. In the study, the relationship between drinking water pollution (from open reservoirs, water

pipelines, and wells) and atmospheric air pollution with morbidity rates was demonstrated using Pearson's correlation and Student's t-test. The results show that the chemical contamination of water bodies and well water has a direct and significant impact on the incidence rate.

Keywords: *Medical geography, Aral Sea region, urolithiasis, nosoecology, morbidity rate, correlation analysis, water mineralization*

Введение. Вопросы снижения и профилактики заболеваемости населения различными болезнями, укрепления общественного здоровья в мире в настоящее время считаются одними из самых актуальных проблем. Неслучайно третья цель программы устойчивого развития оон до 2030 года направлена на решение задач "обеспечение здорового образа жизни и содействие благополучию людей всех возрастов"¹. Достижение этой цели требует анализа региональных особенностей и различий в состоянии здоровья и заболеваемости населения, регулярного изучения их связи с природными и социально-экономическими условиями, а также загрязнением окружающей среды.

Особое внимание уделяется социально-географическим исследованиям, направленным на комплексное изучение территориальных аспектов здоровья и заболеваемости населения мира, его регионов и стран, оценку влияния на них различных категорий нозогеографических и нозоэкологических факторов, разработку путей оптимизации нозоэкологических условий. В исследованиях в этой области приоритетное значение придается медико-географическому районированию и зонированию, распространению заболеваний природно-очагового характера, оценке влияния показателей загрязнения окружающей среды на здоровье и заболеваемость населения.

Основная часть. Методология и источник данных. При изучении медико-географической ситуации и оценке влияния различных факторов на здоровье населения используются различные виды материалов. При изучении медико-географической ситуации использовался комплексный подход. Объектом исследования были выбраны четыре медико-географические зоны (западная, северная, центральная и южная) республики каракалпакстан. Важнейшими источниками информации для проведения медико-географических исследований в республике каракалпакстан стали статистические сборники министерства здравоохранения республики каракалпакстан за 2009-2021 годы. Статистические методы: интенсивные показатели заболеваемости рассчитывались, то есть их современное название - "инцидентность," как правило, рассчитывались на 100 тысяч населения. Для определения взаимосвязи между факторами использовался коэффициент линейной корреляции пирсона. Достоверность полученных результатов проверялась t-критерием стьюдента.

Особенность гидрологических условий республики каракалпакстан заключается в том, что источники питьевой воды (речные и подземные воды) имеют высокую степень минерализации. Минеральные соли в составе воды -

концентрация кальция, магния, сульфатов и хлоридов в несколько раз превышает предельно допустимые нормы (пдк), что непосредственно способствует развитию уролитиаза (мочекаменной болезни) среди населения. Ситуацию в каракалпакстане следует объяснять не только статистическими данными, но и гидрохимическими особенностями региона. Важнейшей частью исследования является математическая связь между загрязнением окружающей среды и заболеванием. Высокое содержание солей кальция, магния и повышенная жесткость воды нарушают обмен веществ в организме человека и ускоряют процесс уролитиаза (камнеобразования). Также научно доказано, что солевая пыль, поднимающаяся в воздух в результате высыхания аральского моря, негативно влияет не только на дыхательные пути, но и на систему фильтрации почек через общий метаболизм. Мы исследовали территориальное распространение и динамику отдельных нозологических единиц заболеваний. Например, заболевания почек, относящиеся к классу заболеваний пищеварительной системы, а именно мочекаменная болезнь и заболевания мочевыводящих путей. При изучении влияния экологически вредных факторов, особенно потребления загрязненной воды, на показатели здоровья населения в каракалпакстане, одним из наиболее чувствительных показателей были выбраны мочекаменная болезнь и заболевания мочевыводящих путей. В каракалпакстане, в разрезе его медико-географических зон и районов, изучена динамика показателей мочекаменной болезни и заболеваний мочевыводящих путей на 100 тыс. Населения в 2009-2021 гг. И разработана итоговая картографическая схема (рис. -1 и табл. -1). Согласно статистическим данным министерства здравоохранения республики каракалпакстан, в 2009 году уровень заболеваемости мочекаменной болезнью и заболеваниями мочевыводящих путей на 100 тыс. Населения составил 0,51 человека, в 2021 году - 0,37 человека.

Самые высокие показатели заболеваемости мочекаменной болезнью и заболеваниями мочевыводящих путей зарегистрированы в западной зоне в муйнакском районе (2016 г. - 1,72 человека; 2017 г. - 1,17 чел.), канлыкульском районе (2015 г. - 1,36 чел.; 2016 г. - 1,68 чел.; 2017 г. - 1,6 чел.; 2018 г. - 1,42 чел.; 2019 г. - 1,36 чел.; 2020 г. - 1,25 чел. И 2021 г. - 1,1 чел.), в северной зоне в чимбайском районе (2020 г. - 1,12 чел.), в центральной зоне в тахиаташском районе (2017 г. - 1,17 чел.) И в южной зоне в амударьинском районе (2009 г. - 3,97 чел.; 2012 г. - 1,14 чел.; 2015 г. - 1,31 чел.; 2018 г. - 2,0 чел.; 2019 г. - 1,79 чел.; 2020 г. - 1,78 чел. И 2021 г. - 1,48 чел.).

Таблица №1

Динамика заболеваемости мочекаменной болезнью и заболеваниями мочевыводящих путей по зонам (на 100 тыс. Населения)

Медико-географическая Зоны	2011-2015	2016-2020	Рост/снижение
Западная зона	0,35	0,73	+2 раза
Северная зона	0,13	0,19	+46%
Центральная зона	0,13	0,26	+2 раза
Южная зона	0,52	0,59	+13%
Каракалпакстан	0,32	0,41	+28%

Таблица составлена авторами на основе данных Министерства здравоохранения Республики Каракалпакстан.

С целью достижения наглядности в освещении динамики мочекаменной болезни и заболеваний мочевыводящих путей были изучены и сопоставлены средние пятилетние показатели, выделенные из периода 2009-2021 гг., состоящие из двух пятилетних периодов: 2011-2015 и 2016-2020 гг. (Таблица №1)

Согласно анализу, в 2016-2020 годах по сравнению с 2011-2015 годами в Каракалпакстане заболеваемость мочекаменной болезнью увеличилась в среднем на 28%. Наиболее тревожная ситуация наблюдается в Западной и Центральной зонах, где заболеваемость увеличилась в 2 раза. При анализе в разрезе отдельных районов показатели в Амударьинском, Канлыкульском и Муйнакском районах остаются выше среднереспубликанского уровня. Например, если в 2016 году в Канлыкульском районе этот показатель составил 1,68, то в 2018 году в Амударьинском районе он достиг 2,0 на тысячу человек.

Корреляция с экологическими факторами. Состав воды играет ключевую роль в развитии мочекаменной болезни. Результаты исследования показали следующие важные взаимосвязи: средние показатели заболеваемости мочекаменной болезнью и заболеваниями мочевыводящих путей в Каракалпакстане и во всех зонах показали тенденцию к росту в последующие пять лет по сравнению с предыдущим пятилетним периодом.

Для определения корреляционных связей показателей мочекаменной болезни и заболеваний мочевыводящих путей с качеством питьевой воды (вода из открытых водоемов, водопроводная вода, колодезная вода) и химическим загрязнением атмосферного воздуха в Каракалпакстане в 2009-2021 гг. были проведены расчеты по методу Пирсона. Достоверность полученных результатов оценивалась по критерию Стьюдента. Прямая средняя достоверная корреляционная связь между показателями заболеваний почечнокаменной болезни и мочевыводящих путей с уровнем химического

загрязнения воды открытых водоемов в 2009-2018 гг. в Шуманайском районе Западной зоны $r_{xy}=0,445$ (при критерии Стьюдента $t=8,67$ и $p=0,95$), в Северной зоне $r_{xy}=0,33$

(при критерии Стьюдента $t=8,197$ и $p=0,95$), а в 2009-2021 годах такая зависимость не была выявлена.

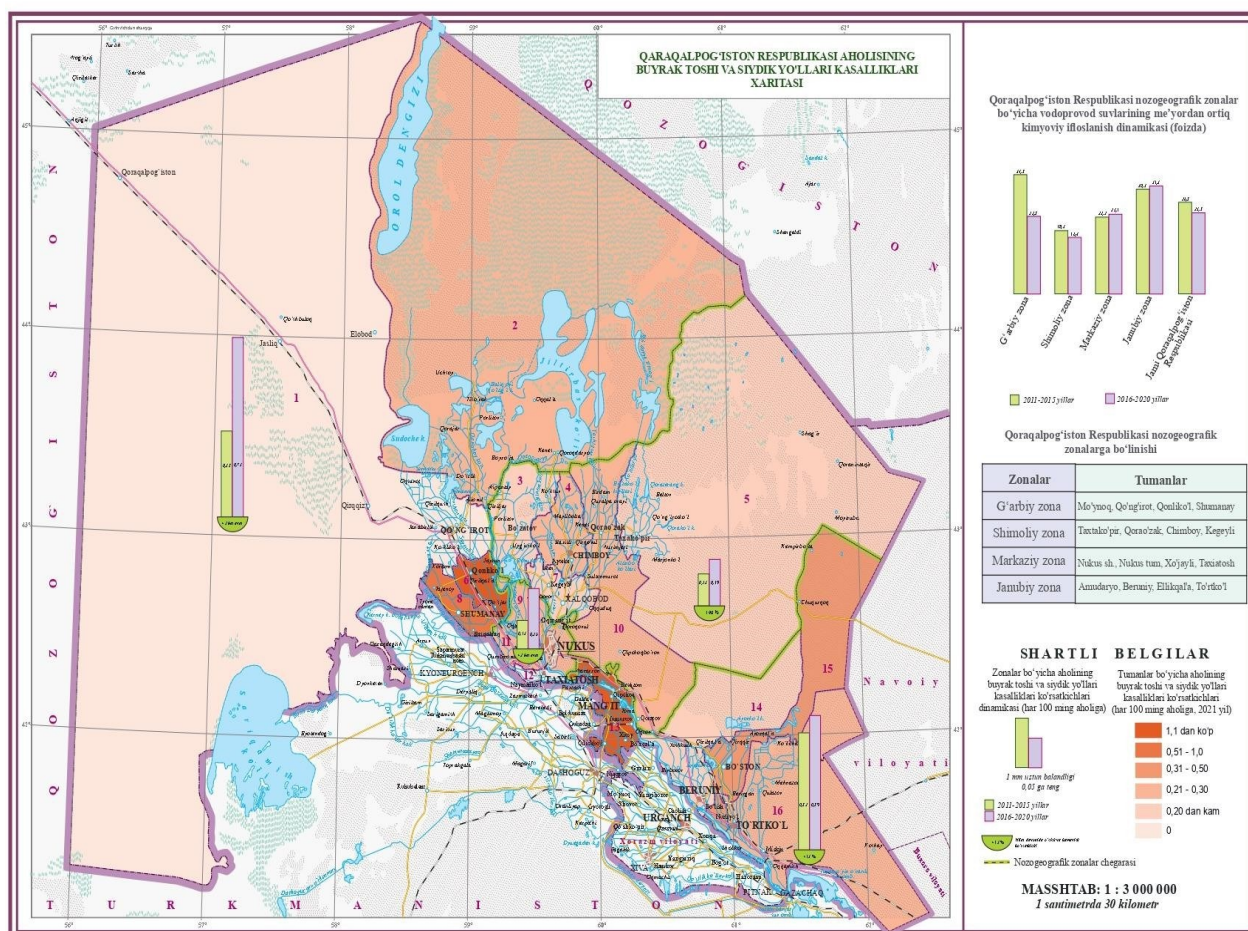


Рис.1. Карта заболеваемости мочекаменной болезнью и заболеваниями мочевыводящих путей населения Республики Каракалпакстан

Карта составлена авторами на основе данных Министерства здравоохранения Республики Каракалпакстан

Показатели заболеваний почечнокаменной болезни и мочевыводящих путей в 2009-2018 гг. прямая средняя корреляционная связь с уровнем химического загрязнения воды открытых водоемов выявлена в Нукусском районе Центральной зоны $r_{xy}=0,42$ (критерий Стьюдента $t=1,48$ и $p=0,8$), в 2009-2021 годах также

прямая средняя достоверная корреляционная связь была определена при $r_{xy}=0,375$ (критерий Стьюдента $t=5,94$ и $p=0,95$).

В 2009-2021 гг. показатели заболеваний почечнокаменной болезни и мочевыводящих путей имели прямую сильную достоверную корреляционную связь с уровнем химического загрязнения воды открытых водоемов в Ходжейлийском районе этой зоны $r_{xy}=0,88$ (критерий Стьюдента $t=3,81$ и $p=0,95$) и среднюю связь в Центральной зоне $r_{xy}=0,63$ (критерий Стьюдента $t=5,43$ и $p=0,95$). Выявлена прямая сильная достоверная корреляционная связь между показателями мочекаменной болезни и заболеваниями мочевыводящих путей с уровнем химического загрязнения воды открытых водоемов в 2009-2021 гг. по Каракалпакстану $r_{xy}=0,33$ (при критерии Стьюдента $t=9,21$ и $p=0,95$). Прямая средняя достоверная корреляционная связь между показателями мочекаменной болезни и заболеваниями мочевыводящих путей с уровнем химического загрязнения водопроводной воды в 2009-2018 гг. В Северной зоне была выявлена связь $r_{xy}=0,347$ (при критерии Стьюдента $t=6,078$ и $p=0,95$), однако в 2009-2021 гг. такая связь не обнаружена. Показатели мочекаменной болезни и заболеваний мочевыводящих путей в 2009-2021 гг. Прямая средняя достоверная корреляционная связь с уровнем химического загрязнения водопроводной воды в Турткульском районе Южной зоны $r_{xy}=0,46$ (при критерии Стьюдента $t=6,24$ и $p=0,95$) и в самой Южной зоне $r_{xy}=0,38$ (при критерии Стьюдента $t=8,59$ и $p=0,95$) была обнаружена. Прямая средняя достоверная корреляционная связь между показателями мочекаменной болезни и заболеваний мочевыводящих путей с уровнем химического загрязнения водопроводной воды в Каракалпакстане $r_{xy}=0,347$ (критерий Стьюдента $t=6,078$ и $p=0,95$ при) выявлено в 2009-2018 гг.

Установлено, что чем выше химическое загрязнение водопроводной воды в Северной зоне, Южной зоне и Турткульском районе этой зоны, а также в Республике Каракалпакстан, тем выше заболеваемость мочекаменной болезнью и заболеваниями мочевыводящих путей. Прямая средняя корреляционная связь между показателями мочекаменной болезни и заболеваний мочевыводящих путей с уровнем химического загрязнения колодезной воды в 2009-2021 гг. в Западной зоне в Канлыкульском районе $r_{xy}=0,64$ (критерий Стьюдента $t=1,52$ при $p=0,8$ при) и средняя достоверная связь выявлена в Шуманайском районе $r_{xy}=0,64$ (критерий Стьюдента $t=3,20$ и $p=0,95$). Прямая средняя корреляционная связь между показателями мочекаменной болезни и заболеваний мочевыводящих путей с уровнем химического загрязнения колодезной воды в 2009-2021 гг. в Северной зоне в Тахтакупырском районе $r_{xy}=0,41$ (критерий Стьюдента $t=2,68$ при $p=0,95$), Караузьякском районе $r_{xy}=0,52$ (критерий Стьюдента $t=2,66$ при $p=0,95$), Чимбайском районе $r_{xy}=0,49$ (критерий Стьюдента $t=6,22$ при $p=0,95$) и

Кегейлийском районе $r_{xy}=0,33$ (критерий Стьюдента $t=3,65$ при $p=0,95$). Такая же связь в Северной зоне в 2011-2021 годах $r_{xy}=0,41$ (критерий Стьюдента $t=3,97$ и $p=0,95$).

Прямая средняя достоверная корреляционная связь между показателями мочекаменной болезни и заболеваний мочевыводящих путей с уровнем химического загрязнения колодезной воды в Нукусском районе Центральной зоны $r_{xy}=0,47$ (критерий Стьюдента $t=3,36$ при $p=0,95$) выявлена в 2011-2020 годах. Выявлена прямая средняя достоверная корреляционная связь между показателями почечнокаменной болезни и заболеваниями мочевыводящих путей с уровнем химического загрязнения колодезной воды в 2009-2018 гг. в Амударьинском районе Южной зоны при $r_{xy}=0,44$ (критерий Стьюдента при $t=1,97$ и $p=0,8$). Выявлена прямая средняя достоверная корреляционная связь между показателями почечнокаменной болезни и заболеваниями мочевыводящих путей с уровнем химического загрязнения колодезной воды в 2009-2021 гг. в Южной зоне $r_{xy}=0,62$ (критерий Стьюдента $t=4,29$ и $p=0,95$) и по Каракалпакстану $r_{xy}=0,47$ (критерий Стьюдента $t=7,32$ и $p=0,95$).

Чем выше химическое загрязнение колодезной воды в Канлыккульском и Шуманайском районах Западной зоны, в самой Северной зоне и в Тахтакупырском, Караузьякском, Чимбайском и Кегейлийском районах этой зоны, в Нукусском районе Центральной зоны, в Амударьинском районе Южной зоны и в Каракалпакстане, тем выше может быть заболеваемость почечнокаменной болезнью. Выявлена прямая средняя достоверная корреляционная связь между показателями почечнокаменной болезни и заболеваниями мочевыводящих путей с уровнем химического загрязнения атмосферного воздуха в 2009-2021 гг. Чем выше химическое загрязнение атмосферного воздуха в Тахтакупырском районе Северной зоны и по Республике Каракалпакстан, тем выше заболеваемость мочекаменной болезнью и заболеваниями мочевыводящих путей. В Каракалпакстане, в основном в районах его Западной и Северной зон, обеспечение населения качественной питьевой водой и предотвращение загрязнения атмосферного воздуха может снизить заболеваемость мочекаменной болезнью и заболеваниями мочевыводящих путей.

Выводы и рекомендации. Полученные данные свидетельствуют о том, что распространенность мочекаменной болезни на территории Каракалпакстана является результатом не только генетической предрасположенности, но и экологических факторов. Избыток солей в воде нарушает минеральный обмен в организме. Проведенные исследования показывают, что снижение заболеваемости мочекаменной болезнью в Каракалпакстане напрямую связано с мерами по экологическому оздоровлению. Основной причиной роста заболеваемости является высокий

уровень химического загрязнения питьевой воды. По результатам исследования были сделаны следующие выводы:

- Довести уровень обеспечения населения централизованной и фильтрованной питьевой водой в Западной и Северной зонах до 100%.

- Ограничить использование колодезной воды или наладить ее очистку с помощью современных мембранных фильтров.

- Внедрить систему регулярного скрининга населения в районах высокого риска (Канлыкуль, Амударья, Ходжейли) на основе медико-географических прогнозов.

- Западную и Центральную зоны Каракалпакстана следует обозначить как "зоны повышенного риска" по развитию мочекаменной болезни.

- Ускорить обеспечение населения централизованной чистой питьевой водой, очищенной с помощью мембранных фильтров.

Практические рекомендации: Провести простую, но важную профилактическую работу среди населения. А именно, проведение разъяснительной работы по "культуре потребления воды" и бессолевой диете среди населения. Контролировать суточное количество потребляемой жидкости. В жарком климате Каракалпакстана организм человека теряет много жидкости. Необходимо пить не менее 2,5-3 литров чистой воды в день. Это снижает концентрацию мочи и обеспечивает вымывание мелких кристаллов (песка) до их превращения в камни. Резко сократите потребление соли. Солёная пища и избыток соли ускоряют выведение кальция почками. Это приводит к накоплению кальция в моче и образованию камней. Не превышать суточную норму соли более 5 граммов (одна чайная ложка). Пить воду с лимоном. Цитраты, содержащиеся в лимонах, являются естественным ингибитором образования камней. Добавление сока половины лимона в стакан теплой воды ежедневно предотвращает образование кальциевых камней. Употреблять животные белки в умеренных количествах. Кроме того, необходимо быть физически активным. Малоактивный образ жизни (гиподинамия) приводит к выходу кальция из костей в кровь и его отложению в почках. Поддерживать вес в пределах нормы. Рекомендуем проходить профилактический осмотр один раз в год.

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МЕТОДОЛОГИЧЕСКИЙ ПЛЮРАЛИЗМ (АНАРХИЗМ) ПОЛА ФЕЙЕРАБЕНДА

Аннотация: Статья посвящена систематизации методологического плюрализма Пола Фейерабенда как радикальной альтернативы универсальным стандартам в философии науки. Авторы анализируют принцип «все дозволено», пролиферацию теорий и несоизмеримость концепций, опираясь на исторический пример из работы философа. Фейерабенд отвергает догматический эмпиризм, сциентизм и фальсификационизм Поппера, предлагая внутринаучный и мировоззренческий плюрализм для стимулирования инноваций и преодоления методологического догматизма. Критика Поппера и Куна подчёркивает конфронтацию теорий как двигатель прогресса.

Ключевые слова: пролиферация, контриндукция, анархистский принцип в науке, несоизмеримость.

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PAUL FEYERABEND'S METHODOLOGICAL PLURALISM (ANARCHISM)

Annotation This article is devoted to systematizing Paul Feyerabend's methodological pluralism as a radical alternative to universal standards in the philosophy of science. The authors analyze the "anything goes" principle, the

proliferation of theories, and the incommensurability of concepts, drawing on historical examples from the philosopher's work. Feyerabend rejects dogmatic empiricism, scientism, and Popper's falsificationism, proposing intrascientific and worldview pluralism to stimulate innovation and overcome methodological dogmatism. The critique of Popper and Kuhn emphasizes the confrontation of theories as the engine of progress.

Keywords: *proliferation, counterinduction, anarchist principle in science, incommensurability.*

Современная философия охватывает разнообразные направления, включая постмодернизм, аналитическую философию и критику науки, где методологический плюрализм (анархизм) Пола Фейерабенда занимает заметное место как радикальная критика строгих научных методологий

Цель статьи — систематизировать ключевые аспекты методологического плюрализма Фейерабенда, подчеркнув его роль в преодолении догматизма в философии науки.

Методологический плюрализм Пола Фейерабенда (1924-1994) представляет собой радикальную концепцию в философии науки, которая отвергает универсальные методологические стандарты в пользу разнообразия теорий и подходов для продвижения научного прогресса. Фейерабенд утверждает, что для прогресса науки необходимо признать равноправие различных методологий и теорий. Он выступает против жестких, универсальных правил научного метода, доказывая, что их соблюдение может ограничивать творческий поиск и инновации. Он отстаивает принцип «все дозволено» (anything goes), подчеркивая, что успешные научные открытия часто происходят в результате нарушения общепринятых норм.

С точки зрения методологии, анархизм является следствием двух принципов: принципа пролиферации и принципа несоизмеримости. Согласно принципу пролиферации, нужно «размножать» и разрабатывать теории и концепции, несовместимые с существующими и признанными теориями. Это означает, что каждый ученый - вообще говоря, каждый человек - может изобретать свою собственную концепцию и разрабатывать ее, какой бы абсурдной и дикой она ни казалась окружающим. Принцип несоизмеримости, гласящий, что теории невозможно сравнивать, защищает любую концепцию от внешней критики со стороны других концепций. Если кто-то изобрел совершенно фантастическую концепцию и не желает с ней расставаться, то с этим ничего нельзя сделать. Нет фактов, которые можно было бы противопоставить этой концепции, так как она формирует свои собственные факты. Нельзя указывать на несовместимость этой фантазии с фундаментальными законами естествознания или с современными научными теориями. Объединение принципа множества вариантов с принципом невозможности их объективного сопоставления создает методологический фундамент анархизма — каждый вправе создавать свою уникальную концепцию.

Методологический анархизм Фейерабенда сохраняет свою значимость в современной философии науки, поскольку предлагает альтернативу универсальным стандартам. В эпоху междисциплинарных исследований и быстрого развития технологий данный подход актуален, так как способствует преодолению догматизма и развитию познания.

Плюрализм в концепции Фейерабенда усиливает творческий потенциал ученых, признавая несоизмеримость теорий и относительность критериев рациональности, что отражает открытость научного поиска, и что наука получила бы наибольшую пользу от введения «дозы» анархизма в методологию. Фейерабэнд также подчёркивал, что такой анархизм предпочтителен, так как представляет собой более гуманистическую альтернативу строгим научным системам, не диктующим жёсткие рамки поведения учёным.

Философская позиция П. Фейерабенда воспринимается научным сообществом как крайне радикальная, поскольку она отрицает возможность философии описывать науку в целом или разрабатывать критерии для отграничения научных теорий от ненаучных, таких как мифы. Кроме того, она отвергает «универсальный план» развития науки, предложенный философами, если тот препятствует ученым в достижении прогресса. Для обоснования тезиса о том, что методологические правила не гарантируют научный успех, Фейерабэнд в своей работе «Против метода» (Against Method) анализирует исторические примеры, включая коперниканскую революцию XVI века, где были нарушены все установленные нормы науки. Он подчеркивает, что строгое следование этим нормам в подобных ситуациях просто заблокировало бы революционные изменения.

Методологический плюрализм построений Пола Фейерабенда имеет бинарное значение:

Первое его значение как «внутринаучное» — проявляется в интерпретации истории науки как "увеличивающийся океан". Научное знание — это не линейный прогресс или смена парадигм, а аккумулятивный процесс. Новые открытия интегрируются в сеть знаний, обогащая общий резервуар без вытеснения старых.;

Второе значение — условно обозначаемое «мировоззренческим» — утверждает равнозначность всех форм познания и критикует сциентизм. Наука, мифология, искусство — это равноправные модули, которые дополняют знание без жесткой приоритетности одной формы над другими, то есть без иерархии или замещения.

Такое понимание плюрализма напрямую вытекает из неприятия Фейерабэндом догматического эмпиризма, что сближает его позицию с постпозитивистами. Однако если для Куна некумулятивное развитие знания характерно для «экстраординарной» науки (период научной революции) и несоизмеримы именно «парадигмы», а не научные теории как таковые, то Фейерабэнд исходит из того, что ситуация методологического хаоса нормальна на всех этапах формирования науки. Анархизм «не только

возможен, но и необходим» для прогресса научного знания, так как попытки жесткого методологического нормирования науки, по мысли философа, превращают ее в догму и фактически уничтожают. Релятивизм в глазах Фейерабенда не досадное упущение, но подлинный залог научного прогресса. На базе обширного исторического материала философ стремится продемонстрировать, что своим успехам наука зачастую обязана не следованию методу, но, напротив, систематическому его нарушению.

Фейерабенд радикализирует идеи, сформулированные Т. Куном и К. Поппером. Научное развитие не представляет собой линейное и последовательное движение к истине. Новая теория не просто дополняет предшествующую путем обобщения эмпирических данных, как утверждали логические позитивисты. В неприятии эмпиризма Фейерабенд солидарен с постпозитивистами. Согласно убеждению большинства постпозитивистов, в науке гораздо меньше порядка, чем принято считать. Фейерабенд трактует это как преимущество. Идея отсутствия абсолютных истин, ценностей и критериев оценки теорий он рассматривает не как досадное упущение, а как подлинный залог научного прогресса. На основе обширного исторического материала философ демонстрирует, что успехи науки зачастую обусловлены не следованием методу, а его систематическому нарушению.

Идеи Фейерабенда неоднократно подвергались критике со стороны других ученых. Карл Поппер критиковал Пола Фейерабенда за радикальный методологический анархизм, который подрывает рациональные стандарты науки, сводя её к равноправному идеологическому продукту наряду с мифами и религией. Поппер настаивал, что науку от ненауки отличает возможность её опровергнуть (принцип фальсифицируемости). Поппер видел в концепции Фейерабенда отказ от критического рационализма и обучения на ошибках, что приводит к иррационализму и угрозе научному прогрессу. Фейерабенд также в свою очередь подверг критике фальсификационизм Поппера, утверждая, что он неосуществим и препятствует научному прогрессу. Фейерабенд доказывал, что ученые часто игнорируют методологические правила, в том числе принцип фальсификации и используют «ad hoc» гипотезы для защиты теорий от опровержения[10].

Фейерабенд также критиковал идею Поппера о «рациональной дискуссии» между конкурирующими теориями, утверждая, что научные дебаты часто являются иррациональными и зависят от риторики и пропаганды. В отличие от Поппера, который стремился к демаркации науки от псевдонауки, Фейерабенд отвергал эту идею, утверждая, что различие между ними искусственно и меняется со временем. В этом контексте может быть понят предлагаемый Фейерабендом принцип контриндукции, подразумевающий выдвижение противоречащих устоявшимся теориям и имеющимся наблюдениям гипотез. Таким образом, наука, по мысли исследователя, нуждается не столько в консенсусе, сколько в конфронтации и взаимной критике противоборствующих теорий.

При этом Фейерабенд не разделяет основных положений критического рационализма К. Поппера, в частности его убежденности в том, что теорию нельзя доказать, но можно убедительно опровергнуть. Фальсификационизм не подтверждается реальной практикой исследовательской деятельности. Обилие критики не делает теорию несостоятельной. Даже самые безумные идеи могут приносить плоды.

Таким образом, по мысли Фейерабенда, появление новой теории не есть следствие кризиса прежней модели описания. Плюрализм Пола Фейерабенда в современном контексте представляет методологическую свободу в науке, отвергающую монополию одной теории или метода и продвигает подход с размножением идей. Эта концепция подчеркивает толерантность к альтернативным взглядам, включая мифы и традиции, как основу для прогресса познания. Несмотря на критику подход усиливает толерантность к альтернативам и открытость познания. Таким образом, идеи Фейерабенда продолжают провоцировать дискуссии о границах науки, подчеркивая ее потенциал для инноваций.

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БИОМЕДИЦИНСКИЕ ФАКТОРЫ, АССОЦИИРОВАННЫЕ С ГИПОКСИЧЕСКИМ ПОРАЖЕНИЕМ ЦНС У НОВОРОЖДЁННЫХ

Аннотация: С позиций сегодняшнего дня можно смело констатировать, что перинатальное поражение центральной нервной системы новорожденных занимают важное место в структуре патологии детей раннего возраста. **Цель:** определить медико-биологические факторы риска гипоксических поражений центральной нервной системы у новорожденных в современных условиях. Мы обследовали 120 новорождёнными с перинатальным поражением ЦНС средней и тяжёлой степени нарушений: I группу составили 40 новорождённых с перинатальным поражением ЦНС гипоксического генеза средней степени тяжести, во II группу вошли 40 новорождённых с перинатальным поражением ЦНС гипоксического генеза тяжёлой степени тяжести, контрольную группу составили 30 здоровых новорождённых. Проведенный нами анализ показателей относительного риска (RR) у новорожденных основной и контрольной групп, позволяет сделать заключение, что модифицирующими факторами риска развития перинатальной энцефалопатии средней степени тяжести являются хламидийная инфекция и токсоплазмоз, прием противогрибковых препаратов, стремительные и затяжные роды, слабая родовая деятельность. Нами также установлено, что модифицирующими факторами риска развития перинатальной энцефалопатии тяжелой степени являются урогенитальная инфекция, прием НПВС, стремительные и затяжные роды, хроническая гипоксия плода.

Ключевые слова: новорожденные, факторы риска, перинатальная энцефалопатия, относительный риск, достоверность

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BIOMEDICAL FACTORS ASSOCIATED WITH HYPOXIC INJURY OF THE CENTRAL NERVOUS SYSTEM IN NEWBORNS

Abstract: *From the standpoint of today, we can safely state that perinatal damage to the central nervous system of newborns occupy an important place in the structure of the pathology of young children. Purpose: to determine medical and biological risk factors for hypoxic lesions of the central nervous system in newborns in modern conditions. We examined 120 newborns with perinatal lesions of the central nervous system of moderate and severe severity: group I consisted of 40 newborns with perinatal lesions of the central nervous system of hypoxic origin of moderate severity, group II included 40 newborns with perinatal lesions of the central nervous system of hypoxic origin of severe severity, the control group consisted of 30 healthy newborns. Our analysis of relative risk (RR) indicators in newborns of the main and control groups allows us to conclude that the modifying risk factors for the development of perinatal encephalopathy of moderate severity are chlamydial infection and toxoplasmosis, taking antifungal drugs, rapid and protracted labor, and weak labor. We also found that modifying risk factors for the development of severe perinatal encephalopathy are urogenital infection, use of NSAIDs, rapid and protracted labor, and chronic fetal hypoxia.*

Key words: *newborns, risk factors, perinatal encephalopathy, relative risk, reliability*

Актуальность. В настоящее время перинатальное поражение центральной нервной системы новорожденных занимают важное место в структуре патологии детей раннего возраста, что связано с высокой распространенностью, тяжестью клинических проявлений и риском формирования инвалидности.

Цель: определить медико-биологические факторы риска гипоксических поражений центральной нервной системы у новорожденных в современных условиях.

Материалы и методы. Мы изучили анамнестические, клинические, инструментальные, общепринятых лабораторные, параклинические данные наблюдения за 120 новорождёнными с перинатальным поражением ЦНС средней и тяжёлой степени нарушений. Больные были разделены на III группы: I группу составили 40 новорождённых с перинатальным поражением ЦНС гипоксического генеза средней степени тяжести. Во II группу вошли 40 новорождённых с перинатальным поражением ЦНС гипоксического генеза тяжёлой степени тяжести. При постановке диагноза перинатальных поражений ЦНС гипоксического генеза и определении тяжести заболевания руководствовались МКБ-10. Проводился анализ с помощью пакета статистической программы «Statistica6.0» с использованием библиотеки статистических функций с вычислением среднего арифметического значения (M), ошибки среднего арифметического значения (m), критерия Стьюдента (t). Значение $p < 0,05$ было принято в качестве порогового уровня статистической значимости.

Результаты и их обсуждение. В ходе исследования мы изучили факторы риска по методике расчета относительного риска с 95% доверительным интервалом и получили следующие результаты:

При оценке относительного риска развития перинатальной энцефалопатии средней степени тяжести в I группе новорожденных по медико-биологическим факторам, установлена высокая значимость таких факторов как наследственные заболевания в семье 1,833 Ме (1,471; 2,285), анемия тяжелой степени 2,364 Ме (1,292; 4,325), хронические очаги инфекции 1,667 Ме (1,078; 2,578), обострение хронических заболеваний 1,714 Ме (1,222; 2,404), острые инфекции верхних дыхательных путей 1,663 Ме (1,178; 2,348) и гинекологическая инфекция 1,811 Ме (1,460; 2,247) (таб. 1).

Таблица 1. Анализ медико-биологических факторов риска перинатальной энцефалопатии согласно критериям относительного риска в I группе

Фактор	I группа (n=40)		Контрольная группа (n=30)		P	RR	ДИ min	ДИ max
	абс.	%	абс.	%				
Наследственные заболевания в семье	4	10,0	-	-	<0,05	1,833	1,471	2,285
Анемия (тяжелая форма)	32	80,0	12	40	<0,05	2,364	1,292	4,325
Хронические очаги инфекции	25	62,5	10	33,3	<0,05	1,667	1,078	2,578
Обострения хронических заболеваний	12	30	2	6,7	<0,05	1,714	1,222	2,404
Острые инфекции верхних дыхательных путей	11	27,5	1	3,3	<0,05	1,663	1,178	2,348
Гинекологическая инфекция	3	7,5	-	-	<0,05	1,811	1,460	2,247

Примечание: P – достоверность различий между группами, RR – относительный риск

Таблица 2. Анализ медико-биологических факторов риска перинатальной энцефалопатии согласно критериям относительного риска во II группе

Фактор	II группа (n=40)		Контрольная группа (n=30)		P	RR	ДИ min	ДИ max
	абс.	%	абс.	%				
Наследственные заболевания в семье	4	10	-	-	<0,05	1,833	1,471	2,285
Анемия (тяжелая форма)	37	92,5	12	40	<0,05	5,286	1,832	15,252
Хронические очаги инфекции	23	57,5	10	33,3	>0,5	1,517	1,001	2,299
Обострения хронических заболеваний	10	25	2	6,7	<0,05	1,611	1,130	2,297
Острые инфекции верхних дыхательных путей	10	25	1	3,3	<0,05	1,788	1,308	2,445
Урогенитальная инфекция	12	30	2	6,7	<0,05	1,714	1,222	2,404
Гинекологическая инфекция	5	12,5	-	-	<0,05	1,857	1,483	2,326

Примечание: P – достоверность различий между группами, RR – относительный риск

При оценке относительного риска развития перинатальной энцефалопатии тяжелой степени во II группе новорожденных по медико-биологическим факторам, установлена высокая значимость таких факторов как наследственные заболевания в семье 1,833 Ме(1,471;2,285), тяжелая анемия 5,286Ме (1,832; 15,252), ожирение 1,500 Ме (1,016; 2,215), хронические очаги инфекции 1,517 Ме (1,001; 2,299), обострения хронических заболеваний 1,611 Ме (1,130; 2,297), острые бактериальные инфекции 1,500 Ме (1,016; 2,215), острые инфекции верхних дыхательных путей 1,788 Ме (1,308; 2,445), а также урогенитальная инфекция 1,714 Ме (1,222; 2,404) и гинекологическая патология 1,857 Ме (1,483; 2,326) (таб. 2).

Таблица 3. Анализ риска перинатальной энцефалопатии по наличию внутриутробной инфекции согласно критериям относительного риска в I группе

Внутриутробная инфекция	I группа (n=40)		Контрольная группа (n=30)		P	RR	ДИ min	ДИ max
	абс.	%	абс.	%				
Хламидийная инфекция	2	5,0	-	-	<0,05	1,789	1,449	2,210
Токсоплазмоз	12	30,0	-	-	<0,05	2,071	1,587	2,704

Примечание: P – достоверность различий между группами, RR – относительный риск

Таблица 4. Анализ риска перинатальной энцефалопатии по наличию внутриутробной инфекции согласно критериям относительного риска во II группе

Внутриутробная инфекция	II группа (n=40)		Контрольная группа (n=30)		P	RR	ДИ min	ДИ max
	абс.	%	абс.	%				
Хламидийная инфекция	3	7,5	-	-	<0,05	1,811	1,460	2,247
Токсоплазмоз	13	32,5	-	-	<0,05	2,111	1,606	2,766

Примечание: P – достоверность различий между группами, RR – относительный риск

При анализе риска перинатальной энцефалопатии по наличию внутриутробной инфекции согласно критериям относительного риска в I и II группах новорожденных выявлено, что на тяжесть патологического процесса в головном мозге с большой вероятностью влияют хламидийная инфекция (1,789 Ме (1,449; 2,210) в I группе и 1,811 Ме (1,460; 2,247) и токсоплазмоз (2,071 Ме (1,587; 2,704) в I группе и 2,111 Ме (1,606; 2,766) во II группе) (таб. 4).

Выводы: проведенный нами анализ показателей относительного риска (RR) у новорожденных основной и контрольной групп, позволяет сделать заключение, что модифицирующими факторами риска развития перинатальной энцефалопатии средней степени тяжести являются хламидийная инфекция и токсоплазмоз, прием противогрибковых препаратов, стремительные и затяжные роды, слабая родовая деятельность. Нами также установлено, что модифицирующими факторами риска развития перинатальной энцефалопатии тяжелой степени являются урогенитальная инфекция, прием НПВС, стремительные и затяжные роды, хроническая гипоксия плода.

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КОРРЕЛЯЦИЯ ЛАБОРАТОРНЫХ И НЕЙРОСОНОГРАФИЧЕСКИХ ПОКАЗАТЕЛЕЙ ПРИ ПЕРИНАТАЛЬНОЙ ЭНЦЕФАЛОПАТИИ У НОВОРОЖДЁННЫХ

Аннотация: Целью нашего исследования явилось определение взаимосвязи лабораторных и нейросонографических показателей у новорожденных с перинатальной энцефалопатией. Материалы и методы: обследовано 120 новорождёнными с перинатальным поражением ЦНС средней и тяжёлой степени нарушений: I группу составили 40 новорождённых с перинатальным поражением ЦНС гипоксического генеза средней степени тяжести, во II группу вошли 40 новорождённых с перинатальным поражением ЦНС гипоксического генеза тяжёлой степени тяжести. Результаты: проведенный нами анализ показателей относительного риска (RR) у новорожденных основной и контрольной групп, позволяет сделать заключение, что модифицирующими факторами риска развития перинатальной энцефалопатии средней степени тяжести являются угроза выкидыша, токсикозы, возраст матери старше 35 лет, анемия средней тяжести, острые инфекции верхних дыхательных путей, гинекологическая патология. Нами также установлено, что модифицирующими факторами риска развития перинатальной энцефалопатии тяжелой степени являются мертворождаемость, вредные привычки у отца, близкородственный брак, ожирение, хронические очаги инфекции, острые бактериальные инфекционные заболевания, урогенитальная инфекция.

Ключевые слова: новорожденные, факторы риска, перинатальная энцефалопатия, относительный риск, достоверность

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CORRELATION OF LABORATORY AND NEUROSONOGRAPHIC INDICATORS IN PERINATAL ENCEPHALOPATHY IN NEWBORNS

Annotation: *Objective: The aim of our study was to determine the relationship between laboratory and neurosonographic parameters in newborns with perinatal encephalopathy.*

Materials and Methods: The study included 120 newborns with moderate and severe perinatal central nervous system (CNS) damage. Group I consisted of 40 newborns with perinatal CNS damage of hypoxic origin of moderate severity, while Group II included 40 newborns with perinatal CNS damage of hypoxic origin of severe degree.

Results: Our analysis of relative risk (RR) indicators in newborns from the main and control groups showed that the modifying risk factors for the development of moderate perinatal encephalopathy were threatened miscarriage, toxicosis, maternal age over 35 years, moderate anemia, acute upper respiratory tract infections, and gynecological pathology. We also found that modifying risk factors for the development of severe perinatal encephalopathy included stillbirth, paternal harmful habits, consanguineous marriage, obesity, chronic foci of infection, acute bacterial infectious diseases, and urogenital infections.

Keywords: *newborns, risk factors, perinatal encephalopathy, relative risk, statistical significance.*

Актуальность. В настоящее время перинатальное поражение центральной нервной системы новорожденных занимают важное место в структуре патологии детей раннего возраста, что связано с высокой распространенностью, тяжестью клинических проявлений и риском формирования инвалидности.

Цель: определение взаимосвязи лабораторных и нейросонографических показателей у новорожденных с перинатальной энцефалопатией.

Материалы и методы. Мы изучили инструментальные, общепринятых лабораторные, параклинические данные наблюдения за 120 новорождёнными с перинатальным поражением ЦНС средней и тяжёлой степени нарушений, находившихся на стационарном лечении в отделении патологии новорождённых и отделении неонатальной реанимации. Больные были разделены на III группы: I группу составили 40 новорождённых с перинатальным поражением ЦНС гипоксического генеза средней степени тяжести. Во II группу вошли 40 новорождённых с перинатальным поражением ЦНС гипоксического генеза тяжёлой степени тяжести.

При постановке диагноза перинатальных поражений ЦНС гипоксического генеза и определении тяжести заболевания руководствовались МКБ-10. Результаты проведенных нами исследований вносили в базу данных с последующей статистической обработкой. Далее проводился анализ с помощью пакета статистической программы «Statistica6.0» с использованием библиотеки статистических функций с вычислением среднего арифметического значения (M), ошибки среднего

арифметического значения (m), критерия Стьюдента (t). Значение $p < 0,05$ было принято в качестве порогового уровня статистической значимости.

Результаты и их обсуждение. При анализе родов выявлено, что среди обследованных мальчиков было 44, девочек 36; в возрасте 3-7 дня – 21 детей, 9-28 дней 59 (таблица 1).

Таблица 1

Распределение больных детей по полу и возрасту в группах обследования

Обследуемые	Количество	Пол		Возраст	
		Мальчики	Девочки	3-7 дней	8-28 дней
I группа	40	20	20	8	32
II группа	40	16	24	13	27
Всего	80	36	44	21	59

Из всех больных 13 (10,8%) переведены из родильных домов в течение третьей сутки от начала заболевания, 63 (52,5%) – на 1-7 сутки и остальные 44 (36,7%) – в течение 8-28 суток.

Анализ распределения больных по дням жизни и по тяжести заболевания показывает, что поступление больных из родильных домов начиная с 8 суток, связано с тяжестью поражения ЦНС и возможностью ухудшения транспортировки из другого стационара, а как известно, строгий покой является одним из основополагающих принципов лечения новорождённых с поражением мозга в первые дни жизни, в этой связи значительно чаще поступали больные с тяжёлой степенью поражения ЦНС.

Для определения значимости показателей сатурации, КОС и газового состава крови и основных количественных показателей нейросонографического исследования у новорожденных с перинатальной энцефалопатией, был проведен корреляционный анализ этих показателей в I (среднетяжелая степень) и II (тяжелая степень) группе новорожденных с перинатальной энцефалопатией.

Таблица 2

Показатели сатурации, КОС и газового состава крови у новорожденных с перинатальной энцефалопатией

	Показатели	I группа (n=40)	II группа (n=40)	P
1	SpO ₂	95±2,0	91±3,0	<0,05
2	pH	7,25±0,05	7,15±0,05	<0,05
3	PaCO ₂	4,7±0,1	4,5±0,2	<0,05
4	PaO ₂	11,8±0,1	11,6±0,2	<0,05

Примечания. Р – достоверность различий между группами

Таблица 3

Показатели нейросонографии у новорожденных с перинатальной энцефалопатией

	Показатели (мм)	I группа (n=40)	II группа (n=40)	Р
1	Третий желудочек (мм)	4,2±0,6	5,7±0,5	<0,01
2	Четвертый желудочек (мм)	5,5±0,4	6,2±0,3	<0,05
3	Субарахноидальное пространство (мм)	3,7±0,3	4,8±0,6	<0,05

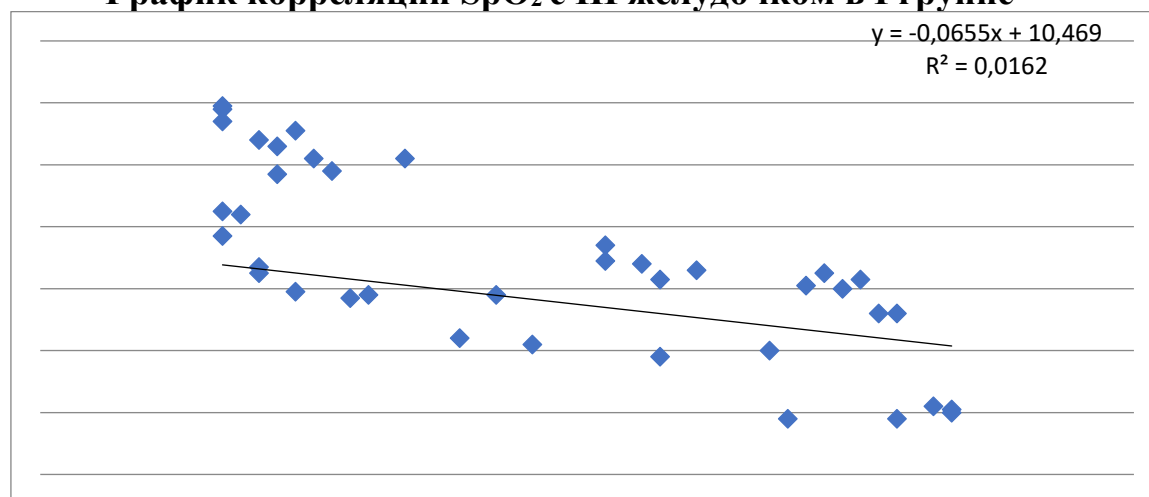
Примечания. Р – достоверность различий между группами

Для установления значимости показателей сатурации, КОС и газового состава крови и УЗИ мозга мы продолжили исследование корреляционной взаимосвязи с целью более детального изучения.

Данные больных с перинатальным поражением ЦНС, приведенные на рисунке 1 показывают неравномерную скученность показателей в виде достаточно большого отклонения точек относительно линии тренда. Полученные данные свидетельствуют о слабой обратной корреляционной зависимости между показателями SpO₂ и размером III желудочком в I группе больных $r=+0,66$, что свидетельствует о недостаточной важности использования данных сатурации в прогнозе тяжести течения перинатальной энцефалопатии у новорожденных.

Рис. 1

График корреляции SpO₂ с III желудочком в I группе



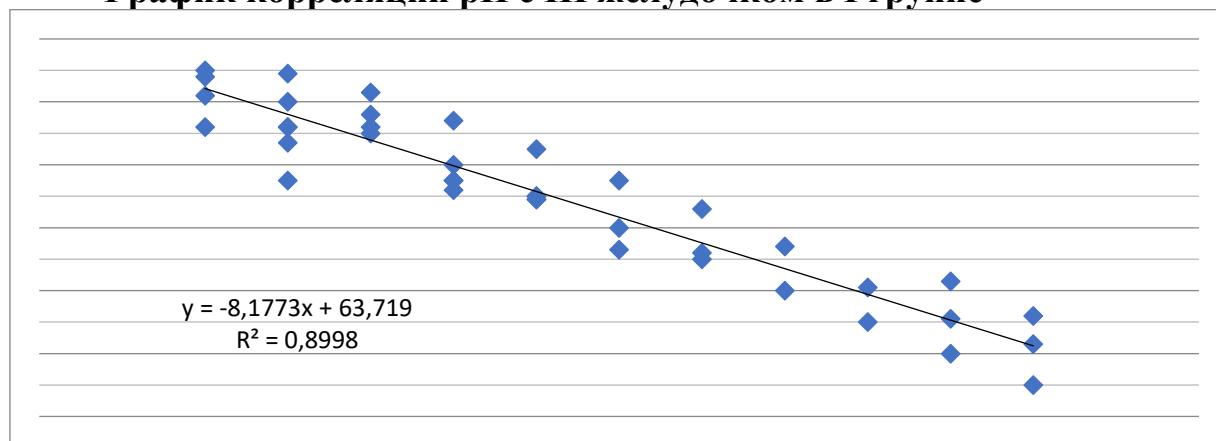
Примечание: у - уравнение диаграммы, R² - величина достоверности аппроксимации. Значения по вертикали – III желудочек, по горизонтали – SpO₂

На приведенном ниже рисунке 2, отражены результаты корреляционного анализа показателями рН и III желудочком. Видна высокая скученность показателей и небольшое отклонение точек относительно линии тренда, что свидетельствуют об очень сильной обратной корреляционной

зависимости между показателями рН и III желудочком – $r=+0,83$ в I группе больных. Это является свидетельством высокой валидности для использования показателей КОС в прогнозе тяжести течения перинатального поражения ЦНС у новорожденных.

Рис. 2

График корреляции рН с III желудочком в I группе

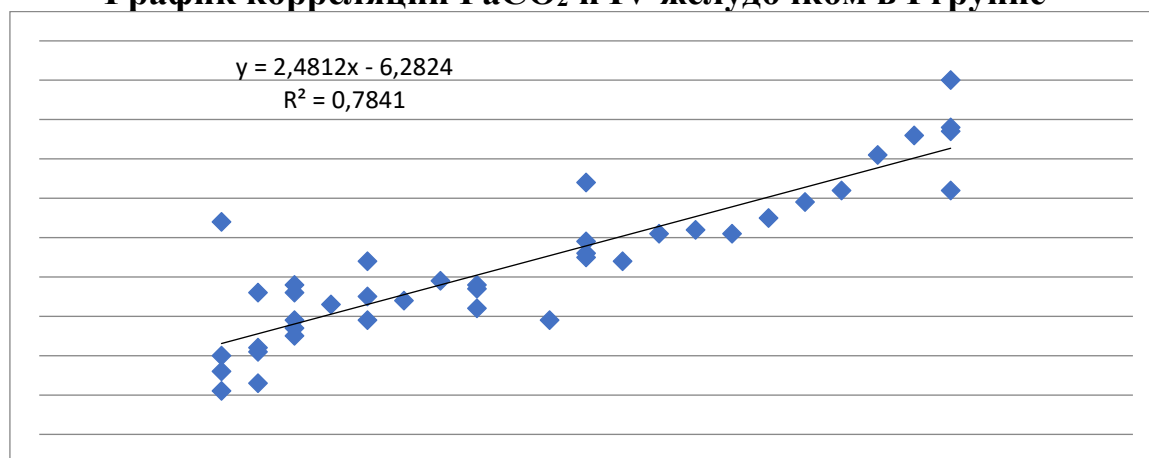


Примечание: у - уравнение диаграммы, R^2 - величина достоверности аппроксимации. Значения по вертикали – III желудочек, по горизонтали – рН

На рисунке 3 мы также зарегистрировали большую скученность точек на плоскости относительно линии тренда при PaCO_2 и размером IV желудочка в I группе. Отмечен высокий коэффициент корреляции - $r=+0,87$, свидетельствующие о сильной прямой корреляционной связи между этими показателями. Данный результат позволяет констатировать высокую степень валидности взаимосвязи показателя PaCO_2 для прогноза тяжести перинатальной энцефалопатии у новорожденных.

Рис. 3

График корреляции PaCO_2 и IV желудочком в I группе



Примечание: у – уравнение диаграммы, R^2 - величина достоверности аппроксимации. Значения по вертикали - IV желудочка, по горизонтали – PaCO_2

Результаты корреляционного анализа с показателями уравнения диаграммы и величины аппроксимации, наглядно показывают, что в I группе больных с перинатальным поражением центральной нервной системы, имеется достаточно высокая равномерная скученность показателей в виде небольшого отклонения точек относительно линии тренда. Так, полученные нами данные свидетельствуют о очень высокой и высокой прямой корреляционной зависимости между показателями рН и размером 3 желудочка в I группе больных ($r=+0,83$), а также количества PaCO_2 и размером 4 желудочка ($r=+0,87$). Это свидетельствует о значимости и валидности использования этих показателей в прогнозе тяжести течения перинатальной энцефалопатии у новорожденных детей. В тоже время, имеется низкая скученность показателей в виде достаточно большого отклонения точек относительно линии тренда между показателями SpO_2 и размерами 3 желудочка ($r=+0,66$), а также PaO_2 и размерами субарахноидального пространства ($r=+0,61$) в I группе больных, очень слабой прямой корреляционной зависимости. Это свидетельствует о невалидности использования этих показателей в прогнозе тяжести течения перинатального поражения ЦНС у новорожденных.

Выявленная направленность указанных сдвигов и их выраженность указывают на важную патогенетическую их роль в развитии и прогрессировании тяжести перинатального поражения ЦНС у новорожденных детей.

Таким образом, проведенные исследования по изучению клинических симптомов и синдромов гипоксико-ишемической энцефалопатии средней и тяжелой степени тяжести, инструментальных показателей отражающих состояние сатурации, КОС и газового состава крови и нервной системы у новорожденных, проведенного корреляционного анализа, показывающего наличие значимой корреляционной зависимости, доказывают наличие достоверной взаимосвязи показателей сатурации, КОС и газового состава крови у новорожденных с перинатальным поражением центральной нервной системы, которую необходимо использовать с диагностической целью и для прогноза тяжести перинатальной энцефалопатии.

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РОЛЬ ФИЗИОТЕРАПИИ В РЕАБИЛИТАЦИИ БОЛЬНЫХ С ГРЫЖАМИ ДИСКОВ ПОЯСНИЧНО-КРЕСТЦОВОГО ОТДЕЛА ПОЗВОНОЧНИКА

Аннотация: Грыжи межпозвоночных дисков пояснично-крестцового отдела позвоночника являются одной из наиболее частых причин болевого синдрома, неврологических нарушений и снижения трудоспособности у пациентов трудоспособного возраста. В системе комплексной реабилитации данных больных важную роль играет физиотерапия, направленная на уменьшение боли, восстановление двигательной функции и профилактику рецидивов заболевания. В аннотации представлены современные представления о роли физиотерапевтических методов, включая лечебную физкультуру, мануальную терапию, тракционные и физические воздействия, в лечении и реабилитации пациентов с грыжами дисков пояснично-крестцового отдела позвоночника. Подчеркивается значение активных методов физиотерапии как в консервативном лечении, так и в послеоперационном периоде. Отмечается необходимость индивидуального подбора реабилитационных программ с учетом клинических и функциональных особенностей пациентов.

Ключевые слова: грыжа межпозвоночного диска; пояснично-крестцовый отдел позвоночника; физиотерапия; реабилитация; лечебная физкультура; болевой синдром; функциональное восстановление.

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THE ROLE OF PHYSIOTHERAPY IN THE REHABILITATION OF PATIENTS WITH LUMBAR–SACRAL INTERVERTEBRAL DISC HERNIATION

Abstract: Lumbar–sacral intervertebral disc herniation is one of the most common causes of pain syndrome, neurological disorders, and reduced working capacity in patients of working age. In the system of comprehensive rehabilitation of these patients, physiotherapy plays an important role, aimed at pain reduction, restoration of motor function, and prevention of disease recurrence. This abstract presents current concepts regarding the role of physiotherapeutic methods,

including therapeutic exercise, manual therapy, traction, and physical modalities, in the treatment and rehabilitation of patients with lumbar–sacral disc herniation. The significance of active physiotherapy methods is emphasized both in conservative management and in the postoperative period. The necessity of an individualized selection of rehabilitation programs, taking into account the clinical and functional characteristics of patients, is highlighted.

Keywords. *intervertebral disc herniation; lumbar–sacral spine; physiotherapy; rehabilitation; therapeutic exercise; pain syndrome; functional recovery.*

Введение.

Грыжа межпозвоночного диска пояснично-крестцового отдела позвоночника — распространённое заболевание, которое часто проявляется болевым синдромом, радикулопатией и снижением двигательной активности. В комплексной терапии этих пациентов физиотерапия играет ключевую роль, способствуя снижению боли, улучшению функции позвоночника и ускорению возвращения к повседневной активности. Физиотерапевтические методы включают широкий спектр процедур: лечебная физкультура, мануальная терапия, тракция, электростимуляция, тепловые и другие воздействия. Эффективность этих методов подтверждена как в консервативной практике, так и после хирургического вмешательства [1–4].

Основные физиотерапевтические методы. Лечебная физкультура и активные методы. Активная физиотерапия включает в себя терапевтические упражнения, направленные на укрепление мышц кора, улучшение осанки и увеличение диапазона движений. Мета-анализ показал, что физиотерапевтические вмешательства значительно уменьшают боль и инвалидность у пациентов с пролапсом поясничных межпозвоночных дисков [1,2]. Это объясняется улучшением биомеханики позвоночника, увеличением межпозвонкового пространства и повышением стабильности сегментов.

Функциональная реабилитация. Функциональные программы, включающие пилатес, балансирующие упражнения и прогрессивную нагрузочную терапию, способствуют значительному снижению функциональных нарушений и повышению трудоспособности пациентов с радикулопатиями, связанными с грыжей диска [4,5].

Физиотерапия после операции. После хирургического удаления грыжи межпозвоночного диска ранняя активная физиотерапия улучшает болевые и функциональные показатели. Систематический обзор показал, что активное восстановление в течение 1–2 месяцев после операции приводит к значительному снижению боли и улучшению функциональных результатов по шкале Oswestry Disability Index [3,6].

Дополнительные методы. Кроме упражнений, в клинической практике применяются мануальная терапия, тракция, электростимуляция и другие физические воздействия, способствующие купированию боли и ускорению

регенерации тканей. Эти методы рекомендуется комбинировать с активными упражнениями в рамках индивидуальной программы реабилитации [1,7].

Обсуждение. Физиотерапия является важным компонентом в реабилитации пациентов с грыжами пояснично-крестцового отдела позвоночника. Комбинирование активных упражнений, мануальных методов и других физиотерапевтических процедур улучшает результаты лечения, снижает выраженность боли и способствует восстановлению повседневной активности. Однако разнородность протоколов и недостаток высококачественных рандомизированных исследований ограничивают возможность создания единых рекомендаций. Поэтому требуется дальнейшее изучение оптимальных программ физиотерапии в различных клинических ситуациях.

Заключение. Физиотерапия играет ключевую роль в реабилитации пациентов с пояснично-крестцовыми грыжами дисков как при консервативном лечении, так и после хирургического вмешательства. Доказательства свидетельствуют о положительном влиянии физиотерапевтических методов на уменьшение боли, улучшение функции и повышение качества жизни пациентов. Будущие исследования должны быть направлены на стандартизацию протоколов и оценку долгосрочных исходов.

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ЭКОНОМИКА ФРИЛАНСА И САМОЗАНЯТОСТИ: СТИМУЛЫ И ОГРАНИЧЕНИЯ

***Аннотация:** Статья посвящена фрилансу и самозанятости как самостоятельной форме экономической активности. Рассматриваются основные стимулы – гибкость рабочего времени, самостоятельное ценообразование и возможность профессионального роста, а также ограничения – нестабильность дохода, высокая конкуренция и отсутствие социальных гарантий.*

***Ключевые слова:** фриланс, самозанятость, микроэкономика, стимулы, ограничения, цифровые платформы, рынок труда.*

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THE ECONOMICS OF FREELANCING AND SELF-EMPLOYMENT: INCENTIVES AND CONSTRAINTS

Abstract: *The article focuses on freelancing and self-employment as independent forms of economic activity. It examines key incentives, such as flexible working hours, self-determined pricing, and professional development, as well as limitations, including income instability, high competition, and lack of social guarantees.*

Keywords: *freelance, self-employment, microeconomics, incentives, limitations, digital platforms.*

В последние годы фриланс и самозанятость всё чаще рассматриваются не как временная подработка, а как полноценная форма экономической активности. Развитие цифровых технологий, онлайн-платформ и удалённых форм взаимодействия заметно изменило рынок труда и поведение участников. Всё больше людей выбирают работу вне классических трудовых отношений, ориентируясь на гибкость, самостоятельность и возможность напрямую влиять на доход. Тема фриланса становится особенно актуальной, затрагивая вопросы занятости, доходов и экономической устойчивости работников.

Фриланс и самозанятость предоставляют альтернативу традиционной занятости: работник выбирает проекты, устанавливает цену услуг и распределяет рабочее время. Доход зависит от количества заказов, их стоимости и личных издержек времени и усилий. Такая занятость требует высокой ответственности: исполнитель отвечает за результат работы, налоги и поиск заказчиков. Отсутствие гарантированного дохода компенсируется гибкостью и возможностью адаптироваться к рыночным изменениям. Ключевую роль играют платформы, связывающие исполнителей и заказчиков, формируя правила работы, рейтинги и систему отзывов, влияя на конкуренцию и распределение доходов. Успех фрилансера зависит от компетенций, репутации и способности адаптироваться к изменениям рынка.

Главным стимулом является гибкость рабочего времени, которая повышает субъективную полезность труда и позволяет сочетать работу с личными интересами. Доход напрямую зависит от объёма выполненной работы, создавая стимул повышать продуктивность. Снижение транзакционных издержек и возможность устанавливать собственные цены делают самозанятость выгодной. Немаловажны нематериальные стимулы: выбор проектов, интересные задачи и повышение профессионального уровня. Эти факторы формируют экономические стимулы, привлекающие всё больше людей к фрилансу и создающие динамичное сообщество специалистов.

Однако фриланс сопровождается ограничениями и рисками: отсутствие социальных гарантий, неравномерные доходы, зависимость от сезона и спроса, постоянный поиск клиентов и асимметрия информации создают экономическую уязвимость. Высокая конкуренция особенно давит на начинающих специалистов, вынуждая снижать стоимость услуг. Эти риски

компенсируются свободой выбора, гибкостью и потенциалом дохода, но требуют самостоятельности, дисциплины и адаптивности.

Спрос и предложение на рынке фриланса подчиняются микроэкономическим законам. Исполнители оценивают доходность проектов и затраты времени, заказчики – цену, качество и репутацию. Цифровые платформы снижают издержки поиска, а рейтинги и репутация формируют доверие и распределение заказов. Ценовая конкуренция стимулирует повышение качества, а дифференциация позволяет занимать собственные ниши. Фрилансеры строят долгосрочные отношения с заказчиками, а заказчики ищут оптимальное сочетание стоимости и качества, создавая динамичную экономическую среду.

Рост числа фрилансеров влияет на рынок труда и экономику: повышается мобильность рабочей силы, структура занятости меняется, доля традиционной работы сокращается. Экономика получает выгоду от гибкого распределения ресурсов и доступа к талантам, а работники – новые возможности заработка и развития. Долгосрочно формируется платформенная экономика, где цифровые инструменты координируют и оценивают труд. Распространение фриланса меняет рыночные принципы, создаёт новые стимулы и ограничения, формируя современный облик занятости.

Фриланс и самозанятость объединяют свободу выбора с экономическими рисками. Стимулы – гибкость, доход, самостоятельное ценообразование – привлекают участников, а ограничения – нестабильность, конкуренция, отсутствие социальных гарантий – требуют ответственности. В итоге формируется новый рынок труда с собственными правилами, влияющий на занятость и экономические отношения.

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ПРОФЕССИОГРАММА БАЗОВЫХ ЦЕННОСТЕЙ СПЕЦИАЛИСТА В СФЕРЕ ФИЗИЧЕСКОЙ КУЛЬТУРЫ И СПОРТА

Аннотация: На современном этапе развития общества и государства актуальным становится повышение уровня человеческого капитала. Следствием этого важным представляется формирование профессиональной и личной системы ценностей специалистов. При этом отдельного внимания заслуживает данный аспект в подготовке специалистов сферы физической культуры и спорта, так как их деятельность связана с вопросами воспитания личности и ее мировоззрения. Цель исследования – выяснение базовых ценностей, лежащих в основе профессиональных компетенций специалистов сферы физической культуры и спорта.

Ключевые слова: человеческий капитал, базовые ценности, профессиограмма, компетенции, личность, общество, физкультурные кадры, нравственные критерии.

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PROFESSIONOGRAM OF THE BASIC VALUES OF A SPECIALIST IN THE FIELD OF PHYSICAL CULTURE AND SPORTS

Abstract: *At the present stage of development of society and the state, increasing the level of human capital becomes relevant. An important consequence of this is the formation of a professional and personal value system for specialists. At the same time, this aspect deserves special attention in the training of specialists in the field of physical culture and sports, since their activities are related to the issues of educating the individual and his worldview. The purpose of the study is to clarify the basic values that underlie the professional competencies of specialists in the field of physical culture and sports.*

Key words: *human capital, basic values, professiogram, competencies, personality, society, physical education personnel, moral criteria.*

На современном этапе развития общества основной ценностью государства является человеческий капитал. Основу развития человеческого капитала любого государства представляет собой подрастающее поколение. Исторически доказано наличие тесной взаимосвязи между такими социальными понятиями, как «ценности», «общество» и «личность». Каково общество, таковы и ценности [5].

Особого внимания заслуживает проблема формирования системы профессиональных и личностных ценностей специалистов сферы физической культуры и спорта, так как их деятельность тесно связана с вопросами воспитания личности и ее мировоззрения. Требования современности к специалисту любой сферы деятельности, в том числе и сферы физической культуры и спорта, обозначают важность задачи подготовки активной личности, с четко определенными жизненными и профессиональными целями, имеющей определённый культурный уровень, обладающей высокими адаптивными способностями к быстро меняющейся социальной и профессиональной действительности с высоким уровнем стрессоустойчивости. Помимо решения задач образовательного характера в рамках обучения в высших учебных заведениях спортивной направленности, должны решаться задачи формирования профессиональных личностных качеств будущих специалистов, подразумевающих умение разбираться и использовать в своей деятельности современные педагогические технологии, высокую культуру в профессиональной деятельности и коммуникациях с окружающими, а также потребность к самостоятельному повышению уровня профессиональных знаний и навыков.

Актуальным вопросом, на наш взгляд, является понимание того, какими ценностями руководствуются россияне, особенно молодое поколение, в выборе образа жизни, каково их представление о состоянии собственного здоровья и роли физической активности в успешности жизнедеятельности, так как именно выбор ценностных ориентиров молодежью определяет будущее состояние общества в целом. Одним из путей в решении данного вопроса является популяризация физической активности. Представляется, что именно кадры в сфере физической культуры и спорта, в частности спортивные педагоги, способны формировать правильный подход к выбору ценностных

ориентиров, и потому становится важным вопрос оценки системы ценностей самих специалистов.

Развитие системы высшего образования в сфере физической культуры и спорта способствует формированию спроса на новые требования к личности специалиста в данной сфере, к его нравственным качествам, профессиональным и психологическим компетенциям [6]. На сегодняшний день в профессиональной деятельности спортивного педагога на первый план выходит творческий компонент, который повышает требования к уровню творческого мышления, самообразованию. Именно синтез знаний и умений и творческого подхода является маркером всесторонне развитой личности [2].

В педагогике требования к специалисту выражаются с помощью таких терминов как профессиональная пригодность, профессиональная готовность, педагогическое мастерство. В целом данные термины раскрывают комбинацию черт личности и особенности психологических проявлений будущего специалиста, которая с высокой долей вероятности гарантирует успешность его деятельности [7].

Эталонные черты характера и профессиональные компетенции, определяющие успешность в профессиональной реализации, можно выразить через так называемую профессиограмму. Профессиограмма педагога была предложена Н.В. Кузьминой. Данная профессиограмма включила в себя ряд социальных и профессиональных качеств личности – выраженная гражданская позиция, социальная активность, любовь к детям, подлинная интеллигентность, духовная культура, высокий профессионализм, инновационный стиль научно-педагогического мышления, способность к принятию творческих решений, потребность в постоянном самообразовании, физическое и психическое здоровье, профессиональная работоспособность [4, 8]. Некоторую долю влияния на формирование профессиограммы оказывает социальная позиция педагога, которая складывается из его взглядов, убеждений и жизненных ценностей.

Определенный интерес в рамках подготовки будущих специалистов представляет профессиограмма именно спортивного педагога, однако сведений о такой характеристике деятельности спортивных специалистов в современной литературе крайне мало. Можно привести лишь некоторые примеры таких данных. Одним из примеров можно считать описание «идеального тренера», предложенное Б.Дж. Кретти. Согласно данной характеристике, спортивный педагог должен обладать такими чертами характера, как общительность, открытость к коммуницированию, уверенность в себе, практичность, а также быть высокоинтеллектуальной и эмоционально устойчивой личностью [3, 8]. При этом Б.Дж. Кретти подчеркивает, что мнение об «идеальном тренере» существует как у тренеров, так и у спортсменов, и оно может не совпадать по ряду пунктов. Спортсмены считают, что ряд личностных недостатков тренера могут быть возмещены его способностью играть ту роль, которой ждут от него ученики, и его профессиональными компетенциями. Нужно отметить, что практикой

подтверждено, что тренер, обладающий высокой квалификацией, имеет авторитарный тип личности, но при этом достаточно лабилен в своем поведении [8]. Спортивный педагог должен обладать такими чертами, как быстрое восприятие нового материала, творческий подход, коммуникабельность, самосовершенствование. При этом нежелательно неконтролируемое проявление сильных эмоций, так как это может способствовать снижению результативности профессиональной деятельности.

В процессе подготовки специалистов по физической культуре и спорту кроме специальной физической и психологической подготовки, решающей задачи овладения профессиональной деятельностью, с этой же целью на высоком уровне развивается целый ряд социально-личностных черт характера. Этот процесс может иметь высокий уровень результативности при его целенаправленности и организации специальных педагогических воздействий, целью которых является передача физкультурных знаний и формирование патриотических, нравственных, правовых и эстетических качеств непосредственно в ходе занятий физической культурой. То есть реализуется формирование физической культуры личности [1].

Цель исследования. Цель исследования - выявление базовых ценностей, которые являются базисом профессиональных компетенций специалистов сферы физической культуры и спорта.

Методы исследования. Для достижения поставленной цели использовались опросные методы – беседа и анкетирование. Опрос проводился как среди студентов, так и среди специалистов разного звена сферы физической культуры.

В анкете были представлены 16 базовых ценностей, таких как денежное вознаграждение, общепринятая мораль, эстетика, любовь, мир, собственность, признание в обществе, равенство, свобода, семейные ценности, сотрудничество, удовольствия, карьерный успех, здоровье, самореализация, чувство собственного достоинства. Таким образом, был отражен весь спектр базовых ценностей, представляющих как личные, так и профессиональные предпочтения. Респондентам было предложено проранжировать предложенные ценности в порядке возрастания (от самой важной до незначительной, по их мнению).

Анализ данных, полученных в ходе анкетирования, проводился с использованием методов статистического анализа.

Результаты исследования. В ходе исследования были сопоставлены базовые ценности обучающихся и специалистов по данному виду деятельности (рис.1).

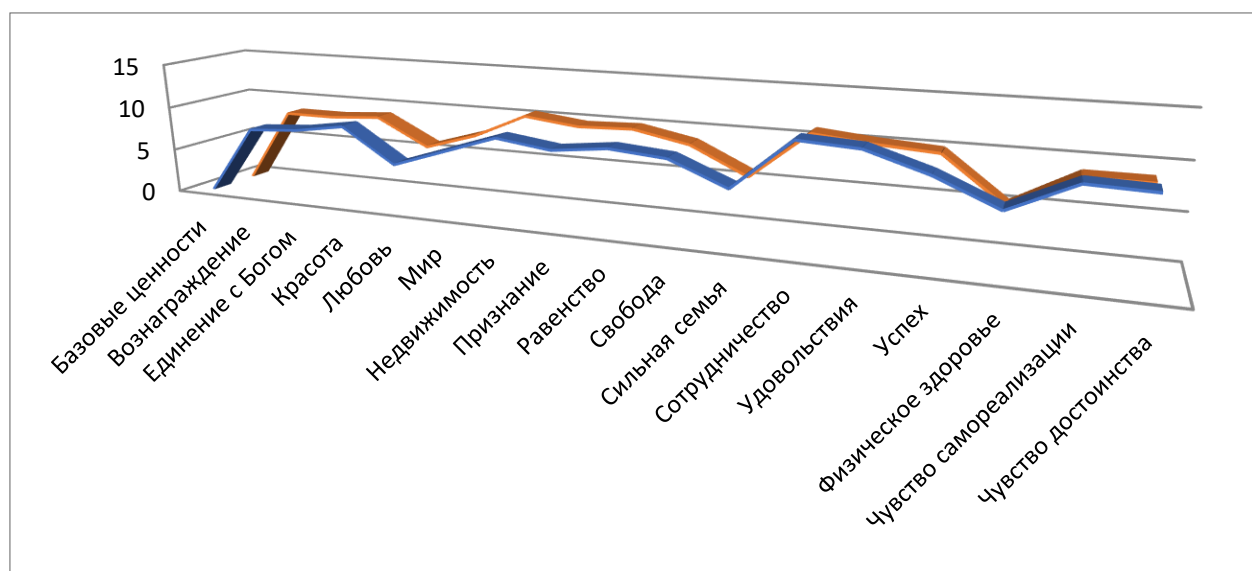


Рисунок 1. Предпочитаемые базовые ценности среди студентов (верхняя линия) и специалистов в сфере физической культуры и спорта (нижняя линия).

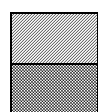
В результате опроса было выяснено, что обучающиеся в вузах спортивной направленности на первое место ставят такие базовые ценности, как любовь, семья, здоровье. Наименее ценны для них оказались такие базовые ценности, как сотрудничество и удовольствия.

Таблица 1

Результаты опроса по выяснению базовых ценностей

Базовые ценности	обучающиеся	специалисты
Вознаграждение	7,7±5,3	8,4±5,2
Единение с Богом	8,1±6,1	8,4±6,5
Красота	9,0±4,7	8,8±4,4
Любовь	5,2±4,1	5,8±3,8
Мир	7,2±4,5	7,6±5,4
Недвижимость	9,2±4,01	10,3±4,2
Признание	8,4±2,9	9,6±3,7
Равенство	9,1±3,01	9,8±3,7
Свобода	8,6±3,2	8,6±3,9
Сильная семья	6,1±4,5	5,7±4,4
Сотрудничество	11,5±2,8	10,8±3,1
Удовольствия	11,15±4,03	10,2±4,02
Успех	9,2±4,5	9,8 ±3,9
Физическое здоровье	6,5±4,7	5,04±4,01
Чувство самореализации	9,6±4,7	8,6±4,4
Чувство достоинства	9,4±5,04	8,6±4,4

Примечание:



- наиболее значимые базовые ценности

- наименее значимые базовые ценности

Что же касается специалистов – спортивных педагогов, руководящих сотрудников сферы физической культуры и спорта, то для них также наиболее важными оказались такие ценности как здоровье, семья, любовь, но здоровье

при этом выходит на первый план. На последнем месте также оказались такие ценности как сотрудничество и удовольствия, однако прибавилась также материальная составляющая – недвижимость (табл.1).

Таким образом, в результате анализа предпочтений в выборе базовых ценностей, можно отметить определенную преемственность ценностей от поколения к поколению.

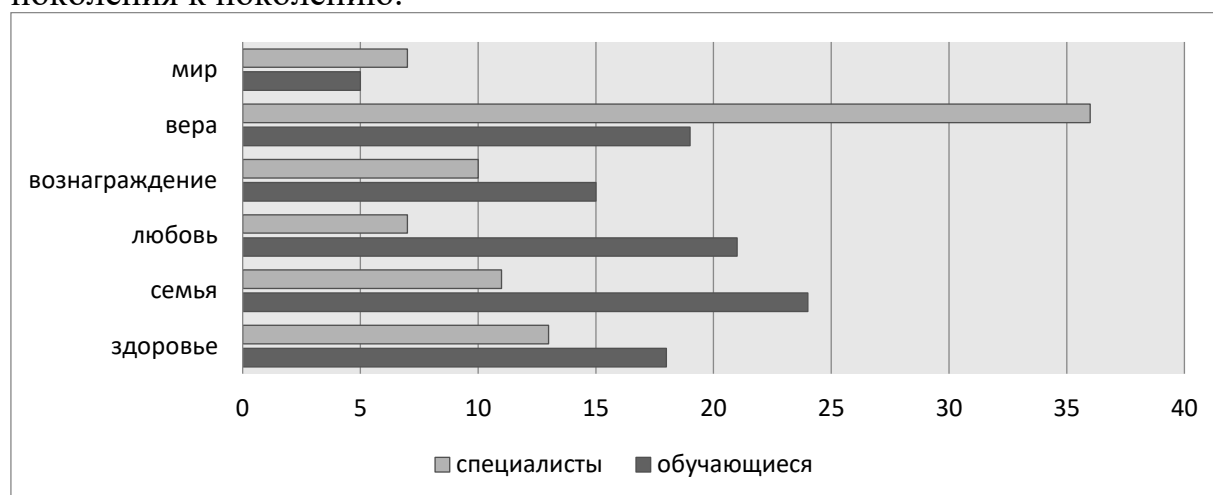


Рисунок 2. Предпочтения в наиболее значимых базовых ценностях среди студентов и специалистов.

В первую пятерку выбранных базовых ценностей с небольшой разницей вышли гуманистические ценности – любовь, семья. Кроме того, отмечена важность здоровья, причем с возрастом и повышением уровня профессиональной квалификации, эта ценность выходит на первый план (рис. 2).

На последнее место ставятся такие ценности как удовольствия, материальные ценности (недвижимость). Несколько неожиданно было выяснено, что такая базовая ценность, как сотрудничество, также оказалась на низких позициях.

Однако с учетом современных реалий деятельность специалистов в сфере физической культуры и спорта заключается в совмещении профессиональных компетенций как педагога, так и менеджера и специалиста по продвижению физкультурно-оздоровительных услуг. То есть его профессиональные знания и навыки должны отвечать актуальному спросу на рынке услуг и даже в некоторой мере формировать этот спрос. Современный спортивный педагог должен решать не только вопросы физического совершенствования, но и формирования личности, ее мировоззрения и жизненного стиля. Поэтому, при всей важности классических ценностей нашего общества, необходимо направить усилия при обучении специалистов на повышение уровня таких ценностей как самореализация, успех, сотрудничество.

Заключение. Процесс подготовки спортивных педагогов, а также руководящего звена сферы физической культуры и спорта должен способствовать развитию таких профессиональных компетенций и

личностных качеств, которые будут способствовать успешной профессиональной реализации и разрешению возникающих проблемных ситуаций с учетом требований, выдвигаемым современным обществом. Только социально активный человек с твердой жизненной позицией и высокими профессиональными знаниями способен продвигать идеи здорового образа жизни и активного отношения к физической культуре, способствуя, таким образом, всецелому оздоровлению общества.

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**СЕЛЬСКОХОЗЯЙСТВЕННЫЕ ЗЕМЛИ: ГЕОГРАФИЧЕСКИЕ
АСПЕКТЫ СТРУКТУРЫ И РАСПРЕДЕЛЕНИЯ
(НА ПРИМЕРЕ БУХАРСКОЙ ОБЛАСТИ)**

Аннотация: В статье рассматриваются географические аспекты структуры, состава и территориального распределения сельскохозяйственных земель Бухарской области. В ходе исследования проанализированы основные элементы земельного фонда региона, включая орошаемые пахотные земли, пастбища, многолетние насаждения и залежные земли, а также их пространственные различия по административным районам. На основе статистических данных дана оценка уровня развития растениеводства и животноводства, их доли в общем объеме сельскохозяйственной продукции и территориальной специализации. Особое внимание уделено деятельности агрокластеров, внедрению водосберегающих технологий и вовлечению в сельскохозяйственный оборот низкобонитетных и деградированных земель как важным факторам повышения эффективности землепользования. Результаты исследования подтверждают ключевую роль природно-климатических и социально-экономических факторов в территориальной организации сельского хозяйства Бухарской области и формировании направлений рационального использования земельных ресурсов.

Ключевые слова: Бухарская область, география сельского хозяйства, сельскохозяйственные земли, земельный фонд, территориальное распределение, растениеводство, животноводство, агрокластеры.

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**GEOGRAPHICAL ASPECTS OF THE STRUCTURE AND
DISTRIBUTION OF AGRICULTURAL LANDS
(A CASE STUDY OF BUKHARA REGION)**

Abstract: This article analyzes the geographical aspects of the structure, composition, and territorial distribution of agricultural lands in Bukhara region.

The study examines the main components of the regional land fund, including irrigated arable lands, pastures, perennial plantations, and fallow lands, as well as their spatial differentiation across districts. Based on statistical data, the development level of crop production and livestock farming, their contribution to the total agricultural output, and territorial specialization are assessed. Particular attention is paid to the role of agro-clusters, the introduction of water-saving irrigation technologies, and the reclamation of low-bonitet and degraded lands in improving the efficiency of land use. The research results highlight the significant interrelation between natural-climatic conditions and socio-economic factors in the territorial organization of agriculture in Bukhara region and provide scientific and practical conclusions for the rational use of agricultural land resources.

Keywords: *Bukhara region, agricultural geography, agricultural land, land fund, territorial distribution, crop production, livestock farming, agro-clusters.*

Говоря об экономике Бухарской области, можно с уверенностью сказать, что она имеет аграрно-промышленную направленность. В регионе сельское хозяйство преобладает над промышленностью. Область является одним из важных сельскохозяйственных районов нашей страны. Здесь особенно хорошо развиты выращивание хлопка и каракульское овцеводство.

Сельскохозяйственные земли — это территории, регулярно используемые для получения сельскохозяйственной продукции. К ним относятся пашни, залежные земли, многолетние сады, сенокосы и пастбища. Сельскохозяйственные земли находятся в пользовании организаций, занимающихся сельскохозяйственной деятельностью, фермерских и личных подсобных хозяйств и могут быть арендованными, постоянными или временными. [2]

Сельским хозяйством занимается сельскохозяйственная география. Сельскохозяйственная география — это отрасль экономической и социальной географии, изучающая территориальную организацию и закономерности развития сельского хозяйства. Она проводит исследования по комплексному изучению и прогнозированию сельского хозяйства в различных странах и регионах, а также оценивает природные условия и ресурсы с точки зрения сельского хозяйства.

Сельское хозяйство как отрасль экономики служит удовлетворению потребностей населения в сельскохозяйственной продукции и потребностей промышленности в сырье. В отличие от других отраслей, сельское хозяйство тесно связано с агроклиматическими ресурсами территории. Земля является одновременно средством труда и объектом производства в сельскохозяйственной деятельности. Расположение и развитие отраслей сельского хозяйства напрямую зависят от природных условий (прежде всего рельефа и климата), ресурсов (земли, воды, животных и растений), социально-экономических факторов, транспорта, экологических условий и других факторов.

Исследования, связанные с сельским хозяйством, охватывают изучение земельного фонда и его использования, картографирование, распространение сельскохозяйственных культур, территориальную организацию агроэкономических отраслей и их предприятий, вопросы развития и районирования сельского хозяйства. В Узбекистане проводились исследования по животноводству (А. Абиркулов) и агропромышленному комплексу (А.Р. Розиев и А.М. Содиков). Проблемами организации сельского хозяйства в различных регионах и отраслях занимались З.М. Акрамов, Р.А. Ходиев, Т.Э. Егамбердиев, Т. Тожимов, С.С. Саидкаримов, Т. Джумаев, К.К. Курбонов, Ш. Азимов, Р.У. Усманов и другие. [6]

Сельскохозяйственная продукция — это общая стоимость продукции растениеводства и животноводства, произведённой в отчетном периоде на фермерских хозяйствах, личных подсобных хозяйствах и организациях, осуществляющих сельскохозяйственную деятельность. Она отражает общий объем производства в сельском хозяйстве. Валовой урожай сельскохозяйственных культур формируется на основе отчетов сельскохозяйственных организаций и фермерских хозяйств, а также отчетов собраний граждан по личным подсобным хозяйствам. [1]

Экономика Бухарской области в основном основана на сельском хозяйстве, включая хлопководство, зерноводство, овощеводство, садоводство и животноводство. В области орошаемые земли (включая личные подсобные участки) занимают 273,7 тыс. га, залежные земли — 14,2 тыс. га, пустынные пастбища - 2 764,6 тыс. га, под хлопком - 129 тыс. га, кукуруза - 857 га, зерновые культуры - 81,2 тыс. га, рис - 200 га, томаты - 2 741 га, овощные и бахчевые культуры - 9,3 тыс. га, свекла - 116 га, картофель - 2 967 га, кормовые культуры - 15,9 тыс. га (в том числе люцерны - 7,1 тыс. га), сады - 18,2 тыс. га, тутовые плантации - 5,9 тыс. га.

В Бухарской области функционируют 236 коллективных и объединённых хозяйств, 4162 фермерских хозяйства, 41 межхозяйственное предприятие и 5 птицеводческих фабрик (2001). Животноводство является развитой отраслью, включая разведение крупного рогатого скота, овец, коз, лошадей, верблюдов и птицы. Особенно известны бухарские каракульские овцы. Во всех хозяйствах области насчитывается 428 тыс. голов крупного рогатого скота (в том числе 184,7 тыс. коров), 750 тыс. овец, 64 тыс. коз, 3 тыс. лошадей, 2,8 тыс. верблюдов и 771 тыс. птицы (2001). Также разводят шелкопряда.

В области функционируют 10 лесохозяйственных предприятий, основные растения - саксаул, черкес, кандим. В Каракульском лесном хозяйстве выращиваются также лекарственные растения. По состоянию на 1 января 2022 года орошаемые сельскохозяйственные земли в Бухарской области занимают 222 019 гектаров, действует 7 732 фермерских хозяйства, 11 хлопково-текстильных кластеров, 13 зерновых кластеров и 6 плодово-овощных кластеров.

В период с января по сентябрь 2022 года объем произведенной сельскохозяйственной продукции в Бухарской области составил 22 897,7 млрд сумов, что на 103,5% выше показателя за аналогичный период 2021 года. Следует отметить, что по итогам января–декабря 2022 года общий объем сельскохозяйственной продукции Бухарской области достиг 33 255,9 млрд сумов, что составило 103,7% по сравнению с аналогичным периодом прошлого года.

По области на долю продукции растениеводства приходится 52,0%, на долю продукции животноводства - 48,0%. В текущем году на территории всей республики продолжают работы по посеву сельскохозяйственных культур. Особое внимание уделяется важным агротехническим мероприятиям в Бухарской области.

По предварительным данным на 11 апреля 2022 года, по области полностью посеяно сельскохозяйственных культур на площади 222 019 гектаров. Среди них - зерновые, соя, подсолнечник, морковь, лук, картофель и другие культуры. В рамках мероприятий по возврату в хозяйственный оборот земель, выведенных из-под посевов, а также для увеличения производства продовольствия, в 2021–2022 годах планировалось освоить 77 800 гектаров, из которых на текущий момент полностью введено в использование 17 852 гектара.

На площади 1 740 га созданы плодовые сады и виноградники, на 1 937 га посеяны озимые зерновые культуры, на 845 га - кормовые культуры для животных, на 100 га - рис, а на 13 230 га - другие виды сельскохозяйственных культур. Также планируется создание многолетних плодовых садов и виноградников на 5 106 га земель с низкой плодородностью.

В соответствии с Постановлением Президента Республики Узбекистан PQ-20 от 23 ноября 2021 года, в целях организации личных подсобных хозяйств гражданам предоставляются земельные участки площадью от 0,10 до 1 гектара на открытом электронном конкурсе на срок 10 лет. В рамках данной программы было выделено 5 979 гектаров земли, полностью подготовленных и выведенных на конкурс. На сегодняшний день 30 738 граждан получили 4 163 гектара земель через открытый электронный конкурс и начали посев сельскохозяйственных культур.

На территории области фермерские хозяйства, хлопково-текстильные кластеры и другие сельскохозяйственные предприятия внедряют мероприятия по экономии воды. В рамках целевых программ планируется орошение на площади 21 839 га, в том числе 19 227 га - капельное орошение, 2 612 га - дождевание, а также выравнивание 14 900 га земель с использованием лазерного оборудования.

В 2022 году в Бухарской области произведено сельскохозяйственной продукции на сумму 34,1 трлн сумов, что на 103,6% выше показателя прошлого года. По доле в региональной структуре сельскохозяйственного производства республика занимает 3-е место после Самаркандской и Андижанской областей с долей 9,6%. В структуре сельскохозяйственной

продукции области доля продукции растениеводства составляет 52%, доля продукции животноводства - 48%. Только в Когонском районе объем продукции животноводства превысил объем продукции растениеводства.

В составе сельскохозяйственных земель Бухарской области пастбища занимают 91,7%, доля обрабатываемых земель составляет 7,2%, многолетние плодовые насаждения - 0,8%, залежные земли - 0,3%. По этому показателю Бухарская область напоминает Республику Каракалпакстан и Навоийскую область. Однако, несмотря на такую структуру земельного фонда, в составе сельскохозяйственных отраслей растениеводство в определенной степени превалирует над животноводством.

Итоги сельского хозяйства Бухарской области за январь–сентябрь 2023 года Эксперты Центра экономических исследований и реформ проанализировали работы, проведенные в сельском хозяйстве Бухарской области за январь–сентябрь 2023 года.

По предварительным данным, за январь–сентябрь 2023 года общий объем продукции (услуг) сельского, лесного и рыбного хозяйства составил 26 568,5 млрд сумов, в том числе продукция растениеводства, животноводства, охоты и оказанные услуги - 26 300,6 млрд сумов, лесного хозяйства - 123,1 млрд сумов, рыбного хозяйства - 144,8 млрд сумов. Объем продукции сельского, лесного и рыбного хозяйства области увеличился на 3,7% по сравнению с аналогичным периодом 2022 года, доля Бухарской области в показателях страны составила 9,1%.

Наибольшие темпы роста по сравнению с областными показателями наблюдались в городе Когон (141,5%), Каравульбозорском районе (108,3%), Джандарском районе (106,0%), Олотском районе (105,3%), Вобкентском районе (105,1%), Ромитанском районе (105,1%), Пешкусском районе (105,0%) и Когонском районе (104,4%), в то время как низкие темпы роста были зафиксированы в Каракуле (102,2%), Бухаре (101,4%), Гиждуване (101,1%) и Шафирконе (100,5%).

По районам и городам наибольший объем продукции (услуг) сельского, лесного и рыбного хозяйства зафиксирован в Джандарском (3 388,0 млрд сумов) и Бухарском районах (3 119,0 млрд сумов), а наименьший - в городе Когон (78,0 млрд сумов), городе Бухара (309,0 млрд сумов) и Каравульбозоре (778,0 млрд сумов). На душу населения произведено сельскохозяйственной продукции (услуг) на сумму 13 137,9 тыс. сумов.

За отчетный период произведено сельскохозяйственной продукции на сумму 26 114,1 млрд сумов (или рост на 3,7% по сравнению с аналогичным периодом 2022 года), из них продукция растениеводства — 12 468,0 млрд сумов, продукция животноводства - 13 646,1 млрд сумов. Доля продукции животноводства составляет 52,3%, растениеводства — 47,7%.

В растениеводстве всеми категориями хозяйств произведено 532,6 тыс. тонн зерновых культур, 675,5 тыс. тонн овощей, 236,1 тыс. тонн картофеля, 125,5 тыс. тонн бахчевых культур, 233,6 тыс. тонн фруктов и ягод, 175,2 тыс.

тонн винограда. В животноводстве добыто 183,1 тыс. тонн мяса живым весом, 698,7 тыс. тонн молока, 202,2 млн штук яиц и 4 385,9 тонн рыбы.

Анализируя структуру произведенной продукции сельского хозяйства Бухарской области по видам, наибольшая доля приходится на мясо (32,3%), овощи (12,1%), молоко (11,2%), а также фрукты и ягоды (9,2%). Доля продукции животноводства, произведенной в Бухарской области в масштабах страны, составила: в 2010 году - 9,2%, в 2015 году - 8,8%, в 2020 году - 9,7%, в 2022 году - 9,6%.

В период с января по сентябрь 2023 года общий объем продукции (услуг) сельского, лесного и рыбного хозяйства Бухарской области составил 26 568,5 млрд сумов, что на 103,7% больше аналогичного показателя прошлого года. Доля области в общем объеме продукции (услуг) сельского, лесного и рыбного хозяйства Республики составила 9,1%.

Общая площадь сельскохозяйственных земель области составляет 279 913 гектаров, из которых площадь посевов — 204 731 гектар. В Бухарской области функционируют 23 агрокластера: 8 хлопково-текстильных (производственная мощность 331 800 тонн), 8 зерновых (21 555 тонн), 5 плодово-овощных (20 300 тонн), 2 кластера лекарственных растений (2 тонны). На эти кластеры выделено 104 206 гектаров, из них 11 992 гектара переданы непосредственно кластерам. В рамках кластеров 3 177 фермерских хозяйств владеют 92 124 гектарами земли. Также в области действует 1 агрологистический центр.

В области работают 4 883 фермерских хозяйства, из которых 2 764 специализируются на хлопководстве и зерноводстве, 948 - на бахчеводстве и виноградарстве, 143 - на садоводстве и овощеводстве, 14 - на садоводстве и зерноводстве, 974 - на животноводстве и 105 - на других направлениях. На площади 780,1 гектара 438 фермерских хозяйств располагают теплицами, а на 2 772 гектарах 196 фермерских хозяйств создали интенсивные плодовые сады.

По итогам января–декабря 2024 года объем продукции (услуг) сельского, лесного и рыбного хозяйства в Бухарской области составил 41 871,5 млрд сумов, что составляет 9% в общей структуре страны. По этому показателю область занимает место после Самаркандской, Андижанской, Ташкентской, Кашкадарьинской и Ферганской областей.

Из общей суммы 41 478,0 млрд сумов приходится на продукцию растениеводства, животноводства, охоты и оказанные в этих секторах услуги; 232,9 млрд сумов — на лесное хозяйство; 160,6 млрд сумов — на рыбное хозяйство.

Распределение продукции растениеводства, животноводства, охоты и оказанных услуг по районам и городам Бухарской области:

- г. Бухара - 475,9 млрд сумов;
- г. Когон - 213,3 млрд сумов;
- Олотский район - 2 792,4 млрд сумов;
- Бухарский район - 4 468,4 млрд сумов;
- Вобкентский район - 3 703,2 млрд сумов;

- Каравульбозорский район - 1 158,1 млрд сумов;
- Джандарский район - 5 334,6 млрд сумов;
- Гиждуванский район - 4 840,5 млрд сумов;
- Шафирконский район - 3 692,5 млрд сумов;
- Каракульский район - 3 855,7 млрд сумов;
- Когонский район - 2 882,6 млрд сумов;
- Пешкусский район - 4 020,2 млрд сумов;
- Ромитанский район - 4 434,1 млрд сумов. [4]

В январе–декабре 2024 года экономические показатели сельского, лесного и рыбного хозяйства Узбекистана составили 467 041,5 млрд сумов.

В Бухарской области за тот же период произведено сельскохозяйственной продукции на сумму 41 039,4 млрд сумов, что составляет 102,7% по сравнению с январем–декабром 2023 года. Доля Бухарской области в формировании ВРП Республики Узбекистан составила 4,9%. Из общего объема продукции 19655,0 млрд сумов (47,9%) приходится на растениеводство, а 21384,4 млрд сумов (52,1%) - на животноводство.

По предварительным статистическим данным, валовой региональный продукт Бухарской области за январь–декабрь 2024 года составил 71 560,4 млрд сумов, что на 6,6% больше показателя за аналогичный период 2023 года.

Анализ распределения продукции растениеводства и животноводства по районам показывает, что в Каравульбозорском и Джандарском районах, а также в городе Бухара относительно развито растениеводство. В этих районах на продукцию растениеводства приходится от 54,2% до 62,3% общего объема сельскохозяйственной продукции, что свидетельствует о благоприятных климатических условиях для растениеводства. В Когонском, Гиждуванском и Каракульском районах, напротив, преобладает животноводство, доля которого составляет от 57,3% до 68,7% общего объема сельскохозяйственной продукции.

Объем продукции (услуг) сельского, лесного и рыбного хозяйства в области составил 22 148,2 млрд сумов в 2023 году и 24 460,8 млрд сумов в 2024 году. В расчете на душу населения ВРП составил 34 729,6 тыс. сумов, что на 4,8% выше аналогичного показателя прошлого года.

Созданная во всех отраслях экономики валовая добавленная стоимость (ВДС) составляет 97,8% от общего ВРП, а чистые налоги на продукцию — 2,2%. Доля сельского, лесного и рыбного хозяйства в структуре ВРП по отраслям составила 35,0%, промышленного сектора - 19,9%, строительства - 9,9%, сферы услуг - 35,2%. [3]

Эти показатели показывают, что доля сельского, лесного и рыбного хозяйства в составе ВРП Бухарской области немного снизилась. Если в 2023 году этот показатель составлял 37,4%, то в 2024 году — 35%. Рост ВРП связан с положительными темпами роста в основных отраслях экономики региона.

Темпы роста по отраслям в 2024 году составили: сельское, лесное и рыбное хозяйство - 102,7% (доля в ВРП по отраслям 35,0%), промышленность - 106,4% (19,9%), строительство - 114,9% (9,9%), сфера услуг - 108,6%

(35,2%). Дефлятор ВРП в 2024 году по сравнению с ценами 2023 года составил 109,6%, при этом самые высокие показатели отмечены в сфере услуг - 113,4% и в промышленности - 115,5%.

При анализе распределения доли валовой сельскохозяйственной продукции по категориям хозяйств и районам города, наибольший вклад приходится на долю фермерских и личных подсобных хозяйств во всех районах и городах.

По итогам января–декабря 2024 года по доле фермерских хозяйств в составе валовой сельскохозяйственной продукции наибольшие показатели отмечены в Караульбозорском районе (54,1%), по доле фермерских и личных подсобных хозяйств — в Каракульском районе (77,6%), по доле организаций, осуществляющих сельскохозяйственную деятельность - в городе Бухара (17,2%). Наименьшие показатели по доле фермерских хозяйств - в Когонском районе (17,0%), по доле фермерских и личных подсобных хозяйств - в городе Когон (16,8%), по доле организаций - в Олотском районе (2,6%).

В расчете на душу населения ВРП составил 34 729,6 тыс. сумов, что на 4,8% выше аналогичного показателя прошлого года. Созданная во всех отраслях экономики валовая добавленная стоимость (ВДС) составляет 97,8% от общего ВРП, а чистые налоги на продукцию — 2,2%.

Доля сельского, лесного и рыбного хозяйства в структуре ВРП по отраслям составила 35,0%, промышленности — 19,9%, строительства — 9,9%, сферы услуг - 35,2%. Рост ВРП связан с положительными темпами роста в основных отраслях региона: сельское, лесное и рыбное хозяйство - 102,7% (доля 35,0%), промышленность - 106,4% (19,9%), строительство - 114,9% (9,9%), сфера услуг - 108,6% (35,2%).

Если проанализировать атлас регионов Бухарской области, динамика производства сельскохозяйственной продукции показывает, что доходы от растениеводства превышают доходы от животноводства.

Производство продукции растениеводства по годам:

- 2007 год - 507,9 млрд сумов,
- 2008 год - 524,8 млрд сумов,
- 2009 год - 660,6 млрд сумов,
- 2010 год - 817,5 млрд сумов,
- 2011 год - 1 045,0 млрд сумов,
- 2012 год - 1 179,0 млрд сумов.

Доходы от животноводства в эти годы составили:

- 2007 год - 376,3 млрд сумов,
- 2008 год - 437,5 млрд сумов,
- 2009 год - 563,5 млрд сумов,
- 2010 год - 699,5 млрд сумов,
- 2011 год - 901,8 млрд сумов,
- 2012 год - 958,9 млрд сумов.

По категориям хозяйств все сельскохозяйственные посевные площади делятся на три группы: сельскохозяйственные предприятия, дехонские

хозяйства и фермерские хозяйства, из которых наибольшую долю занимают фермерские хозяйства. В 2013 году фермерские хозяйства обеспечивали 28,9% объема сельскохозяйственной продукции, а деhqонские хозяйства - 55,1%, в целом страна получила 9,9% сельскохозяйственной продукции от фермерских хозяйств.

На 1 января 2025 года в Республике Узбекистан действуют 30 952 предприятия и организации в сфере сельского, лесного и рыбного хозяйства (за исключением деhqонских и фермерских хозяйств), из них: 28 109 предприятий в растениеводстве, животноводстве, охоте и оказании услуг в этих сферах, 228 - в лесном хозяйстве, 2615 - в рыбном хозяйстве. Доля Бухарской области составляет 2 839 предприятий.

По предварительным данным, в январе–марте 2025 года общий объем продукции (услуг) сельского, лесного и рыбного хозяйства составил 4 890,7 млрд сумов, из которых: растениеводство и животноводство, охота и оказание услуг в этих сферах - 4 812,2 млрд сумов, лесное хозяйство - 53,0 млрд сумов, рыбное хозяйство - 25,4 млрд сумов.

В мировом контексте проводится научно-практическая работа по использованию деградированных земель, выведенных из сельскохозяйственного оборота, с приоритетной расстановкой направлений использования. Особое внимание уделяется научно-исследовательской работе, направленной на выявление отрицательных процессов на землях, предназначенных для сельскохозяйственных посевов, их восстановление и повышение производственной способности. В Республике Узбекистан предпринимаются широкомасштабные меры по рациональному и эффективному использованию деградированных земель, и достигаются определенные результаты. В частности, в стратегии развития «Нового Узбекистана» на 2022–2026 годы стратегическими задачами определены: освоение 464 тыс. га новых и выведенных из оборота земель, совершенствование системы агросервисов на основе науки и инноваций, обеспечение агропромышленных предприятий сырьем и увеличение объемов производства в 1,5 раза. Таким образом, включение деградированных земель в сельскохозяйственный оборот на основе комплексных проектов землеустройства и их эффективное использование имеет важное стратегическое значение для страны. [3]

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МҲХСЛАРНИ КУЛЛАШ ШАРОИТИДА КОРХОНАЛАР КУЧМАС МУЛКЛАРИНИ ТАСНИФЛАШ ВА УЛАР ХИСОБИНИ ТАКОМИЛЛАШТИРИШ

Аннотация: Ушбу мақолада молиявий ҳисоботдан фойдаланувчилар ва уларнинг корхоналар кучмас мулк объектлари бўйича ахборот талабларидан келиб чиқиб, уларни таснифлаш ва туркумлаш асослари ҳамда улар ҳисобини юритишнинг алоҳида хусусиятлари очиқ берилган.

Калит сўзлар: Кучмас мулк, потенциал инвесторлар, шахсий карточка, бино, ер участкаси, иншоот, ҳисоб, таҳлил, кучмас мулк ҳисоби.

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CLASSIFICATION OF REAL ESTATE OF ENTERPRISES AND IMPROVEMENT OF THEIR ACCOUNT USING THE CERTIFICATES

Abstract: In this article, based on the information requirements of financial reporting users and their enterprises, the bases of their classification and categorization and special features of their accounting are revealed.

Keywords: Real estate, potential investors, personal card, building, plot of land, structure, account, analysis, real estate account.

Kirish. МҲХСларда кучмас мулк объектлари бир-биридан таркиби, фойдаланиш муддати, амортизация килиниши, баҳоланиши, кадрсизланиши ва бошқа жиҳатлари бўйича фаркланади. Шу боис ҳам, уларни молиявий ҳисоботда атрофлича акс эттириш ҳамда очиклаш инвесторлар, мулк эгалари ва бошқа кредиторлар учун муҳим ҳисобланади. Республикамиз Президентининг 2020 йил 24 февралдаги “Молиявий ҳисоботнинг халқаро стандартларига утиш бўйича қушимча чора-тадбирлар тугрисида” ПК 4611 - сон қарорига мувофиқ МҲХСга утувчи субъектлар юқорида номлари эътироф этилган халқаро стандартлар талабларини бажаришлари лозим. Акс ҳолда бундай корхоналар МҲХСга утган корхоналар сифатида тан олинмайди.

Mavzuga oid adabiyotlar tahlili. Молиявий ҳисоботнинг Концептуал асосларига⁶⁵ мувофиқ молиявий ҳисоботдан фойдаланувчилар бўлиб мавжуд ва потенциал инвесторлар, қарз берувчилар, бошқа кредиторлар, шунингдек, корхона бўлинмалари ва ходимлари, солиқ ва ҳуқуқни ҳимоя қилувчи

⁶⁵ Молиявий ҳисоботнинг концептуал асослари

органлар, сугурта ва баҳолаш ва компаниялари, аудиторлик ташкилотлари ва бошқалар ҳисобланади. Ушбу фойдаланувчилар таркиби ва уларнинг корхоналар кучмас мулк объектлари бўйича асосий ахборот талаблари 1-жадвалда келтирилган.

1-жадвал

Молиявий ҳисоботдан фойдаланувчилар ва уларнинг корхоналар кучмас мулк объектлари бўйича ахборот талаблари⁶⁶

№	Ахборот фойдаланувчилар гуруҳлари	Ахборот фойдаланувчилар таркиби	Ахборот фойдаланувчиларнинг талаблари
1	Мавжуд ва потенциал инвесторлар	Корхонага уз капиталини киритган юридик ва жисмоний шахслар	Уларни корхонанинг молиявий-иктисодий ҳолати, киритилган инвестициялар, фаолиятни ривожлантириш стратегияси, киритилган кучмас мулк ёки кучмас мулкка киритилган иктисодий ресурсларнинг келажакдаги нафи ва уларни йукотиш rischi тугрисидаги ахборотлар кизиктиради
2	Карз берувчилар	Кредит ташкилотлари (банклар) ва жисмоний шахслар)	Уларни кучмас мулк объектларини харид қилиш, қуриш, реконструкциялаш, реновациялаш учунолинган кредит ва қарзларни, фоиз туловларини корхона томонидан қайтариш ва тулаш қобилияти тугрисидаги ахборотлар кизиктиради
3	Бошқа кредиторлар	Таъминотчилар, харидорлар, ходимлар, давлат бошқарув органлари	Уларни корхонанинг кучмас мулк объектлари бўйича уз мажбуриятларини узиш қобилиятига эгаллиги, бунинг учун етарлича маблағларнинг мавжудлиги тугрисидаги ахборотлар кизиктиради
4	Корхона булинмалари ва ходимлари	Корхона ташкилий булинмалари ва ходимлар	Уларни уз функционал мажбуриятларини бажариш ҳамда ҳуқуқларини билишлари учун зарур бўлган корхона фаолияти мазмунини ташкил қилувчи жараёнлар, уларнинг натижалари, ресурслар ҳолати ва улардан самарали фойдаланишга доир ахборотлар кизиктиради
5	Солик органлари	Давлат солик Инспекциялари	Солик объектлари, солик базалари, солик ларни ҳисобланиши, туланиши, улар бўйича қарздорлик тугрисидаги ахборотлар кизиктиради
6	Статистика органлари	Давлат статистика органлари	Корхонанинг молиявий-иктисодий салоҳияти, кучмас мулкнинг турлари, қиймати, эскириш ва яроқлилиги

⁶⁶ МҲХС асосида муаллиф ишланмаси

			даражаси, кучмас мулкка капитал сарфлар, инвестициялар ва улар кайтими тугрисидаги ахборотлар кизиктиради
7	Хукукни ҳимоя қилиш органлари	Ички ишлар, прокуратура ва суд органлари	Корхонанинг кучмас мулк объектлари талон-тарож қилиниши, амалга оширилган операцияларнинг қонунга зид ҳоллари тугрисидаги ахборотлар кизиктиради
8	Сугурта ва баҳолаш компаниялари	Сугурта ва баҳолаш компанияси	Корхонанинг кучмас мулк объектлари ҳисоб киймати, бозор киймати тугрисидаги ахборотлар кизиктиради
9	Аудиторлик ташкилотлар		Корхонанинг кучмас мулк объектларига оид операциялар ҳамда улар натижаларини ҳисоб ва ҳисоботларда реал акс эттирилганлигини тасдиқловчи ахборотлар кизиктиради

МҲХСлар асосида ташкил этиш шароитида корхоналар кучмас мулки тугрисидаги ахборотларни номлари юқорида санаб утилган фойдаланувчиларга ушбу активларнинг қуйидаги таснифий белгилари бўйича тақдим этиш ута муҳим ҳисобланади:

- (1) кучмас мулк тури ва таркиби;
- (2) кучмас мулкнинг фойдаланиш мақсади ва йуналишлари;
- (3) кучмас мулк фойдаланишидан олинadиган даромаднинг асосийлиги ёки асосий эмаслиги;
- (4) кучмас мулк объектларининг фойдали хизмат муддати;
- (5) кучмас мулк объектларининг амортизация қилиниши ёки қилинмаслиги;
- (6) амортизацияси қиритилadиган харажатлар тури;
- (7) кучмас мулк объектларининг мол-мулк солигига тортилиши ёки тортилмаслиги.

Корхоналар кучмас мулк объектларини ушбу белгилари бўйича биз томонимиздан тақлиф этилаётган таснифи 1-расмда келтирилган.

Республикамызда амалда булган кодекслар⁶⁷[1] ва қонунларда⁶⁸[2] корхоналар кучмас мулк объектларининг турлари ва таркиби умумий тарзда берилган. Чунончи, республикамызнинг фуқаралик кодекси (83-модда)га мувофиқ корхоналар кучмас мулки жумласига ер участкалари, ер ости бойликлари, бинолар, иншоотлар, қуп йиллик дов-дарахтлар ва ер билан узвий боғланган бошқа мол-мулк, яъни белгиланган мақсадига номутаносиб зарар етказмаган ҳолда жойини узгартириш мумкин булмайдиган объектлар

⁶⁷ Ўзбекистон Республикасининг Фуқаралик кодекси, 1997 йил 1 мартдан қучга қиритилган. <https://lex.uz/docs/111189>

⁶⁸ Ўзбекистон Республикаси қонуни “Ўзбекистон республикасида мулкчилик тўғрисида”, 1990 йил 31 октябрь, 152-ХП-сон қонуни (кейинги қўшимчалар ва ўзгартиришлар билан). <https://lex.uz/mact/111466>

киради. Республикамизнинг Солик кодексида (411-модда)⁶⁹ [3] корхоналар кучмас мулки жумласига бинолар ва иншоотлар, қурилиши тугалланмаган объектлар, темир йуллар, магистраль кувурлар, алоқа ва электр узатиш линиялари, шунингдек мазкур объектларнинг ажралмас технологик қисми бўлган иншоотлар, қурилиш ташкилотлари ёки иморатларни қурувчилар балансида кейинчалик сотиш учун курсатилган турар жой кучмас мулк объектлари (кучмас мулк объекти фойдаланишга топширилгандан кейин олти ой утгач) киритилган.

Таснифлаш мезони (белгиси)	Таснифи ва тавсифи							
1.Тури бўйича	Ер (ер участ-калари)		Бинолар		Иншоотлар		Тугалланмаган қурилиш объектлари	
2.Фойдаланиш мақсади ва йуналиши бўйича	Фойдаланишдаги кучмас мулки		Узок муддатга ижарага олинган кучмас мулки		Инвестицион кучмас мулк		Сотиш учун мулжалланган кучмас мулк	
3.Даромад келтирувчи фаолият турига киритилиши бўйича	Асосий фаолият даромадига киритиладиган				Асосий бўлмаган фаолиятдан даромадга киритиладиган			
4.Фойдали хизмат муддати бўйича	5 йил	10 Йил	15 йил	20 йил	25 йил	30 йил	40 Йил	50 Йил
5.Амортизацияланиши бўйича	Амортизация қилинпадиган				Амортизация қилинмайдиган			
6.Амортизацияси киритиладиган харажатлар тури бўйича	Таннарга киритиладиган		Сотиш харажати-га киритиладиган		Бошқарув харажати-га киритиладиган		Бошқа операцион харажатга киритиладиган	Капитал инвестицияларга киритиладиган
7.Мол-мулк солигига тортилиши бўйича	Мол-мулк солигига тортиладиган			Мол-мулк солигига тортилмайдиган			Солик тулови-дан вақтинча озод қилинган	

1-расм. Корхоналар кучмас мулк объектларини таснифлаш асослари⁷⁰

“Бухгалтерия ҳисоби тугрисида қонун”⁷¹[4]ва “Асосий воситалар” номли 5-сон БҲМСда⁷²[5] ҳам “корхоналар кучмас мулки” атамаси (тушунчаси) қулланилмаган ва таркиби махсус белгиланмаган. Ушбу меъёрий ҳужжатларда кучмас мулк объектлари корхоналарнинг асосий воситаларининг таркибий қисми сифатида тавсифланган. “Хужалик юритувчи субъектлар молиявий-хужалик фаолияти бухгалтерия ҳисоби счётлар режаси ва уни қуллаш бўйича йуриқнома”да⁷³ [6] кучмас мулкнинг алоҳида турлари (ер, ер участкалари, бино, иншоотлар, узатиш мосламалари,

⁶⁹ Ўзбекистон Республикасининг Солик кодекси (янги таҳрири), 2020 йил 1 январдан қўлдан киритилган. <https://lex.uz/docs/111189>

⁷⁰ Муаллиф ишланмаси

⁷¹ “Бухгалтерия ҳисоби тугрисида қонун” 13.04.2016 йилдаги ЎРҚ-404-сон

⁷² БҲМС 5 “Асосий воситалар”. Ўзбекистон Республикаси Иқтисодиёт ва молия вазирининг буйруғи, 09.08.2024 йилда қўйхатдан ўтган, қўйхат рақами 3546

⁷³ БҲМС 21 “Хўжалик юритувчи субъектлар молиявий-хўжалик фаолияти бухгалтерия ҳисоби счётлар режаси ва уни қўллаш бўйича йуриқнома”. Ўзбекистон Республикаси иқтисодиёт ва молия вазирининг буйруғи, 27.12.2024 йилда қўйхатдан ўтган, қўйхат рақами 3593

куп йиллик дарахтларга) ва улар эскириши хисоби учун мулжалланган махсус счётлар назарда тутилган.

БХМС 2 “Асосий хужалик фаолиятдан тушган даромадлар”⁷⁴ [7] ва БХМС 3 “Молиявий натижалар тугрисида ҳисобот”⁷⁵[8]га мувофиқ, шунингдек профессорлар К.Б. Уразов ва М.Э. Пулатов⁷⁶[9] эътироф этганларидек, корхоналар хужалик фаолиятдан олган даромадлари иккита гуруҳга бўлинади:

Асосий фаолиятдан олинган даромадлар;

Асосий бўлмаган фаолиятдан олинган даромадлар.

Фикримизча, МҲХСни куллашда яхлит тартибни таъминлаш учун “Асосий воситалар” номли 5-сон БХМСда кучмас мулк объектлари турлари ва таркибини ягона классификатор сифатида белгилаш ҳамда унда кучмас мулк объектлари стандарт турлари ҳамда таркибини қуйидагича тизимлаш мақсадга мувофиқ (2-жадвалга қаранг).

2-жадвал

Корхоналар кучмас мулк объектларининг турлари ва таркиби

№	Кучмас мулк тури	Кучмас мулк тури таркибига кирувчи объектлар
1	Ер	*ер майдонлари
2	Ерни ободонлаштириш	*корхонага кириш-чикиш йуллари, * автомобиллар ва бошқа транспорт воситаларининг тухташ майдонлари, * деворлар, * гулзорлар; *бошқа кукаламзорлаштирилган урама майдонлар
3	Молиявий ижара шартномаси бўйича ижарага олинган мулкни ободонлаштириш	*корхонага кириш-чикиш йуллари, * автомобиллар ва бошқа транспорт воситаларининг тухташ майдонлари, * деворлар, * гулзорлар; *бошқа кукаламзорлаштирилган урама майдонлар
4	Бинолар	*цеҳлар, * омборлар, *лабораториялар, * офис, *гараж, *ут учириш депоси, *коровулхона, *тиббий марказ, *санитария-гигиена объектлари

⁷⁴ БХМС 2 “Асосий хўжалик фаолиятдан тушган даромадлар”. Ўзбекистон Республикаси Молия вазирлигининг Миллий стандарти 26.08.1998 йилда рўйхатдан ўтган, рўйхат рақами 483, кучга кириш санаси 26.08.1998

⁷⁵ БХМС 3. “Молиявий натижалар тўғрисида ҳисобот”. Ўзбекистон Республикаси Молия вазирлигининг Миллий стандарти 26.08.1998 йилда рўйхатдан ўтган, рўйхат рақами 484, кучга кириш санаси 26.08.1998

⁷⁶

		*бошка бинолар
5	Иншоотлар	*очик айвонлар, * сув минораси, *темир йул шаҳобчалари, *насос станциялари, * каналлар, *сув ҳавзалари, *дренаж, *стадион * куприклар, * осма йулар, *нефть ва газ кудуклари, *шахта кудуклари *бошка иншоотлар
6	Узатувчи мосламалар	*электр қувватини узатиш тизимлари, *труба йулар, иссиқлик ва газ тармоқлари, *трансмиссиялар; * бошқалар узатувчи мосламалар.
7	Қўп йиллик усимликлар	*питомниклар *декоратив усимликлар, *мева-резавор дарахтлар *яшил деворлар *бошка қўп йиллик усимликлар
8	Тугалланмаган қурилиш объектлари	*бинолар *иншоотлар *узатувчи мосламалар

Қорхоналар қўчмас мулки объектлари туғрисида фойдаланувчиларга келтирилган таснифий жиҳатлари бўйича атрофлича ахборотларни ҳисоб ва ҳисоботда МҲХС талаблари асосида шакллантиришни таъминлаш учун биз томонимиздан қуйидагилар тавсия қилинди.

Биринчидан, қорхоналар қўчмас мулки объектларини ҳисоб ва ҳисобот мақсадларида таснифлаш ҳамда улар турларини белгилашда яхлит ёндашувни урнатиш мақсадга мувофиқ. Бунинг учун, фикримизча, 5-сон БҲМС “Асосий воситалар” да биз томонимиздан қўчмас мулк объектлари бўйича юқорида ишлаб чиқилган таснифий тартибларни асос сифатида қабул қилишни.

Иккинчилан, амалдаги 21-сон БҲМСда асосий воситалар ҳисоби учун назарда тутилган счётлар тизими таркибини қўчмас мулк объектларини улардан фойдаланиш йўналишлари бўйича акс эттиришга имкон берувчи қуйидаги счётлар билан бойитиш лозим (3-жалвалга қаранг).

3-жадвал

Корхоналар кучмас мулк объектлари ҳисобини юритиш учун тавсия этилаётган счётлар тизими⁷⁷

21-сон БХМС бўйича		Тавсия	
Счёт номери	Счёт номи	Счёт номери	Счёт номи
0110	Ер	0111	Фойдаланишдаги ер участкалари
		0112	Инвестицион мулк сифатидаги ер участкалари
		0113	Оператив ижарага мулжалланган ер участкалари
		0124	Сотиш учун мулжалланган ер участкалари
0120	Бино, иншоотлар ва узатувчи мосламалар	0121	Фойдаланишдаги бино, иншоотлар ва узатувчи мосламалар
		0122	Инвестиция учун мулжалланган бино, иншоотлар ва узатувчи мосламалар
		0123	Оператив ижарага мулжалланган бино, иншоотлар ва узатувчи мосламалар
		0124	Сотиш учун мулжалланган бино, иншоотлар ва узатувчи мосламалар
0180	Куп йиллик усимликлар	0181	Фойдаланишдаги куп йиллик усимликлар
		0182	Инвестиция учун мулжалланган куп йиллик усимликлар
		0183	Оператив ижарага мулжалланган куп йиллик усимликлар
		0184	Сотиш учун мулжалланган куп йиллик усимликлар

Учинчидан, 1 С: Бухгалтерия тизимида тавсия этилаётган счётлар асосида корхоналар кучмас мулк объектлари яхлит таркибини улардан фойдаланиш ва даромад келтириш йуналишлари кесимида акс эттирувчи махсус ягона классификаторни шакллантириш лозим. Мазкур классификаторда, фикримизча, кучмас мулк объектлари (КМО)ни 7 хонали ракамлар асосида қуйидагича кодлаштиришни тавсия этамиз (2-расм):



2-расм. Кучмас мулк объектлари кодлари тафсилоти⁷⁸

Кучмас мулк объектларининг 7 хонали кодларида биринчи туртта код уларнинг фойдаланиш ва даромад келтириш йуналишлари бўйича турларини

⁷⁷ Муаллиф ишланмаси

⁷⁸ Муаллиф ишланмаси

акс эътирувчи счётларни, колган 3 таси эса КМО турлари ичида ҳисоб бирлиги ҳисобланган объектларга берилган аниқ инвентар рақамларини билдиради.

Юқорида биллирилган таклифларимизни амалиётга жорий этиш кучмас мулк объектлари тугрисидаги ахборотларни ҳисоб ва ҳисоботда МХҲС талаблари асосида шакллантиришни таъминлаш имкониятини беради.

Хулоса ва таклифлар.

Татқиқотлар натижасида қуйидагиларни таклиф қиламиз:

Биринчидан, корхоналар кучмас мулки объектларини ҳисоб ва ҳисобот мақсадларида таснифлаш ҳамда улар турларини белгилашда яхлит ёндашувни урнатиш мақсадга мувофиқ. Бунинг учун, фикримизча, 5-сон БҲМС “Асосий воситалар” да биз томонимиздан кучмас мулк объектлари бўйича юқорида ишлаб чиқилган таснифий тартибларни асос сифатида қабул қилиш фойдадан холи бўлмайди.

Иккинчилан, амаллаги 21-сон БҲМСла асосий воситалар ҳисоби учун назарда тутилган счётлар тизими таркибини кучмас мулк объектларини улардан фойдаланиш йуналишлари бўйича акс эътиришга имкон берувчи қуйидаги счётлар билан бойитиш лозим (3-жалвалга қаранг).

Учинчидан, 1 С: Бухгалтерия тизимида тавсия этилаётган счётлар асосида корхоналар кучмас мулк объектлари яхлит таркибини улардан фойдаланиш ва даромад келтириш йуналишлари кесимида акс эътирувчи махсус ягона классификаторни шакллантириш лозим.

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ФИЗИОЛОГИЯ КОГНИТИВНОГО УПРОЩЕНИЯ: ПОЧЕМУ МОЗГ СТУДЕНТА ВЫБИРАЕТ ПОДСКАЗКИ ИИ ВМЕСТО САМОСТОЯТЕЛЬНОГО АНАЛИЗА

Актуальность. Современный этап развития медицинского образования характеризуется избыточным информационным потоком и доступностью инструментов искусственного интеллекта ИИ, что неизбежно ведет к трансформации когнитивных стратегий обучающихся. Актуальность данной темы обусловлена необходимостью глубокого физиологического осмысления того, как нейросетевые технологии влияют на базовые механизмы мышления будущего врача. Впервые процесс использования ИИ студентами рассматривается не просто как педагогическая проблема, а как проявление физиологической адаптации мозга к цифровой среде, направленной на минимизацию когнитивных усилий, что требует пересмотра подходов к контролю знаний в медицинских вузах.

Ключевые слова. Клиническое мышление, когнитивное упрощение, нейропластичность, принцип экономии энергии, искусственный интеллект в медицине, функциональные системы, когнитивная нагрузка, акцентор результатов действия, медицинское образование.

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THE PHYSIOLOGY OF COGNITIVE SIMPLIFICATION: WHY DO STUDENTS' BRAINS CHOOSE AI CUES INSTEAD OF INDEPENDENT ANALYSIS?

Relevance. The current stage of medical education development is characterized by an excessive information flow and the availability of artificial intelligence (AI) tools, which inevitably leads to the transformation of students' cognitive strategies. The relevance of this topic stems from the need for a deep physiological understanding of how neural network technologies influence the fundamental cognitive mechanisms of future physicians. For the first time, students' use of AI is considered not simply a pedagogical problem, but rather a manifestation of the brain's physiological adaptation to the digital environment, aimed at

minimizing cognitive effort. This requires a revision of approaches to knowledge assessment in medical schools.

Keywords: *Clinical reasoning, cognitive facilitation, neuroplasticity, energy conservation principle, artificial intelligence in medicine, functional systems, cognitive load, action result acceptor, medical education.*

Введение. Современная медицина переживает этап стремительной цифровой трансформации, где системы искусственного интеллекта (ИИ) становятся неотъемлемым инструментом поддержки принятия врачебных решений. Однако внедрение этих технологий в образовательный процесс медицинских вузов опережает понимание их долгосрочного влияния на фундаментальные механизмы формирования профессионального мышления. В этом контексте особую научно-практическую значимость приобретает изучение физиологических аспектов взаимодействия «мозг обучающегося — цифровой алгоритм».

Проблема формирования клинического мышления традиционно рассматривается как процесс создания сложных динамических стереотипов и развернутых функциональных систем (по П.К. Анохину), требующих значительных когнитивных усилий. В то же время, с позиций биологической эволюции, мозг человека функционирует в режиме строгой минимизации энергетических затрат. Появление инструментов ИИ, способных мгновенно генерировать диагностические гипотезы, создает физиологический прецедент «когнитивного аутсорсинга», при котором наиболее энергозатратные этапы аналитической деятельности делегируются внешнему носителю.

Несмотря на рост технических показателей (скорость и формальная точность диагностики), наблюдается парадоксальное снижение глубины патофизиологического обоснования решений. Физиологический механизм этого явления кроется в деградации стадии афферентного синтеза и исключении активного поиска информационных признаков из внутренней памяти. Вместо построения собственной модели «акцептора результатов действия», обучающийся адаптируется к верификации готовых шаблонов, что ведет к упрощению нейронных связей и формированию зависимости от технологического инструмента. Таким образом, исследование физиологических причин выбора стратегии когнитивного упрощения является необходимым условием для разработки дидактических методов, обеспечивающих сохранение когнитивной автономности будущего врача.

Материалы и методы. Исследование было организовано и проведено на базе Самаркандского Государственного Медицинского Университета в условиях, максимально приближенных к реальной клинической практике, при строгом соблюдении этических норм и получении информированного согласия от всех участников. В качестве объекта исследования выступила репрезентативная выборка студентов старших курсов, чей уровень предварительной подготовки позволял проводить полноценный дифференциально-диагностический поиск. Для обеспечения чистоты

эксперимента была проведена процедура рандомизации, в результате которой сформировались две группы участников с идентичными показателями академической успеваемости и когнитивного профиля, что исключило влияние индивидуальных интеллектуальных различий на итоговые результаты.

Процедура экспериментального воздействия заключалась в последовательном предъявлении участникам серии клинических задач, охватывающих различные разделы внутренней патологии и требующих интеграции фундаментальных знаний по физиологии и биохимии. Контрольная группа решала задачи, опираясь исключительно на внутренние когнитивные ресурсы и традиционные бумажные справочные материалы, что позволяло зафиксировать естественный ход аналитического процесса. Экспериментальная группа в процессе работы имела постоянный доступ к специализированному интерфейсу искусственного интеллекта, способному обрабатывать симптомокомплексы и выдавать готовые диагностические заключения.

Важным методическим аспектом исследования стала многокритериальная оценка когнитивной деятельности. Физиологический компонент «когнитивного упрощения» анализировался через призму временных затрат на различных этапах решения задачи. Особое внимание уделялось латентному периоду между ознакомлением с условиями кейса и формулировкой первой гипотезы. Кроме того, применялся метод качественного контент-анализа протоколов решений, в ходе которого экспертная комиссия оценивала наличие или отсутствие промежуточных звеньев в логической цепи патофизиологических рассуждений. Исключение студентом этапов объяснения механизмов развития болезни при верном конечном ответе интерпретировалось как переход мозга на стратегию функциональной минимизации энергетических затрат.

Для оценки ментальных усилий и психофизиологической нагрузки применялась адаптированная шкала NASA-TLX, позволяющая субъективно оценить уровень фрустрации, умственного напряжения и усилий, затраченных на поиск решения. Это дало возможность сопоставить объективную результативность с внутренними физиологическими затратами обучающегося. С целью верификации навыка критического мышления и детекции феномена «алгоритмической предвзятости» в структуру эксперимента были внедрены кейсы-дистракторы, в которых искусственный интеллект намеренно предлагал логически неверные или неполные решения.

Математическая обработка полученных массивов данных осуществлялась с применением методов вариационной статистики. Учитывая характер распределения данных, использовались как параметрические, так и непараметрические критерии для оценки достоверности различий между группами. Весь объем статистических вычислений проводился с использованием современного программного обеспечения, что гарантировало высокую точность и воспроизводимость полученных результатов. Такой

комплексный методологический подход позволил не просто зафиксировать факт использования технологий, а глубоко проанализировать физиологическую трансформацию самого процесса мышления в условиях цифровой среды.

Результаты. Анализ данных, полученных в ходе эксперимента, выявил статистически значимые различия в когнитивных стратегиях между контрольной и экспериментальной группами. Основной физиологической закономерностью стало резкое сокращение временных затрат на принятие решения в группе, использовавшей искусственный интеллект. Среднее время диагностического поиска у студентов экспериментальной группы составило $3,5 \pm 0,8$ минут, что почти в четыре раза меньше показателей контрольной группы ($12,4 \pm 2,1$ минут, $p < 0,01$). Такое ускорение сопровождалось снижением субъективного ментального напряжения по шкале NASA-TLX до $3,2 \pm 0,7$ баллов против $8,5 \pm 0,5$ в контроле, что подтверждает гипотезу о переходе мозга в режим функционального энергосбережения при наличии внешней алгоритмической поддержки.

Несмотря на то, что формальная точность постановки диагноза в группе с ИИ была выше (88% против 72% в контрольной группе, $p < 0,05$), качественный анализ ответов выявил серьезную деградацию аналитической функции. Глубина патофизиологического обоснования в экспериментальной группе снизилась до $1,8 \pm 0,6$ баллов (по 5-балльной шкале), в то время как студенты, работавшие самостоятельно, демонстрировали средний балл $4,2 \pm 0,4$ ($p < 0,01$). Это указывает на то, что студенты при поддержке ИИ игнорируют промежуточные звенья патогенеза, фокусируясь исключительно на конечном результате.

Наиболее критическим результатом стало снижение бдительности и способности к критическому анализу. В условиях, когда ИИ выдавал намеренно ошибочную гипотезу, лишь 32% студентов экспериментальной группы смогли распознать ошибку и предложить верное решение. В контрольной группе уровень обнаружения диагностических ошибок составил 78% ($p < 0,01$). При этом зафиксирован феномен «цифровой самоуверенности»: индекс когнитивной уверенности у пользователей ИИ достиг 90%, что значительно превышает показатели контрольной группы (60%, $p < 0,05$).

Таким образом, результаты подтверждают, что использование ИИ в обучении ведет к формированию стратегии когнитивного упрощения. Мозг студента адаптируется к цифровой среде через подавление навыков глубокого анализа и критической верификации, подменяя реальную компетентность субъективным ощущением уверенности, основанным на авторитете алгоритма.

Выводы. На основании проведенного исследования влияния инструментов искусственного интеллекта на когнитивные стратегии студентов были сформулированы следующие выводы:

1. Доминирование стратегии когнитивного упрощения. Подтверждено, что использование ИИ в процессе обучения ведет к активации биологического механизма минимизации энергетических затрат мозга. Студенты склонны делегировать наиболее энергозатратные этапы мышления (афферентный синтез и принятие решения) алгоритму, что сокращает время решения задачи в 4 раза, но снижает глубину патофизиологического анализа более чем в 2 раза.

Блокада функциональных систем обучения. С позиций системной физиологии установлено, что получение готового ответа от ИИ выступает как «суррогатный акцептор результата действия». Это исключает стадию активного построения диагностической гипотезы и нарушает формирование устойчивых нейронных ансамблей, отвечающих за самостоятельный клинический анализ.

2. Эрозия критического мышления и бдительности. Выявлено статистически значимое снижение уровня критической оценки (до 32% против 78% в контроле). Мозг обучающегося в условиях «цифрового комфорта» переходит в режим пассивного восприятия, при котором критический фильтр коры больших полушарий ослабевает, делая будущего врача уязвимым перед алгоритмическими ошибками.

3. Формирование феномена цифровой самоуверенности. Зафиксирован парадокс, при котором снижение реальной глубины знаний сопровождается ростом субъективной уверенности в своей компетентности (до 90%). Это создает физиологическую основу для профессиональной инфантильности, когда наличие доступа к технологиям подменяет собой интернализированный опыт.

4. Необходимость физиологически обоснованных фильтров. Результаты диктуют необходимость внедрения в образовательный процесс специальных «когнитивных барьеров» — задач, требующих обязательной демонстрации патофизиологического анализа без использования цифровых ассистентов, для сохранения нейропластичности и когнитивной автономности будущего врача.

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METHODS FOR DETECTING TUBERCULOSIS IN HIV-INFECTED PATIENTS IN OUTPATIENT (POLYCLINIC) SETTINGS

Abstract. *Tuberculosis is one of the leading opportunistic infections among people living with HIV and remains a major cause of morbidity and mortality worldwide. Early diagnosis of tuberculosis in HIV-infected patients is particularly challenging in outpatient healthcare settings due to atypical clinical manifestations and limited diagnostic resources. This article analyzes the most accessible and practical methods for detecting tuberculosis in HIV-positive individuals under polyclinic conditions. Clinical screening, radiological examination, sputum smear microscopy, and rapid diagnostic tests are evaluated. The study emphasizes the importance of an integrated diagnostic approach to ensure early detection, timely initiation of treatment, and reduction of tuberculosis transmission in the community.*

Keywords: *tuberculosis; HIV infection; outpatient care; diagnosis; sputum microscopy; chest radiography.*

Relevance of the Study. Tuberculosis and HIV infection represent a serious global health problem, particularly in developing countries. HIV significantly increases the risk of developing active tuberculosis due to progressive immunodeficiency. According to the World Health Organization, tuberculosis is the leading cause of death among people living with HIV. In outpatient healthcare facilities, early diagnosis of tuberculosis is often complicated by limited access to advanced laboratory and molecular diagnostic methods.

In HIV-infected patients, tuberculosis frequently presents with non-specific or atypical symptoms, which may lead to delayed diagnosis and late initiation of treatment. Polyclinics serve as the first point of contact for most patients; therefore, improving tuberculosis detection at this level is essential. The use of affordable, simple, and effective diagnostic methods in outpatient settings plays a key role in reducing disease burden and preventing further transmission.

Aim of the Study. The aim of this study is to evaluate the most accessible and effective methods for detecting tuberculosis in HIV-infected patients in outpatient (polyclinic) conditions.

Materials and Methods. This study was conducted based on the analysis of outpatient medical records of HIV-infected patients who sought medical care at polyclinic healthcare facilities. The diagnostic process included a comprehensive clinical assessment, evaluation of epidemiological history, physical examination, and identification of tuberculosis-related symptoms such as prolonged cough, weight loss, fever, and night sweats.

Chest radiography was used as a primary imaging method for detecting pulmonary tuberculosis. Sputum smear microscopy for acid-fast bacilli using Ziehl–Neelsen staining was performed in patients with suspected pulmonary involvement. In addition, rapid immunological and screening tests were applied when available. The effectiveness of each diagnostic method was assessed based on detection rates and clinical confirmation of tuberculosis.

Results. The analysis demonstrated that clinical screening remains the most accessible and widely used initial diagnostic method in outpatient healthcare settings, particularly in polyclinics and other primary care facilities where resources may be limited. Clinical evaluation typically includes a detailed patient history, assessment of risk factors such as previous tuberculosis exposure, HIV disease stage, immunosuppressive therapy, and the presence of comorbidities. It also involves a thorough physical examination to identify possible signs of tuberculosis, including prolonged cough, fever, night sweats, weight loss, and general malaise. Despite being inexpensive and easily implementable, relying solely on clinical screening is insufficient for early and accurate tuberculosis detection, especially in HIV-infected patients, because the clinical manifestations in this population are often atypical or masked by immunodeficiency. For instance, many HIV-positive patients may present without the classical symptoms of tuberculosis, such as persistent cough or cavitory lesions, leading to delayed suspicion and subsequent diagnosis.

Chest radiography, as an additional diagnostic tool, has demonstrated moderate value in identifying pulmonary tuberculosis. Radiographs can reveal patterns such as infiltrates, nodular lesions, or pleural effusions. However, the diagnostic utility of chest X-rays in HIV-infected patients is limited by atypical and non-specific findings. In many cases, radiological manifestations differ from classical tuberculosis presentations observed in immunocompetent individuals. For example, instead of the upper lobe cavitory lesions typical of tuberculosis, HIV-infected patients may display diffuse, bilateral, or lower-lobe infiltrates that can easily be misinterpreted as other pulmonary infections, including bacterial pneumonia or fungal infections. Therefore, while chest radiography can provide valuable supportive information, it cannot reliably confirm tuberculosis in isolation, especially in early or subclinical stages of the disease.

Sputum smear microscopy remains a practical, affordable, and widely applied method for detecting *Mycobacterium tuberculosis* in outpatient settings. It allows for direct visualization of acid-fast bacilli and provides rapid results within a few hours to a day. However, the sensitivity of this method is reduced in HIV-positive patients, particularly those with a low bacterial load or extrapulmonary tuberculosis, which is more common in immunocompromised individuals. Despite these limitations, sputum smear microscopy continues to be an essential diagnostic tool due to its low cost, simplicity, and feasibility in resource-constrained environments. To enhance detection rates, multiple consecutive sputum samples are often examined, improving the likelihood of identifying active tuberculosis.

Discussion. Early diagnosis of tuberculosis in HIV-infected patients remains a major challenge in outpatient healthcare practice. Immunosuppression alters the clinical course of tuberculosis, often leading to atypical manifestations and diagnostic difficulties. In polyclinic settings, limited access to advanced diagnostic technologies necessitates reliance on simple and cost-effective methods.

The findings of this study confirm that no single diagnostic method is sufficient for reliable tuberculosis detection in HIV-infected patients. Instead, a combination of clinical evaluation, radiological examination, and bacteriological confirmation should be used. Strengthening diagnostic capacity at the outpatient level is essential for improving patient outcomes and reducing tuberculosis transmission.

Conclusion. Early detection of tuberculosis in HIV-infected patients in outpatient settings is achievable through the rational use of accessible diagnostic methods. Clinical screening, chest radiography, and sputum smear microscopy remain essential tools in polyclinic practice. The implementation of an integrated diagnostic approach enables earlier diagnosis, timely treatment initiation, and improved prognosis for patients with HIV-associated tuberculosis.

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SIMULTANEOUS SURGICAL PULPECTOMY IN PROSTATE CANCER MANAGEMENT

Abstract: *Simultaneous pulpectomy for prostate cancer is a surgical approach aimed at reducing androgen production by removing testicular tissue. This method is used as a form of hormonal therapy in advanced or hormone-sensitive prostate cancer. The procedure helps slow tumor progression and alleviate symptoms associated with disease spread.*

Keywords: *Prostate cancer, pulpectomy, hormonal therapy, androgen deprivation, surgical treatment*

Prostate cancer (PC) is currently one of the most pressing diseases in urology oncology. Its detectability increases annually, which is associated with the constant improvement of early diagnosis. The average incidence of prostate cancer in the world is 25.3 per 100 thousand population. In Russia, there are still high rates of PC detection at late stages: at stage III - in 34.9-37.6% and at IV - 18.5-19.7% of patients [Chissov V.I., Starinskiy V.V., Petrova G.V. 2009], which does not allow the full use of radical methods of treatment. Currently, the main method of treatment is antiandrogenic drug therapy. Due to the high cost of drugs, surgical castration is also widely used in clinical practice.

Removal of both testicles as a whole can lead to stress in some patients, in connection with which there is a need to develop medico-legal aspects of this problem. Orchiectomy helps to control the course of the disease and reduce its symptoms in about 90% of cases.

Prostate cancer is still relevant in the entire set of problems, as evidenced by numerous congresses on its diagnosis and treatment. This disease is a complex problem of modern medicine, being the most frequent pathology among tumors of the genitourinary system. Improvement of living conditions and the related increase in its duration in developed countries leads to an aging population, and, consequently, to an increase in the incidence of malignant neoplasms; PC is no exception in this: in 2010, 26,268 new cases of PC were registered in the Russian Federation. About 500 thousand cases of prostate cancer are diagnosed in the world every year. The increase in the incidence of prostate cancer reaches 3% per year, which makes it possible to predict a doubling of the number of registered cases by 2030. Due to the prevalence of the process, less than 50% of patients manage to carry out radical treatment, and this leads to an increase in the rate of disability and a decrease in the quality of life. The peak incidence occurs in the 6-7th decade of life. Many men at this age have concomitant diseases, which does not allow radical

surgery. Alternative methods are radiation therapy or its combination with hormonal therapy. Among all hormone-dependent tumors, prostate cancer is the most sensitive to hormonal influences.

Due to the peculiarities of the clinical course, 60 to 80% of patients with prostate cancer have common forms of the disease at the initial treatment. Despite the fact that HT effectively eliminates the symptoms of the disease in patients with metastatic prostate cancer, there are still no convincing data on the effect of HT on life expectancy. The growth, proliferation and development of pancreatic cells are largely dependent on androgens. Testosterone is not directly responsible for the onset of prostate cancer, but plays an essential role in regulating the mechanism of growth and development of tumor cells. The choice of methods of treatment for locally advanced and disseminated prostate cancer and their sequence depend on the general condition of the patient and the sensitivity of the tumor to one or another effect. The main directions in the treatment of locally advanced and advanced prostate cancer: pathogenetic, cytoreductive, symptomatic. The essence of therapeutic measures is to maximally reduce the concentration of endogenous testosterone - the so-called androgenic blockade. For common forms of the disease, patients are treated with various options for hormonal drug therapy. Ideal therapy for prostate cancer involves blocking the action of androgens at the cellular level of the prostate gland, which is realized by a decrease in the binding of dihydrotestosterone to the nuclear receptor during competitive inhibition or a decrease in the concentration of the cytoplasmic androgen receptor. Orchiectomy is an effective method of reducing the main biologically active androgen, testosterone, in the blood, but does not affect the production of adrenal androgens. Surgical castration is still considered the "gold standard" for antiandrogen therapy. Removal of the testes, which are the main source of androgens, leads to a significant decrease in testosterone levels and causes a hypogonadal state, although a negligible testosterone level remains (castration level). Bilateral orchiectomy is an easy surgical operation performed under local anesthesia and has virtually no complications. This is a quick (less than 12 hours) way to achieve castration testosterone levels. The standard castration level is considered to be $<20 \text{ ng / dL}$. The main disadvantage of this method is the negative psychological effect. The irreversibility of surgical castration is an obstacle to intermittent therapy. A tumor reduction of 50-70% can be achieved with hormone therapy. Most researchers confirm that the reaction of the body and the prostate can be determined using available methods: by objectively reducing the tumor, reducing the level of circulating PSA, or simply by improving indicators of quality of life, such as pain, appetite, increased work capacity. testosterone by 95%, androgens synthesized by the adrenal glands continue to be metabolized to DHT in the pancreas tissue, stimulating cell growth and proliferation. The action of adrenal androgens can be blocked by the use of antiandrogens after surgical or medical castration, which is called MAB. With all the effectiveness of antiandrogen therapy, which is basically palliative, it is able to stop the growth of cancer cells, change the biological potential of the tumor, suspend the processes of further metastasis, "reduce" the stage of the

tumor process. In recent years, thanks to the introduction of new diagnostic methods into clinical practice (TRUS, CT, MRI, study of blood PSA concentration), the disease began to be detected much more often at earlier stages. Nevertheless, 50-70% of patients seek medical help for the developed complications caused by prostate cancer (10,16,17,18).

Prostate cancer (PC) is one of the most common malignant neoplasms in men of advanced and old age, which accounts for 4.5% of all malignant neoplasms or 12% of all malignant tumors in men. The peak incidence is observed after 70 years. About 500 thousand cases of prostate cancer are diagnosed in the world every year. In 1971, Professor A. Shelly isolated native LHRH, and in 1977 he received the Nobel Prize for his work on the study of peptide hormones in the brain. This has led to the development of LHRH agonist therapy as a means of medical castration. Hormone therapy is currently the main treatment for locally advanced cancer. The choice of the type and timing of hormone therapy (HT) is based on the opinion of the physician and the informed consent of the patient. In the case of development of resistance to HT, the survival rate decreases. Thus, prevention of hormone resistance and new therapies are important areas of research.

Unlike all other authors, we decided to make an incision along the Wesling's line along the back, which does not at all affect the accessibility of the scrotal organs, but at the same time enhances the cosmetic appearance of the postoperative scar, i.e. its visibility is absolutely lost, especially when the body is upright. In patients with prostate cancer T4N0M0, bilateral pulpectomy followed by antiandrogen treatment was performed using this approach. It should be noted that regardless of the method of suturing the skin of the scrotum with a single operative access along the Wesling's line, the formed postoperative scar looked like a suture of the scrotum. When the patients were re-examined 1 and 3 months after the surgery, a good cosmetic effect was noted. This approach is especially convenient for performing bilateral orchiectomy or pulpectomy in advanced stages of prostate cancer or in case of testicular tumors. In addition, when suturing the skin of the scrotum, such an access leaves an almost imperceptible postoperative scar resembling a Wesling's line.

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BIOMARKERS ARE POTENTIAL PREDICTORS FOR EARLY DIAGNOSIS AND PROGNOSIS OF PREECLAMPSIA

Abstract. *In recent years, biomarkers have been considered among the most promising tools for the early diagnosis and prognosis of preeclampsia, a complex multisystem condition that remains a leading cause of maternal and perinatal morbidity and mortality. Current research shows that disturbances in angiogenic balance, endothelial function, placental perfusion, immune regulation, and metabolic processes arise long before the clinical manifestation of the disease. Therefore, circulating biomarkers reflecting these pathophysiological changes can serve as valuable predictors of the risk of developing preeclampsia in early pregnancy.*

The use of biomarkers in clinical practice facilitates the development of a personalized approach to pregnancy management, improves maternal and fetal monitoring, and reduces the likelihood of severe complications. The implementation of biomarker technologies is an important step toward personalized medicine in obstetrics and more effective preeclampsia management.

Keywords: *preeclampsia, pregnancy, risk factor, maternal mortality.*

Introduction. Although great efforts have been made to elucidate the etiology and pathogenesis of preeclampsia in pregnancy, the processes involved in its development remain largely unknown. Most efforts in the last decade have relied on biomarkers for the prediction or diagnosis of preeclampsia, including the antiangiogenic factor sFlt-1 (soluble FMS-like tyrosine kinase-1), the angiogenic factors PlGF (placental growth factor), and PP13 (placental protein-13). These marker proteins have been shown to predict the development of preeclampsia. are still under debate and their actions have been described separately so far. The three markers mentioned above are said to induce preeclampsia during pregnancy and act synergistically, and when complicated by preeclampsia, it is necessary to protect the mother from harmful effects released from the placenta [7].

Most of these markers indicate impaired placentation, with insufficient development of spiral arteries in the uterus leading to trophoblast invasion and reduced placental perfusion, resulting in ischemia in the placenta, which in turn leads to the release of pro-inflammatory factors, platelet activation, endothelial dysfunction, and maternal renal failure [12].

Studies have shown that maternal plasma markers, pregnancy-associated plasma protein-A (PAPP-A) and placental growth factor (PlGF), are early predictors

of preeclampsia and have high predictive value. The level of β -hCG in plasma increases between 11 and 13 weeks of pregnancy [2].

Placental growth factor (PIGF) is a glycosylated iron glycoprotein, a member of the vascular endothelial growth factor family. It binds to vascular growth factor receptor-1, which is increased during pregnancy. PIGF is synthesized by villous and extravillous cytotrophoblasts and has vasculogenic (neovascular) and angiogenic functions. It contributes to angiogenesis by changing the vascular phenotype from branched to unbranched and regulating capillary networks. Alterations in the level of placental growth factor or its inhibitory receptors may play an important role in the development of preeclampsia. In the setting of preeclampsia, placental growth factor (PIGF) production by the placenta is reduced, and plasma PIGF concentrations decrease with the onset of clinical signs of preeclampsia [6].

In addition, a decrease in PIGF levels is associated with pregnancy. Clinical signs of preeclampsia also occur in the first and second trimesters [9].

Soluble fms-like tyrosine kinase-1 (sFlt1) is a glycosylated protein with a molecular weight of 90-110 kDa, which is a soluble form of vascular endothelial growth factor (VEGF) and placental growth factor (PIGF). This protein lacks transmembrane and intracellular domains, and is a "working" cellular receptor specific for the Flt-1 molecule. Normally, sFlt-1 is detected in physiological and pathological pregnancy. The concentration of sFlt-1 increases significantly even before the onset of preeclampsia. In clinical practice, the concentration of the sFlt-1-e5a isoform is used, the expression of which is associated with syncytiotrophoblast and cytotrophoblast [5].

The concentration of sFLT-1 increases with increasing gestational age, which also depends on the mother's age. Its concentration decreases if the mother is overweight, increases with the use of assisted reproductive technologies (ART), and is lower in nulliparous women than in pregnant women [1].

Recent studies have shown that the ratio of soluble fms-like tyrosine kinase-1 (sFLT-1) and placental growth factor PIGF is a very accurate marker for identifying a group at high risk of developing preeclampsia [4].

A number of foreign studies have shown that a study involving 1,149 patients showed that the sFlt-1/PIGF ratio is a clear marker for an increased risk of developing preeclampsia, 20-30 There were more than 85 cases of preeclampsia during the first week of pregnancy and more than 110 cases of preeclampsia during the first week of pregnancy [8].

Currently, a number of anti-inflammatory cytokines (TNF α , IL-1, IL-6), as well as biochemical markers - angiogenesis factors are being additionally studied for the early diagnosis of the development of preeclampsia in pregnant women. These include: PIGF - placental growth factor or vascular endothelial growth factor. Its content increases significantly in the second trimester of pregnancy and remains constant throughout this period, by the end of pregnancy, sFlt-1, soluble PIGF receptors decrease slightly [10].

According to the authors, insufficient increase in PlGF concentration in early pregnancy and increased sFlt-1 concentration are highly likely to cause preeclampsia.

The detection of sFlt-1 is effective in the second half of pregnancy, as well as the sFlt-1/PlGF ratio, which indicates the level of angiogenic activity. In addition to the above data, impaired blood flow in the uterine arteries can play a predictive role in predicting preeclampsia [15].

The aforementioned biochemical markers PAPP-A and PlGF are among the best-studied laboratory parameters in early preeclampsia studies.

At the Fetal Medicine Foundation (UK), a study was conducted to evaluate the construction of a risk model using the Bayesian method, in which anamnesis and instrumental studies (uterine artery pulsatility index (PI)), mean arterial blood pressure, PAPP-A and PlGF are studied at 11-13 weeks of pregnancy, and when these indicators are studied together, it is possible to more accurately identify high-risk groups for the development of preeclampsia [11].

Pregnancy-associated plasma protein-A (PAPP-A) is a glycoprotein produced primarily by placental trophoblast cells and may reflect the degree of placental ischemia or hypoxia.

PAPP-A can regulate the activity of insulin-like growth factors and thus influence the infiltration of placental trophoblast cells, which is therefore very important for normal pregnancy [14].

However, low levels of PAPP-A in plasma early in pregnancy may be associated with preeclampsia. PAPP-A has low plasma concentrations in pregnant women complicated by preeclampsia, and its use alone is not effective in predicting preeclampsia. Some researchers use PAPP-A in combination with Doppler testing to achieve better results in predicting preeclampsia [13].

It is noted that a study of 8839 women showed that PAPP-A levels of five percent or less are associated with a higher risk of preterm birth, intrauterine growth retardation, preeclampsia, and stillbirth. Predictive models for estimating individual risk of late-term preeclampsia are based on a combination of first-trimester PAPP-A levels and second-trimester sFlt1/PlGF ratios. (Detection rate: 87.5%, false positive rate 5%). With the development of preeclampsia, the concentration of PlGF and PAPP-A in maternal plasma decreases during pregnancy. These proteins are produced by trophoblasts, and their decreased plasma concentration delays the formation of the placenta [14].

AFP (alpha-fetoprotein) is a major plasma protein produced by the fetal liver and gallbladder. AFP is similar to the fetal analogue of serum albumin—they have similar physical properties and are inversely proportional to each other. Elevated levels of AFP in the second trimester of pregnancy are a good predictor of preeclampsia [5].

Human chorionic gonadotropin (HCG) is a hormone produced by trophoblast cells from 10-12 weeks of pregnancy. It has been shown that HCG stimulates angiogenesis, so today, according to clinical indications, its concentration in the

second trimester of pregnancy is considered to be a basis for suspecting the presence of preeclampsia if it is > 3 MoM [8].

As a test for predicting PE in the third trimester of pregnancy, high AFP levels (>2 MoM) have been shown to have a sensitivity of 11% and a specificity of 96% [7].

sFlt-1 binds to both VEGF-A and PlGF, inactivating their functions, so an increase in its blood concentration leads to various pregnancy complications, especially preeclampsia [1].

Studies have shown that in patients with preeclampsia, sFlt1 is increased and PlGF is decreased, and the increase in Flt1 may be associated with a decrease in VEGF and PlGF in the blood. sFlt1 and PlGF have shown high sensitivity in predicting the onset of PE from the second trimester of pregnancy [13].

In the literature, it has been found that an increased sFlt:PlGF ratio may be of some importance in predicting PE [6]. Due to the potential role of sFlt1 and PlGF in the pathogenesis of PE and their predictive role, they have become high-ranking biomarkers for PE, especially randomized trials, although further studies are still required to assess their value.

Thus, the levels of angiogenic proteins (sFlt-1, PlGF, and sEng) in the blood of pregnant women change several weeks before the onset of clinical signs and symptoms of the disease, which allows their quantitative parameters to be used for early non-invasive diagnosis of PE [3]. In the second trimester, the ratio of angiogenic factors PlGF/sEng and PlGF/sFlt is the best prognostic indicator.

At the same time, impaired placental angiogenesis is accompanied not only by PE, but also by other pathologies of pregnancy: premature birth, premature placental abruption, low-lying placenta, intrauterine fetal death. To increase the accuracy of predicting PE, a number of researchers have used complex parameters - the concentration of sFlt-1 / PlGF, PlGF / sEng, sFlt-1 / sEng, sFlt-1 / PlGF + sEng, and other combinations of these factors [10].

Such combinations allow for effective differentiation of PE from each indicator separately and in combination with Doppler data from the second trimester - with sensitivity reaching almost 100%, specificity reaching 98-99%.

Many studies have shown that excess sFlt-1 production is associated with an increased risk of PE. It has been proven that excessive amounts of this factor are released from the placenta under the influence of proteases. Plasma sFlt-1 levels are significantly higher in pregnant women with preeclampsia compared to women with normal pregnancies in the first and second trimesters [13].

Thus, the placentally secreted marker sFlt-1 may be a prognostic or diagnostic marker for preeclampsia. Developing a precise assay for these variants could significantly improve early and late disease screening (in combination with PlGF and alone).

The right test could significantly accelerate obstetric care worldwide without increasing the economic burden on financially challenged health systems. In addition, a better understanding of the pathways involved in the release of

antiangiogenic factors from the placenta and the role played by different splicing variants may help improve therapeutic design and evaluate drug efficacy.

Thus, high levels of antiangiogenic factors and low levels of proangiogenic factors are useful biomarkers for early detection and prognosis of preeclampsia.

Thus, the search for markers that contribute to the diagnosis and differentiation of hypertension in pregnant women is currently an urgent problem in obstetrics. Timely diagnosis and determination of the nature of the identified pathology can have a decisive impact on the tactics of managing pregnant women and the timely initiation of treatment, pregnancy outcomes, and the health of newborns.

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USE OF THE DRUG "KOBAVIT" TO PREVENT COMPLICATIONS FROM THE GASTROINTESTINAL TRACT IN BURN DISEASE

Abstract: *The use of cobavit for the prevention of gastrointestinal complications in burn patients demonstrated superior efficacy in 33 patients compared to standard therapy in 30 patients.*

Key words: *burn disease, complication, prevention.*

One of the serious complications of severe burn disease is the development of acute gastroduodenal erosions and ulcers. Gastroduodenal hemorrhage (GDH) occurs in 15-25% of patients with severe burns and most often occurs in the burn toxemia stage. The relevance of this issue is due to the frequency of this complication in patients with extensive wound processes of various etiologies, which increases the cost of treatment for this group of patients, prolongs recovery time, and sometimes leads to unfavorable outcomes. In recent years, interest in acute erosive and ulcerative lesions of the gastrointestinal tract in patients with severe burns has increased due to their increasing frequency, the difficulty of timely diagnosis, and the low effectiveness of conservative and surgical treatment [2].

One of the main causes of acute damage to the stomach and duodenum (DU) are critical conditions such as severe thermal injury, sepsis, multiple injuries, etc. [4].

Acute symptomatic ulcers of the upper gastrointestinal tract (ASU) are typically defined as acute, often superficial, and multiple erosive-ulcerative lesions of the upper gastrointestinal tract (EGT) that occur in patients with severe burns. The most common cause of acute upper gastrointestinal bleeding is thermal injuries, accounting for approximately 30-40% of cases. Developing EGTs not only significantly aggravate the course of burn disease but also increase the mortality rate to 70-80% [4].

Conducting preventive antisecretory therapy allows us to reduce the incidence of GDC in victims of this category to 7–11% [5].

A comprehensive approach to the prevention of GDC, including infusion, metabolic and antisecretory therapy, as well as early enteral support, can reduce the incidence of this complication of burn disease to 5–7% [5].

The pathogenesis of developing bleeding remains poorly understood. According to laboratory studies, shockogenic thermal injury leads to a significant increase in cortisol secretion, the level of which remains elevated for 10–14 days of treatment [2].

Excess hydrochloric acid causes erosive and ulcerative lesions of the stomach and duodenum. These changes are multiple and most often localized in areas of the mucosa that directly produce hydrochloric acid and pepsin, that is, in the fornix and body of the stomach [1].

This causes a significant amount of fluid to leak into the interstitial space, leading to hypovolemia, hemoconcentration, and centralized circulation, leading to microcirculation impairment. A common manifestation of developing compensatory vasoconstriction is a 50–60% reduction in blood supply to the gastric mucosa. Persistent spasm of the celiac vessels with impaired arterial perfusion and venous outflow leads to blood stagnation, plasma leakage into the extravascular space, local hemoconcentration, and subsequent microthrombosis, resulting in areas of ischemic necrosis of the mucosa [1].

Burn injury provokes an immediate response from all organs and systems, which are not always able to maintain homeostasis and are often subject to pathophysiological and morphological damage. One such target system is the gastrointestinal tract. After severe burns, intestinal ischemia and hypoxia disrupt the intestinal epithelial barrier and intestinal bacterial translocation, leading to serious complications such as systemic inflammatory response syndrome, sepsis, and multiple organ failure. Peritonitis or gastrointestinal bleeding accounted for 88.2% of deaths among patients with gastrointestinal dysfunction [1-5].

Gastric damage is caused by an imbalance between the aggressive and protective factors to which the gastric mucosa is exposed; when the protective agents are overloaded and therefore unable to provide sufficient protection, damage occurs as a result of histopathological changes [1-3].

Fundamental and current data on ulcers occurring in burn patients has led to widespread recognition of ulcer prevention. Along with antisecretory therapy using proton pump inhibitors (PPIs), a gentle diet, eliminating unhealthy habits, and stress prevention also play an important role [3].

Mixed protein supplementation reduces the systemic inflammatory response induced by burn injury, attenuates inflammatory cell infiltration, and improves kidney and liver function. Mixed protein supplementation is known to reduce burn-induced inflammatory cell infiltration and protect liver and kidney function. This study suggests a new and promising potential nutritional therapy for burn patients aimed at reducing the inflammatory response and protecting organ function [2,5].

In Uzbekistan, scientists have developed a drug called Cobavit. It is a complex compound of cobalt, glutamic acid, and vitamin U, possessing antioxidant, immunostimulatory, and inductive effects. The drug also stimulates hematopoiesis and has a positive effect on ulcer healing. However, its effect on the protective mechanisms of the mucous membrane has not been sufficiently studied [2-3].

The aim of the study: to study the effectiveness of using cobavit in combination therapy for the prevention and treatment of duodenal ulcer in burn disease.

Materials and methods: Sixty-three patients aged 18 to 55 years who suffered from burns and as a result had pathological changes in the gastrointestinal

tract in the Bukhara branch of the Republican Scientific Center for Emergency Medical Care in 2023-2025 were examined in the Burn and Toxicology Resuscitation Department. Of these, 31 were men and 32 were women. The patients were divided into two groups. The first group (30 patients) received proton pump inhibitors (PPIs): omeprazole, pantoprazole (40 mg/day 2 times a day) for 10 days. The second group (33 patients) received cobavit in a daily dose of 20 mg (1 tablet 2 times a day) for 10 days in addition to a traditional PPI.

The diagnosis of pathological changes in the gastrointestinal system was confirmed by clinical, instrumental and laboratory research methods. Inclusion criteria for the study: patients over 18 years of age, esogastroduodenoscopy examination, patient consent to the study.

All patients underwent a comprehensive clinical, laboratory and instrumental examination. Random selection of patients in research groups was carried out taking into account age and gender composition, causes of appearance, clinical appearance, results of laboratory and instrumental research methods. Treatment effectiveness was evaluated based on the following parameters:

1) changes in the patient's subjective complaints and objective disease manifestations;

2) the condition of the mucous membrane of the stomach and duodenum was studied based on the results of endoscopic examination.

Results and discussion: Before treatment, epigastric pain was observed in 24 patients, heartburn in 12 patients, and nausea in 10 patients out of all 33 patients in the second group. The proportion of clinical symptoms in the 30 patients in the first group did not differ significantly from the first group: epigastric pain was observed in 25 patients, heartburn in 15 patients, and nausea in 14 patients. After a 10-day course of treatment, the main symptoms of the disease (pain, heartburn, nausea, bleeding) disappeared in the first and second groups. In addition, as shown in Table 1, the time of disappearance of the main clinical symptoms was observed much earlier in patients receiving combination therapy with Cobavit than in patients receiving PPIs.

Table 1.

Dynamics of disappearance of the main clinical symptoms in patients in the analyzed groups

Patient group	Patients	Epigastric pain	Nausea	Boiling of the spleen
Proton pump inhibitor (first group)	30	6,8±0,24*	6,3±0,48	6,1±0,31*
Proton pump inhibitor+cobavit (second group)	33	4,2±0,16	5,0±0,26	3,4±0,22

* – significance of changes compared to the comparison group at $r < 0.05$.

The study showed that patients in both groups had new ulcers detected by endoscopic examination. Ulcers ranging from 3 to 9 mm predominated in both groups. The average ulcer size in group 2 was 6.58 ± 0.77 mm, and in group 1 it was 6.72 ± 0.49 mm.

Particular attention should be paid to comparing the reparative effectiveness of combination therapy with Cobavit and the treatment regimen with PPIs. After a ten-day course of combination therapy (group 2), ulcer healing was observed in 28 out of 33 patients (84.8%). The remaining 5 patients had a significant positive endoscopic dynamic, which was manifested by a 2-3-fold decrease in ulcer volume (the average residual ulcer volume was 2.2 ± 0.35 mm).

In group 1 patients (PPI was used) during controlled esophagogastroduodenoscopy, 10 days after the start of treatment, only 19 out of 30 patients (63.3%) had complete wound healing. In eleven patients (36.6%), the wound size decreased by 2-3 times (on average to 2.8 ± 0.7 mm). These observations indicate a significant reparative effect of combined therapy in the kobavit group: wound healing was observed in almost 86.6% of patients within 10 days after treatment.

Thus, the results of the study partially confirm the ability of combined gastroprotection against acute ulcers in combination with Cobavit to enhance the differentiation of the newly formed mucosa and stimulate epithelialization of the ulcer defect. In both analyzed groups of patients with acute gastrointestinal ulcers, a direct relationship was observed between the effectiveness of the ulcer defect scar and its initial size. With PPI, small ulcers were scarred in 89.8% of cases, and medium ulcers in 48.2%. Combination therapy with Cobavit led to the same degree of scarring for small and medium-sized ulcers (91.2%). When analyzing the frequency of ulcer scarring by groups depending on the severity of acute ulcers, a progressive decrease in the frequency of scarring was observed with increasing severity of the disease. However, while the incidence of wound scarring was similar in mild and severe cases (97.3% and 2.3%), combination therapy with Cobavit was 2.3 times more effective than PPI therapy in patients with moderate disease (41.3% in the first group and 92.5% in the second group). These observations further confirm the high reparative effect of combination therapy with Cobavit and allow us to predict the course of wound healing.

Therefore, the positive changes observed in the second group, which additionally received Cobavit, are probably due to the presence of glutamic acid and vitamin U in Cobavit, which have a strong antioxidant and reparative effect. The active substance of vitamin U is methylmethionine, which normalizes the secretion of hydrochloric acid and accelerates the healing of the resulting wound. The element cobalt also plays an important role. As a biogenic microelement, cobalt is used to synthesize cobalamin and has an anti-anemic effect, which is important for the treatment of acute wounds. Since the healing wound contained acute wounds caused by burns, 2 types of antibiotics, which are part of the triple therapy for the treatment of ulcer disease, were not added to the healing wound. The inclusion of Cobavit in

the combination therapy of patients with peptic ulcer disease has been proven to be effective.

Conclusion: In patients with peptic ulcer disease, the use of PPIs in combination with cobavit helps to reduce the duration of clinical symptoms and ulcer healing time in the gastrointestinal mucosa compared to standard conventional therapy.

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**SUN'IY INTELLEKT TEXNOLOGIYALARI ASOSIDA
RAQAMLASHTIRILGAN MUHITIDA TIBBIYOT TALABALARI
KASBIY KOMPETENTLIGINI RIVOJLANTIRISH METODIKASINI
TAKOMILLASHTIRISH**

***Annotatsiya.** Ushbu maqolada sun'iy intellekt (SI) texnologiyalarini integratsiya qilish orqali raqamli ta'lim muhitida tibbiyot talabalari kasbiy kompetentligini rivojlantirish metodikasini takomillashtirish yo'llari tahlil qilinadi. Tadqiqot kompetensiyaga yo'naltirilgan yondashuvga asoslanib, intellektual o'qituvchi tizimlar, adaptiv ta'lim platformalari, ta'limiy analitika hamda virtual klinik simulyatsiyalar kabi SI asosidagi vositalarning pedagogik imkoniyatlariga e'tibor qaratadi. Maqolada klinik fikrlash, raqamli savodxonlik, qaror qabul qilish ko'nikmalari va uzluksiz kasbiy rivojlanish kompetensiyalarini shakllantirish masalalariga alohida urg'u berilgan.*

***Kalit so'zlar.** kasbiy kompetentlik, tibbiyot ta'limi, raqamli ta'lim muhiti, sun'iy intellekt texnologiyalari, kompetensiyaga asoslangan yondashuv, adaptiv ta'lim, intellektual o'qituvchi tizimlar, raqamli savodxonlik, klinik fikrlash*

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**IMPROVING THE METHODOLOGY FOR DEVELOPING
PROFESSIONAL COMPETENCE OF MEDICAL STUDENTS IN A
DIGITALIZED ENVIRONMENT BASED ON ARTIFICIAL
INTELLIGENCE TECHNOLOGIES**

***Annotation.** This article examines ways to improve the methodology for developing the professional competence of medical students in a digital educational environment through the integration of artificial intelligence (AI) technologies. The study is grounded in a competency-based approach and focuses on the pedagogical potential of AI-driven tools such as intelligent tutoring systems, adaptive learning platforms, learning analytics, and virtual clinical simulations. Particular attention is given to the formation of clinical thinking, digital literacy, decision-making skills, and continuous professional development competencies. The article proposes a methodological framework that combines traditional medical education with AI-*

supported personalized learning, data-driven assessment, and interactive digital resources.

Keywords. *professional competence, medical education, digital educational environment, artificial intelligence technologies, competency-based approach, adaptive learning, intelligent tutoring systems, digital literacy, clinical thinking*

Kirish.

Raqamli transformatsiya sharoitida tibbiyot ta'limi sun'iy intellekt (SI) texnologiyalarining jadal rivojlanishi ta'sirida tub paradigmatic o'zgarishlarni boshdan kechirmoqda. Ta'lim jarayonlariga SI ni integratsiya qilish nafaqat global raqamlashtirish tendensiyalarini aks ettiradi, balki kelajakdagi sog'liqni saqlash mutaxassislarini zamonaviy klinik amaliyot uchun zarur bo'lgan kompetensiyalar bilan ta'minlashga bo'lgan dolzarb ehtiyoj bilan ham uyg'unlashadi. So'nggi tizimli tahlillarga ko'ra, adaptiv elektron ta'lim, intellektual o'qituvchi tizimlar va virtual bemor simulyatsiyalarini o'z ichiga olgan SI bilan boyitilgan raqamli ta'lim muhitlari an'anaviy o'qitish usullariga nisbatan ancha yuqori o'quv natijalarini namoyon etib, tibbiyot talabalari orasida bilimni saqlab qolish va klinik fikrlash ko'nikmalarining sezilarli darajada yaxshilanishiga olib kelmoqda [1].

Materiallar va usullar. Mazkur tadqiqotda taklif etilgan metodologik asos aralash (mixed-methods) tadqiqot dizayniga tayangan bo'lib, u nazariy modellashtirish, empirik tahlil va bashoratli baholashni o'z ichiga oladi. Metodologiya asosiy tamoyili kompetensiyaga asoslangan yondashuv hisoblanadi hamda u raqamli pedagogika va sun'iy intellektni integratsiya qilish modellarini qo'llash bilan boyitilgan.

Ishtirokchilar va ma'lumotlar manbalari. Metodologik model bakalavriat bosqichida tahsil olayotgan tibbiyot talabalari bilan amalga oshirilishini nazarda tutadi. Statistik ishonchlilikni ta'minlash maqsadida odatda 100–150 nafar talaba ishtirok etadigan guruhlar shakllantiriladi. Ta'limiy analitika ma'lumotlari raqamli platformalardan olinib, ular o'quv faoliyatiga sarflangan vaqt ko'rsatkichlari, baholash natijalari, adaptiv teskari aloqa jurnallari hamda simulyatsion mashg'ulotlar samaradorligi indikatorlarini o'z ichiga oladi.

Sun'iy intellektga asoslangan o'qitish vositalari. Metodologiya quyidagi sun'iy intellekt texnologiyalarini integratsiya qilishni nazarda tutadi:

- talabalar o'zlashtirish darajasiga qarab o'quv materiallari murakkabligini dinamik tarzda moslashtiruvchi adaptiv ta'lim platformalari;
- shaxsiylashtirilgan tavsiyalar va avtomatlashtirilgan formatif baholashni ta'minlovchi intellektual o'qituvchi tizimlar;
- klinik ko'nikmalarni rivojlantirish va diagnostik tayyorgarlik uchun mo'ljallangan SI bilan qo'llab-quvvatlangan virtual simulyatsiyalar;
- kasbiy kompetentlik shakllanishini uzluksiz monitoring qilishga xizmat qiluvchi ta'limiy analitika paneli (dashboard)lari.

Avvalgi empirik modellar shuni ko'rsatadiki, ushbu vositalarni kompleks qo'llash raqamli bo'lmagan metodikalarga nisbatan kasbiy kompetentlikni rivojlantirish samaradorligini 30–45 foizga oshirishi mumkin.

Natijalar. Sun'iy intellekt (SI) texnologiyalariga asoslangan raqamli ta'lim muhitida tibbiyot talabalarining kasbiy kompetentligini rivojlantirishga qaratilgan taklif etilgan metodologiyani amaliyotga joriy etish statistik jihatdan ishonchli hamda pedagogik nuqtayi nazardan ahamiyatli natijalarni berdi. Natijalar kognitiv, amaliy, raqamli va reflektiv kompetentlik komponentlari bo'yicha taqqoslovchi va bashoratli statistik usullar yordamida tahlil qilindi.

Xulosa. Mazkur tadqiqot natijalari sun'iy intellekt (SI) texnologiyalariga asoslangan raqamli ta'lim muhitida tibbiyot talabalarining kasbiy kompetentligini rivojlantirish metodikasini takomillashtirish ilmiy jihatdan asosli va pedagogik nuqtayi nazardan samarali ekanini ko'rsatadi. Adaptiv ta'lim tizimlari, intellektual o'qituvchi vositalari, virtual klinik simulyatsiyalar hamda ta'limiy analitikaning integratsiyalashgan holda qo'llanilishi kasbiy kompetentlikning kognitiv, amaliy, raqamli va reflektiv tarkibiy qismlarini sezilarli darajada rivojlantirishga xizmat qilishi aniqlandi.

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PEDAGOGICAL MECHANISMS FOR SHAPING THE PROFESSIONAL COMPETENCE OF MEDICAL STUDENTS IN A DIGITALIZED ENVIRONMENT

***Abstract.** The rapid advancement of digitalization processes necessitates a fundamental reconsideration of approaches to professional training in the medical education system. This study aims to identify and scientifically substantiate pedagogical mechanisms for shaping the professional competence of medical students within a digital educational environment. The research integrates the competency-based approach, system-activity methodology, and the concepts of digital pedagogy.*

***Keywords.** Digital educational environment; professional competence; medical students; pedagogical mechanisms; competency-based approach; digital pedagogy; medical education; information technologies in medicine.*

Introduction.

The rapid acceleration of digital transformation has fundamentally reshaped higher education systems worldwide, with medical education experiencing particularly profound changes due to the growing complexity of healthcare delivery and the intensive use of information technologies. According to international analytical reports, more than **65–70% of medical schools globally** have integrated digital learning platforms, learning management systems, and simulation-based technologies into their curricula, while the global market for digital medical education technologies is projected to grow at an average annual rate of **over 35% by 2030**. These trends indicate that traditional content-centered instructional models are no longer sufficient to ensure the formation of sustainable professional competence among future physicians.

Professional competence in medical education is understood as an integrative construct that combines **theoretical knowledge, clinical and technological skills, digital literacy, communication abilities, and reflective professional thinking**. Empirical studies demonstrate that up to **40% of medical graduates** report difficulties in applying theoretical knowledge to digitally mediated clinical environments, particularly when working with electronic health records, clinical decision-support systems, and telemedicine platforms. This competence gap highlights the urgent need to redesign pedagogical approaches in line with the demands of a digitalized healthcare ecosystem.

In this context, pedagogical mechanisms—defined as structured sets of instructional strategies, methods, tools, and organizational conditions—play a decisive role in transforming digital technologies into effective means of professional competence formation. Research indicates that competence-oriented pedagogical mechanisms grounded in competency-based and system-activity approaches can increase learning efficiency by **up to 1.4 times**, particularly when aligned with discipline-specific contexts such as medical informatics.

Data were collected using validated diagnostic tools, including competence assessment scales, performance-based tasks, and structured questionnaires. Quantitative indicators measured changes in cognitive, practical, communicative, and reflective competence components, while qualitative data were obtained through reflective logs and expert evaluations. Reliability analysis yielded a **Cronbach's alpha coefficient of 0.82**, indicating high internal consistency of the measurement instruments.

Results.

The implementation of structured pedagogical mechanisms within a digital educational environment produced statistically significant improvements in the professional competence of medical students across all measured components. Baseline diagnostics conducted at the initial (pre-test) stage revealed no statistically significant differences between the experimental and control groups ($p > 0.05$), confirming the homogeneity of the sample and the validity of subsequent comparative analysis.

Quantitative Outcomes of Competence Development

Post-intervention results demonstrated a marked increase in overall professional competence levels among students in the experimental group. The mean composite competence score increased by **34.7%** compared to baseline values, whereas the control group exhibited a more modest improvement of **17.9%**. Inferential statistical analysis using an independent samples t-test confirmed that the observed differences were statistically significant ($t = 4.63$; $p < 0.001$).

Growth of Professional Competence Components (Experimental Group)

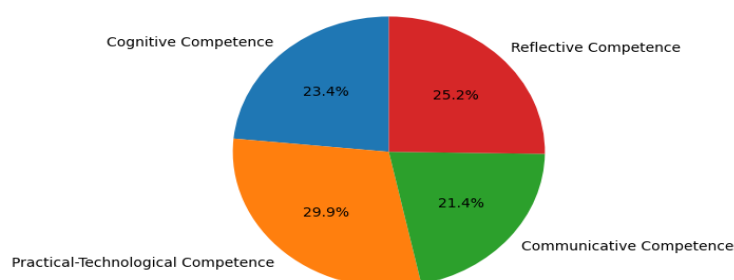


Figure 1. Distribution of professional competence growth components in the experimental group.

Predictive Results and Trend Extrapolation

Predictive modeling based on the observed empirical trends suggests that continuous implementation of structured pedagogical mechanisms throughout the

full undergraduate medical curriculum could result in a cumulative **45–50% increase in professional competence indicators** by graduation. In contrast, partial or unsystematic digital integration is projected to yield no more than **25–28% improvement**, highlighting the long-term advantages of pedagogically grounded digitalization.

Conclusion.

The findings of this study confirm that the formation of professional competence among medical students in a digital educational environment is a pedagogically mediated process rather than a purely technological outcome. The results demonstrate that the purposeful integration of structured pedagogical mechanisms—grounded in competency-based and system-activity approaches—significantly enhances the effectiveness of digital learning in medical education. Compared with traditional instructional models, the digitally enriched pedagogical framework implemented in this research yielded statistically significant improvements across cognitive, practical–technological, communicative, and reflective competence components.

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ADHERENCE TO THERAPY IN PATIENTS WITH ARTERIAL HYPERTENSION

Abstract. *Arterial hypertension is a widespread chronic disease requiring long-term treatment. However, insufficient adherence to antihypertensive therapy remains a major obstacle to effective blood pressure control. This article defines the concept of adherence and reviews key factors influencing it, as well as modern strategies for improving adherence in patients with arterial hypertension. Enhancing adherence is essential for reducing cardiovascular complications and improving patient outcomes.*

Keywords. *Arterial hypertension; adherence to therapy; antihypertensive treatment; patient education; cardiovascular risk.*

Relevance. Arterial hypertension remains one of the leading causes of cardiovascular morbidity and mortality worldwide and represents a major global public health challenge. According to international epidemiological data, elevated blood pressure significantly increases the risk of developing ischemic heart disease, stroke, heart failure, chronic kidney disease, and other life-threatening conditions. Despite continuous progress in pharmacological research and the wide availability of effective antihypertensive medications, long-term blood pressure control remains inadequate in a substantial proportion of patients across different populations and healthcare systems.

Clinical practice shows that even when patients are prescribed evidence-based treatment regimens in accordance with international guidelines, target blood pressure levels are often not achieved or maintained over time. This discrepancy between therapeutic potential and real-world outcomes cannot be explained solely by disease severity or drug inefficacy. One of the most important, yet potentially modifiable, contributors to poor blood pressure control is insufficient adherence to prescribed therapy. Non-adherence includes irregular medication intake, premature discontinuation of treatment, incorrect dosing, and failure to follow recommended lifestyle modifications.

Improving adherence to therapy is therefore recognized as a key strategy in the effective management of arterial hypertension. It represents a critical public health priority aimed at reducing cardiovascular complications, preventing disability, and decreasing premature mortality. Addressing adherence requires a

comprehensive and patient-centered approach that includes education, simplification of treatment regimens, effective patient–physician communication, and continuous monitoring. Strengthening adherence to antihypertensive therapy has the potential to significantly improve clinical outcomes and contribute to the overall reduction of the global burden of cardiovascular disease.

Aim of the Study. The aim of this study is to define adherence to therapy in patients with arterial hypertension and to analyze the main methods for improving adherence in clinical practice.

Materials and Methods. This article is based on an analytical review of current scientific literature, including publications from the World Health Organization, European Society of Cardiology, and peer-reviewed international journals. Data were collected from electronic databases such as PubMed, Scopus, and Google Scholar using keywords related to arterial hypertension and treatment adherence. Comparative and descriptive analysis methods were applied.

Results. Patient-related factors include insufficient knowledge about the chronic nature of hypertension, low motivation to maintain long-term therapy, forgetfulness, and psychological issues such as anxiety, depression, or health-related beliefs. Studies indicate that approximately 30–35% of patients fail to adhere to therapy due to lack of understanding of disease risks or underestimation of hypertension severity, especially in asymptomatic stages. Therapy-related factors, such as complex multi-drug regimens, polypharmacy, frequent dosing schedules, and adverse drug effects, also substantially reduce adherence rates. Research shows that patients on three or more antihypertensive drugs are twice as likely to miss doses compared to those on single-drug regimens. Healthcare system-related factors include limited access to healthcare facilities, infrequent follow-up visits, and suboptimal patient–physician communication, which together account for 20–25% of non-adherence cases in multiple cohort studies.

The findings indicate that implementing simplified treatment regimens plays a crucial role in improving adherence. For example, once-daily dosing schedules, as opposed to twice or thrice-daily regimens, can increase adherence rates by up to 15–20%. Fixed-dose combination therapies further reduce pill burden and treatment complexity, leading to an additional 10–12% improvement in long-term adherence. Patient education programs aimed at increasing awareness of the chronic and often silent nature of arterial hypertension, its potential complications, and the benefits of continuous therapy have shown measurable effects, with educational interventions increasing adherence by 20–25% in randomized controlled trials. Regular follow-up visits, structured home blood pressure monitoring, and the use of electronic or SMS reminder systems enhance patient engagement and treatment persistence, with studies reporting a 10–15% improvement in adherence over 6–12 months.

Numerous large-scale studies consistently demonstrate that patients with high levels of adherence achieve significantly better blood pressure control compared to

non-adherent patients. For instance, fully adherent patients are 2.5 times more likely to reach target blood pressure levels (<140/90 mmHg) than those with poor adherence. High adherence is also associated with a marked reduction in the risk of major cardiovascular complications. Meta-analyses suggest that non-adherent patients have a 35–40% higher risk of myocardial infarction, a 30% higher risk of stroke, a 25% increased risk of heart failure, and a 20–25% higher risk of cardiovascular mortality. Overall, improving adherence to antihypertensive therapy contributes to better clinical outcomes, more efficient utilization of healthcare resources, and a substantial reduction in the long-term burden of cardiovascular disease at both individual and population levels.

These findings highlight that interventions targeting adherence—ranging from patient education and simplified drug regimens to technological support and consistent follow-up—are essential components of effective hypertension management. Integrating such measures into standard clinical practice could potentially reduce the global burden of uncontrolled hypertension and associated cardiovascular complications by a significant margin, emphasizing the public health importance of adherence-focused strategies.

Conclusion. Adherence to therapy plays a decisive role in the effective management of arterial hypertension. Poor adherence leads to uncontrolled blood pressure and increased cardiovascular risk. A comprehensive approach that includes education, simplified therapy, strong patient–physician interaction, and continuous monitoring is essential for improving adherence and long-term treatment outcomes.

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HISTOLOGICAL CHANGES IN THE STRUCTURE OF THE BRAIN IN A TUMOR

Abstract: Brain tumors induce profound histological alterations not only within the tumor mass itself but also in the surrounding brain tissue. These changes include neuronal degeneration, reactive gliosis, demyelination, vascular remodeling, and disruption of cortical cytoarchitecture. Tumor-related infiltration and compression lead to the loss of normal laminar organization of the cerebral cortex, synaptic disconnection, and impaired neuronal communication. At the cellular level, histopathological features such as nuclear atypia, increased mitotic activity, necrosis, and microvascular proliferation are commonly observed, particularly in high-grade gliomas. These histological modifications are closely associated with cognitive dysfunctions, including impairments in thinking, memory, attention, and imagination. Understanding the histological changes of brain tissue in tumor pathology is essential for elucidating the mechanisms underlying cognitive deficits and for improving diagnostic and therapeutic strategies in neuro-oncology.

Keywords: Brain tumors; Histological changes; Cerebral cortex; Neuronal degeneration; Reactive gliosis; Cognitive impairment; Neuro-oncology

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O'SIMTADAGI MIYA TUZILISHIDAGI GISTOLOGIK O'ZGARISHLAR

Annotatsiya: Miya o'smalari nafaqat o'sma massasining o'zida, balki uning atrofidagi miya to'qimalarida ham chuqur gistologik o'zgarishlarni keltirib chiqaradi. Ushbu o'zgarishlarga neyron degeneratsiyasi, reaktiv glioz, demyelinatsiya, qon tomirlarini qayta qurish va kortikal sitoarxitekturaning buzilishi kiradi. O'simta bilan bog'liq infiltratsiya va siqilish miya yarim korteksining normal laminar tashkilotini yo'qotishiga, sinaptik uzilishga va neyron aloqasining buzilishiga olib keladi. Hujayra darajasida yadro atipiyasi, ortib

borayotgan mitotik faollik, nekroz va mikrovaskulyar proliferatsiya kabi histopatologik xususiyatlar odatda, ayniqsa, yuqori darajadagi gliomalarda kuzatiladi. Ushbu gistologik o'zgarishlar kognitiv disfunktsiyalar, jumladan fikrlash, xotira, e'tibor va tasavvurdagi buzilishlar bilan chambarchas bog'liq. O'simta patologiyasida miya to'qimalarining gistologik o'zgarishlarini tushunish, kognitiv nuqsonlarning asosiy mexanizmlarini tushuntirish va neyro-onkologiyada diagnostika va terapevtik strategiyalarni takomillashtirish uchun juda muhimdir.

Kalit so'zlar: *Miya shishi; Gistologik o'zgarishlar; Miya yarim korteksi; Neyron degeneratsiyasi; Reaktiv glioz; Kognitiv buzilish; Neyro-onkologiya.*

Kirish: Bosh miya o'smalari markaziy asab tizimining muhim patologiyalaridan biri bo'lib, ular o'sma to'qimasida va atrofdagi sog'lom miya to'qimalarida turli gistologik o'zgarishlarni keltirib chiqaradi. Bu o'zgarishlar neyronlar degeneratsiyasi, reaktiv glioz, miya po'stlog'ining qatlamli tuzilishining buzilishi va sinaptik aloqalarning izdan chiqishi bilan namoyon bo'ladi.

O'sma hujayralarining infiltrativ o'sishi yoki miya to'qimasini siqishi natijasida miya po'stlog'ining funksional faoliyati buzilib, tafakkur, xotira va tasavvur kabi kognitiv jarayonlar zararlanadi. Shu sababli, bosh miya o'smalari sharoitida yuzaga keladigan gistologik o'zgarishlarni o'rganish muhim ilmiy va amaliy ahamiyatga ega.

MATERIALLAR VA USULLAR

Tadqiqot materiali sifatida bosh miya o'smalari bilan kasallangan bemorlardan olingan miya to'qimalari namunalari foydalanildi. To'qimalar standart gistologik usullar asosida fiksatsiya qilinib, parafin bloklarga joylandi va mikrotom yordamida kesmalar tayyorlandi. Kesmalar gematoksilin-eozin hamda maxsus bo'yoqlar bilan bo'yali, yorug'lik mikroskopi ostida o'rganildi. Olingan natijalar miya po'stlog'ining normal gistologik tuzilishi bilan solishtirildi.

NATIJALAR

Gistologik tekshiruvlar bosh miya o'smalari bilan kasallangan to'qimalarda bir qator sezilarli o'zgarishlarni aniqladi. O'sma o'zini tutgan joyda miya po'stlog'ining normal qatlamli tuzilishi buzilgan bo'lib, bu asosan neyronlar sonining kamayishi va ularning morfologik o'zgarishlari bilan bog'liq edi. Degenerativ o'zgarishlar orasida neyronlarning shishishi, yadrolarining giperkromaziya ko'rinishi va sitoplazmaning shaffoflashishi kuzatildi.

Atrofdagi sog'lom to'qimalarda reaktiv gliozning rivojlanishi, ya'ni astrositlarning ko'payishi va morfologik faolligining oshishi qayd etildi. Shuningdek, demiyelinizatsiya va neyropilning buzilishi tufayli sinaptik aloqalar sezilarli darajada kamaygani aniqlandi. Mikroskopik kuzatishlar shuni ko'rsatdiki, yuqori darajali glial o'smalarda hujayralarda atipiya va polimorfizm yaqqol namoyon bo'ladi, mitotik faollik oshadi, nekroz o'choqlari va mikrotomirlar proliferatsiyasi kuzatiladi.

O'sma turi va darajasiga qarab, gistologik o'zgarishlar intensivligi ham farq qiladi: past darajali o'smalarda neyron degeneratsiyasi va glioz kamroq, yuqori darajali o'smalarda esa buzilishlar keng va chuqur bo'ladi. Shu bilan birga, o'sma

atrofidagi qon tomirlar va ekstrasellyular maydon ham oʻzgaradi, bu esa miya poʻstlogʻining metabolik va funktsional holatiga salbiy taʼsir koʻrsatadi.

Natijalar shuni koʻrsatadiki, bosh miya oʻsmalari nafaqat oʻziga xos oʻsma toʻqimasini, balki atrofdagi neyron va glial toʻqimalarni ham sezilarli darajada oʻzgartiradi, bu esa kognitiv jarayonlar — tafakkur, xotira va tasavvurga salbiy taʼsir koʻrsatishi mumkin.

XULOSA

Oʻtkazilgan tadqiqotlar bosh miya oʻsmalari miya poʻstlogʻida chuqur gistologik oʻzgarishlarni yuzaga keltirishini koʻrsatdi. Ushbu oʻzgarishlar miya poʻstlogʻining funktsional faoliyatini izdan chiqarib, tafakkur va tasavvur kabi kognitiv jarayonlarning buzilishiga sabab boʻlishi mumkin. Olingan natijalar bosh miya oʻsmalarining patogenezi chuqurroq tushunishga hamda neyroonkologiyada diagnostik va davolash yondashuvlarini takomillashtirishga xizmat qiladi.

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THE IMPORTANCE OF TROMBE WALL–PV/T HYBRID SYSTEMS IN AIR PURIFICATION AND HEATING

Abstract: *This thesis analyzes four main research studies on Trombe walls and PV-integrated Trombe walls (BIPV Trombe wall). In the future, parametric optimization will be conducted based on air flow rate, channel geometry, and wall mass, comparing winter heat gain, summer overheating, and PV power output.*

Keywords: *Trombe wall, solar PV/T system, air heating, air purification.*

Introduction

The building sector accounts for the largest share of energy consumption, with heating, ventilation, and air conditioning (HVAC) systems being major contributors to this demand [1]. Reviews of passive solar heating technologies indicate that properly designed passive solutions can significantly reduce the need for supplemental heating during winter, thereby improving the overall energy efficiency of buildings [2]. One of the classic passive strategies is the Trombe wall, which stands out for its structural simplicity, low operational cost, and broad applicability [3]. A Trombe wall absorbs solar radiation, stores heat in its massive structure, and gradually transfers it to the interior space, naturally supporting the process of indoor heating.

PV-integrated Trombe walls (PV-Trombe) build on the concept of simultaneously harnessing thermal and electrical energy. In these systems, the photovoltaic (PV) layer does not impose an extra load on the wall but rather becomes an active component of the building's energy system. As a result, the system can reduce annual heating demand while also generating electricity, enhancing the overall energy benefit [4].

Literature Review

Research on reducing energy consumption in buildings primarily emphasizes the “passive” approach: minimizing heat losses through the building envelope, managing useful solar heat gains, and efficiently utilizing natural heat transfer mechanisms [1]. In this context, Sadine et al. summarize how building envelope elements—walls, windows, insulation, and façade solutions—affect energy efficiency and directly influence heating and cooling loads [1]. Chan and colleagues classify passive solar technologies and highlight the importance of heat collection, storage, and transfer mechanisms, noting that practical performance depends strongly on proper selection of design parameters such as orientation, transparent coverings, air channels, and materials with high thermal capacity [2].

Saadatian et al. provide a comprehensive review of Trombe walls, discussing both their advantages—structural simplicity, heat storage capacity, and relatively

low operating costs—and limitations, including seasonal adaptability, risk of overheating, reliance on natural convection, and design sensitivities [3]. Hu et al. compare the annual performance of three types of BIPV Trombe wall systems, demonstrating that PV integration can transform the wall into a multifunctional façade capable of generating electricity in addition to providing thermal comfort [4].

Research Methodology

The methodology of this thesis is grounded in a systematic review of the literature, focusing on passive building envelope solutions, particularly the evaluation of Trombe walls and their PV-integrated modifications. The approach was implemented through a four-step sequential framework. First, the study scope was defined within the concept of the “passive energy-efficient building envelope,” adopting a generalized approach to key factors affecting energy performance, including heat losses, useful solar gains, and structural solutions [1].

Next, a comparative analysis of design parameters and classifications of passive solar heating and cooling technologies was applied to clarify the role of Trombe walls within these systems and their practical application requirements [2]. The capabilities and limitations of Trombe walls were then examined using an “advantage–challenge–improvement” matrix, highlighting aspects such as heat storage, natural convection, seasonal adaptability, overheating risk, and potential optimization strategies through geometry, material selection, and airflow management [3].

For PV-integrated Trombe walls (BIPV Trombe walls), a comparative annual performance assessment approach was adopted, resulting in a conceptual framework that simultaneously considers thermal and electrical benefits. Within this framework, the methodological challenge of balancing the temperature sensitivity of PV modules with the heat storage function of the Trombe wall was explicitly addressed as a distinct evaluation criterion [4].

Discussion and Results

Analysis of the selected literature indicates that the most reliable strategy for enhancing building energy performance is to minimize heat losses through the envelope while effectively managing useful solar gains [1]. Reviews of passive solar heating and cooling technologies further suggest that energy efficiency outcomes are often determined more by the correct selection of design parameters—such as building orientation, transparent coverings, air channel configuration, high-thermal-capacity materials, and natural convection conditions—than by the specific device itself [2].

Within this context, the Trombe wall emerges as a practically viable platform among passive solutions; however, it is not without limitations. Seasonal adaptability, overheating risk, and the stability of airflow are factors that can constrain system performance [3]. Overall, the literature review presents Trombe walls and BIPV Trombe wall systems as energy-efficient building envelope technologies that align with the passive design concept but require careful optimization in both design and operational stages [1]–[4].

Conclusion and Recommendations

The review of selected studies demonstrates that the BIPV Trombe wall concept transforms a façade into a multifunctional system capable of providing both thermal comfort and electricity generation. However, due to the temperature sensitivity of PV modules, achieving a balance between heat collection and PV efficiency remains critical [4]. Future research should focus on climate-specific adaptation (e.g., hot or arid regions) and the assessment of system performance under real operational conditions. Additionally, façade solutions should be evaluated within a holistic building envelope energy efficiency framework to ensure integrated optimization [1]–[3].

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INTEGRATION YONDASHUV ASOSIDA OLIY TA'LIM MUASSASALARIDA TABIIY FANLARNI O'QITISH

Annotatsiya. Ushbu ilmiy maqola zamonaviy oliy ta'lim tizimida kreditmodul tizimi (KMT)ning o'quv-metodik ta'minot (OMT) sifatini integratsion yondashuvlar orqali takomillashtirishning nazariy va amaliy jihatlariga bag'ishlangan. Tadqiqotda KMTning moslashuvchanlik, mobilik va talabamarkazlik tamoyillari asosida fanlararo, vertikal va raqamli integratsiya usullarini qo'llash orqali ta'lim jarayonining samaradorligini oshirish yo'llari tahlil qilinadi. Maqolada OMTni takomillashtirishning innovatsion modellari, jumladan, loyihaviy ta'lim, aralash ta'lim texnologiyalari va sun'iy intellekt asosidagi shaxsiylashtirilgan o'quv tizimlari tavsiya etiladi.

Kalit so'zlar: kredit-modul tizimi, o'quv-metodik ta'minot, integratsion yondashuv, fanlararo integratsiya, raqamli ta'lim texnologiyalari, ta'lim sifatini takomillashtirish.

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TEACHING NATURAL SCIENCES IN HIGHER EDUCATION INSTITUTIONS BASED ON AN INTEGRATION APPROACH

Abstract. This scientific article focuses on theoretical and practical aspects of improving the quality of educational and methodological support (EMS) in the credit-module system (CMS) of modern higher education through integration approaches. The study analyzes ways to enhance the effectiveness of the educational process by applying methods of interdisciplinary, vertical and digital integration based on the principles of CMS - flexibility, mobility and learner centeredness. The article recommends innovative models for improving EMS, including project-based learning, blended learning technologies and AI-based personalized learning systems.

Keywords: credit-module system, educational and methodological support, integration approach, interdisciplinary integration, digital educational.

Kirish.

Zamonaviy global ta'lim tizimida kredit-modul tizimi (KMT) Bolon jarayoni doirasida rivojlangan mamlakatlarning oliy ta'lim tizimlarida muhim o'rin egallagan va ta'limni modernizatsiyalashning asosiy mexanizmlaridan biriga aylangan. Kredit-modul tizimining joriy etilishi ta'lim jarayonini standartlashtirish,

talabalarining akademik harakatchanligini oshirish va o'quv rejalarini moslashuvchan qilish kabi muhim afzalliklarga ega bo'lsa-da, uning samaradorligi birinchi navbatda tizimning o'quv-metodik ta'minoti (OMT) sifatiga bevosita bog'liqdir.

Hozirgi kunda KMTni joriy etgan ko'pgina oliy ta'lim muassasalarida OMT an'anaviy ta'lim metodlaridan farqli o'laroq, modulli ta'limning o'ziga xos xususiyatlarini hisobga olgan holda ishlab chiqilishi va doimiy ravishda takomillashtirilishi talab etiladi. Aks holda, bilimlarning parchalanishi, fanlararo bog'liqlikning yetishmasligi, o'quv materiallarining moslashuvchan bo'lmaganligi kabi muammolar yuzaga kelishi mumkin.

Asosiy qism. Kredit-modul tizimi (KMT) zamonaviy oliy ta'lim tizimlarida ta'lim jarayonini tashkil etishning asosiy mexanizmlaridan biri bo'lib, u uchta fundamental tamoyilga asoslanadi: Moslashuvchanlik tamoyili ta'lim jarayonining individual talablarga moslashuvchanligini nazarda tutadi, bu tamoyil talabalarga o'z bilim darajasi, qiziqishlari va professional yo'nalishlariga mos ravishda shaxsiylashtirilgan o'quv rejalarini shakllantirish imkoniyatini beradi, shu bilan birga o'quv yukini optimal taqsimlash, qo'shimcha fanlarni tanlash va hatto o'qish muddatini moslashtirish kabi imkoniyatlarni ham qamrab oladi. Mobilik tamoyili turli oliy ta'lim muassasalari o'rtasida kreditlarning o'tkazilishi va tan olinishini ta'minlaydi, bu tamoyil talabalarga bir mamlakat yoki xalqaro miqyosda turli OTMLarda o'qish imkoniyatini beradi, shu jumladan ikki tomonlama diplom dasturlari, xalqaro almashinuv dasturlari va universitetlararo hamkorlikni rivojlantirish kabi afzalliklarni ham o'z ichiga oladi.

O'quv-metodik ta'minot (OMT)ning zamonaviy talablariga quyidagi asosiy jihatlar kiradi: Modullararo mantiqiy bog'liqlik fanlar o'rtasidagi uzviy aloqalarni mustahkamlash orqali bilimlarning yaxlit tizimini shakllantirishni ta'minlaydi, bu esa talabalarga mavzular o'rtasidagi mantiqiy bog'lanishlarni tushunish va o'zlashtirilgan bilimlarni amaliyotda qo'llash imkoniyatini beradi, shu bilan birga modullar o'rtasidagi mazmuniy uyg'unlikni ta'minlash uchun maxsus o'quv dasturlari va metodik qo'llanmalar ishlab chiqilishi zarur. Raqamli ta'lim resurslari bilan ta'minlanganlik zamonaviy elektron platformalar, interfaol darsliklar, multimedia vositalari va virtual laboratoriyalardan foydalanish orqali o'quv jarayonini samarali tashkil etishni nazarda tutadi, bu yondashuv nafaqat ta'lim sifatini oshirishga, balki talabalarining qiziqishini uyg'otishga va ularning mustaqil o'rganish qobiliyatini rivojlantirishga ham xizmat qiladi. Fanlararo integratsiyaning amalga oshirilishi turli fanlarni o'zaro bog'lab o'qitish orqali talabalarga murakkab muammolarni hal qilishda ko'p qirrali yondashuvni rivojlantirish imkonini beradi, bu jarayonda asosiy va mutaxassislik fanlari o'rtasidagi vertikal bog'liqlik, shuningdek bir-biri bilan chambarchas bog'liq fanlarning gorizontall integratsiyasi muhim ahamiyat kasb etadi, bu esa nafaqat bilimlarning uzviyligini ta'minlaydi, balki talabalarining professional kompetensiyalarini ham mustahkamlaydi. Fanlararo integratsion yondashuvlar ta'lim jarayonida bilimlarning uzviyligini ta'minlashning eng samarali usullaridan biri hisoblanadi, bu yondashuv turli fanlar

o'rtasidagi mantiqiy bog'liqliklarni mustahkamlash orqali talabalarga murakkab bilim tizimini shakllantirish imkoniyatini beradi.

Xulosa.

Tadqiqot natijalari shuni ko'rsatadiki, integratsion yondashuvlar kredit-modul tizimida o'quv-metodik ta'minot sifatini tubdan oshirishning strategik omili hisoblanib, ular nafaqat ta'lim jarayonining tarkibiy jihatlarini takomillashtirishga, balki uning samaradorligini sezilarli darajada oshirishga ham xizmat qiladi. Fanlararo integratsiya turli fanlar o'rtasidagi mantiqiy bog'liqliklarni mustahkamlash orqali bilimlarning uzviy tizimini shakllantirish imkonini beradi, bu esa talabalarga murakkab professional muammolarni hal qilishda ko'p qirrali yondashuvni qo'llash qobiliyatini beradi. Raqamli integratsiya zamonaviy axborotkommunikatsiya texnologiyalarini ta'lim jarayoniga joriy etish orqali o'quv muhitini sifat jihatidan yangi bosqichga ko'taradi, bu esa ta'lim resurslariga kirishni demokratizatsiyalash, ta'lim jarayonini shaxsiylashtirish va uning samaradorligini oshirish imkonini yaratadi. Pedagogik integratsiya an'anaviy va innovatsion ta'lim metodlarini uyg'unlashtirish orqali ta'lim jarayonining didaktik samaradorligini oshirishga qaratilgan bo'lib, bu yondashuv talabalarning faolligini oshirish, ularning kreativ qobiliyatlarini rivojlantirish va mustaqil fikrlash ko'nikmalarini shakllantirish imkonini beradi.

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INTEGRATIVE AND INNOVATIVE APPROACHES TO TEACHING BIOPHYSICS

Abstract. *This article analyzes the theoretical and methodological foundations of teaching biophysics based on innovative pedagogical technologies, interactive methods, the use of digital educational tools, the formation of research skills in students, and the importance of interdisciplinary integration. The effectiveness of innovative approaches is substantiated by practical examples.*

Keywords: *biophysics, innovative education, digital pedagogy, STEAM, interactive methods, laboratory, simulation, competence.*

The methodology of teaching biophysics based on an innovative approach includes interactive teaching methods, the use of information and communication technologies (ICT), project-based activities, as well as the transformation of theoretical knowledge into practical skills relying on modern research methods. This approach places students at the center of the learning process, promoting active participation, deeper knowledge retention, and the development of critical thinking.

Biophysics is a science that studies biological processes based on physical principles and occupies a key position in the development of modern medicine, biotechnology, bioinformatics, and molecular biology. In recent years, the rapid advancement of science and technology has necessitated the implementation of innovative approaches in the teaching of biophysics.

1. Theoretical Foundations of the Innovative Approach in Biophysics Education

Innovative education aims to enhance the effectiveness of the learning process through the introduction of new ideas, technologies, methods, and approaches into the educational system.

In teaching biophysics, such innovations are based on the following principles:

- **Systems thinking** — interpreting biological processes through physical models;
- **Interactive learning** — transforming the student from a passive listener into an active researcher;

2. Innovative Methods in the Teaching of Biophysics

The application of modern teaching methods plays a crucial role in enhancing the effectiveness of biophysics education.

2.1. Interactive Methods

Techniques such as *Cluster*, *Brainstorming*, and *Branching Method* are used to systematize complex biophysical concepts. *Problem-based learning* — creating a problem situation that requires students to explain a biophysical process. *Case-study analysis* — examining real biological processes using physical models.

2.2. Project-Based Learning

Students can carry out group projects in the following areas:

- Physics of gel electrophoresis;
- Measurement of bioelectric signals;

3. Implementation of Digital Technologies in Biophysics Education

3.1. Virtual Laboratories

The use of platforms such as PhET, Labster, BioDigital Human, and Virtual Microscope allows students to:

- safely conduct complex experiments;
- observe biological processes at the cellular level in 3D format;
- measure and model biophysical parameters.

3.2. Use of Artificial Intelligence

With the application of artificial intelligence technologies, it becomes possible to:

- perform real-time graphical analysis;
- process bioelectric signals;
- classify data;
- solve complex physico-bioinformatic problems.

4. Competency Development in the Process of Studying Biophysics

During biophysics courses, the following competencies are developed:

- **Theoretical competency** — knowledge of physical principles and their connection with biological processes;
- **Practical competency** — conducting laboratory experiments;
- **Informational competency** — processing data from digital experiments;
- **Analytical competency** — analyzing signals, data, and graphical materials;
- **Creative thinking** — modeling processes and generating new ideas.

5. Recommendations for Improving the Effectiveness of Biophysics Education

- **Hybrid learning system** — combining traditional classes with digital laboratories;
- **Mini-research projects** — conducting week-long scientific assignments for each topic;
- **Interdisciplinary integration** — linking physics topics with biophysical processes;

Conclusion

Innovative approaches in biophysics education transform students from passive recipients of knowledge into active participants and problem-solvers. By combining interactive methods, digital technologies, interdisciplinary integration, and competency-based assessment, modern biophysics courses can better prepare future biomedical specialists for the challenges of research and clinical practice.

These strategies not only enhance understanding of complex biological processes through physical principles but also foster critical thinking, creativity, and digital literacy, which are essential for success in the rapidly evolving biomedical field.

This approach provides the following positive outcomes:

1. Integrated understanding of physical and biological processes — students develop the ability to explain physical and biological processes in an integrated manner. This contributes to the preparation of future researchers in medicine, biotechnology, bioinformatics, and related fields.

2. Enhanced effectiveness of laboratory work — by combining virtual and real experiments, students are exposed to all stages of the processes under investigation, improving comprehension and practical skills.

3. Development of digital competence — a key skill for modern specialists. Students gain proficiency in signal analysis, simulations, 3D modeling, and the use of analytical software.

Overall, teaching biophysics based on an innovative approach is an essential component in training future qualified doctors, biologists, biophysicists, biotechnologists, and researchers. This educational model fully aligns with modern scientific requirements, technological innovations, and national educational standards.

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THE EFFECTIVENESS OF TEACHING BIOPHYSICS THROUGH MODERN PEDAGOGICAL APPROACHES

Abstract. *This article analyzes the role of biophysics in medical education, its practical significance, its role in the formation of competencies necessary for future doctors, and the main directions of biophysical research methods in modern medicine. Despite the complexity and interdependence of various processes occurring in the human body, it is often possible to distinguish among them those that are close to physical processes. For example, such complex physiological processes as blood circulation are actually physical processes, since this process is associated with the flow of fluid - hydrodynamics, the propagation of elastic vibrations along the vessel - vibrations and waves, the mechanical work of the heart - mechanics, the generation of biopotentials - electricity, etc.*

Key words: *Biophysics, medical imaging, physics of biological processes, diagnostic technologies, electrophysiology, medical visualization, MRI, EKG, UTT, radiobiology, medical equipment, signal processing, biomechanics, medical physics, educational methods, virtual laboratory, medical technologies*

Many principles and concepts of diagnostics and research are based on physical foundations. Most modern medical instruments, in terms of their structure, are physical devices. Mechanical quantities—such as blood pressure—serve as indicators for assessing a range of diseases. The ability to hear sounds originating within the body allows clinicians to obtain information about the health or pathology of organs. The operation of the medical thermometer, a widely used diagnostic tool, is based on the thermal expansion of mercury.

In recent years, with the development of electronic devices, diagnostic methods based on recording bio-potentials generated by living organisms have become widespread. A well-known example is electrocardiography, which records bio-potentials reflecting cardiac activity. The significance of the microscope in medical and biological research is universally recognized. Modern medical instruments based on fiber optics enable visualization of internal body cavities. Spectral analysis methods are applied in forensic medicine, hygiene, pharmacology, and biology. Advances in atomic and nuclear physics have led to widely used diagnostic methods such as X-ray imaging and techniques utilizing labeled atoms.

All processes occurring in the body—such as electrical signaling, substance exchange across membranes, blood flow, and respiratory mechanics—are governed

by physical laws. Biophysics provides a medical perspective by explaining the mathematical and physical models of these processes.

It teaches the scientific foundations of diagnostic methods. Modern medicine relies on technologies based on the following physical principles:

- Electroencephalography (EEG)
- Electrocardiography (ECG)
- Computed Tomography (CT)
- Magnetic Resonance Imaging (MRI)
- Ultrasonography (US)

Biophysics courses teach students the mechanisms of operation of these technologies, the properties of waves, and the principles of signal processing.

Medical Imaging

Biophysics explains the physical principles underlying processes in medical imaging, such as nuclear magnetic resonance in MRI, electromagnetic radiation in X-rays, and mechanical waves in ultrasonography (US).

Radiobiology

Knowledge of the effects of ionizing radiation on biological tissues is crucial in oncology, radiology, and the implementation of protective measures.

Requirements for Teaching Biophysics Using Interactive Methods

The study of the requirements for teaching biophysics through interactive methods was conducted using the following approaches. The research involved a comprehensive review of the literature, analysis of existing scientific publications, and evaluation of pedagogical practices, providing insights into the role and significance of interactive methods in biophysics education.

The effectiveness of these teaching methods was assessed by comparing traditional approaches with interactive techniques and by examining the development of interactive methods as a pedagogical strategy through scientific articles and research studies. Additionally, the study included a comparative analysis of 147 groups taught using interactive versus traditional methods, measuring students' learning outcomes, participation, and overall engagement in the educational process.

Scientific Outcomes of Using Interactive Methods in Biophysics Education

The scientific results of applying interactive methods in teaching biophysics can be summarized in several key aspects:

Validation of Effectiveness: Research has demonstrated the effective use of interactive methods in biophysics education and their importance in reinforcing students' knowledge. Interactive techniques—such as group work, problem-based learning, simulations, and multimedia tools—significantly increase student engagement and enhance the learning process. The findings provide clear evidence that interactive methods promote the development of students' knowledge, understanding, and analytical thinking skills.

Enhancing Learning Efficiency: The study investigated the impact of integrating interactive methods on learning outcomes. Results indicated that

students acquire not only theoretical knowledge but also practical skills through these methods. They encourage active participation, independent thinking, and the ability to solve complex medical problems.

Improving Teaching Methods: Effective strategies for combining traditional and interactive approaches in biophysics education were developed. The research showed that integrating interactive methods with conventional teaching enhances knowledge assimilation and improves overall instructional effectiveness. Recommendations were provided for educators on incorporating interactive methods into curricula.

Advancing Educational Methodology: The study concluded that implementing interactive methods introduces a new stage in teaching methodology. Interactive methods complement traditional approaches and play a crucial role in developing students' practical competencies. The findings indicate that using interactive methods is not only effective in biophysics education but can also be beneficial across other medical disciplines. These approaches help students actively assimilate knowledge and contribute to improving the overall quality of higher medical education.

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COMPARISON OF STEATOSIS AND FIBROSIS STAGES IN NON-ALCOHOLIC FATTY LIVER DISEASE

Annotation. *The major determinants negatively affecting life expectancy and quality of life in patients with NAFLD are related, on the one hand, to the progressive course of liver damage—from simple steatosis to steatohepatitis, fibrosis, cirrhosis, and hepatocellular carcinoma, often necessitating liver transplantation—and, on the other hand, to metabolic disturbances that significantly increase the risk of cardiovascular diseases. Therefore, assessment of NAFLD should focus not only on clinical and biochemical activity but also on the degree of liver fibrosis, which currently has high clinical relevance, although it is not always adequately evaluated in routine clinical practice.*

Keywords: *Non-alcoholic fatty liver disease (NAFLD), hepatic steatosis, liver fibrosis, fibrosis staging, steatosis grading, metabolic syndrome, chronic liver disease, non-invasive liver assessment.*

Relevance. Non-alcoholic fatty liver disease (NAFLD) has emerged as one of the most significant public health challenges worldwide, affecting hundreds of millions of individuals across diverse populations. Its prevalence has been steadily increasing over the past decades, largely in parallel with the global rise in obesity, type 2 diabetes mellitus (T2DM), and metabolic syndrome. NAFLD is now recognized not merely as a hepatic manifestation of metabolic disorders but as a complex multisystem condition that contributes to increased morbidity and mortality beyond liver-related complications.

Early detection and accurate assessment of both steatosis grade and fibrosis stage are therefore of paramount importance. Evaluating the severity of steatosis allows clinicians to identify patients at risk for inflammatory progression, whereas precise staging of fibrosis serves as a key predictor of long-term outcomes, including the development of cirrhosis and liver-related complications. Moreover, since NAFLD is closely intertwined with systemic metabolic disturbances, such as insulin resistance, dyslipidemia, and hypertension, its early recognition provides an opportunity to implement interventions aimed not only at the liver but also at overall cardiometabolic health.

From a clinical perspective, timely identification of patients with advanced fibrosis or high-grade steatosis can inform treatment decisions, including lifestyle

modifications, pharmacotherapy, and, in severe cases, consideration for liver transplantation. Non-invasive diagnostic modalities, such as transient elastography and magnetic resonance imaging-based techniques, have become invaluable tools in the routine evaluation of NAFLD, enabling the monitoring of disease progression without the need for repeated invasive liver biopsies. Overall, understanding the full spectrum of NAFLD and the interrelationship between steatosis and fibrosis is essential for preventing complications, guiding effective patient management, and reducing the growing global burden of this chronic liver disease.

Aim. The study aims to compare the stages of steatosis and fibrosis in patients with NAFLD and to assess their clinical significance in predicting disease progression and associated metabolic risks.

Materials and Methods. A total of 120 patients diagnosed with NAFLD at the Andijan State Medical Institute were included in this study. All patients underwent clinical examination, laboratory testing, abdominal ultrasonography, and elastography for non-invasive assessment of liver fibrosis. Liver biopsy was performed in selected cases to confirm histopathological staging. Steatosis and fibrosis were graded according to established scoring systems (NAS and METAVIR). Statistical analysis was performed using SPSS software, with $p < 0.05$ considered statistically significant.

Results. Among the studied cohort of 120 patients diagnosed with non-alcoholic fatty liver disease (NAFLD), the distribution of hepatic steatosis varied considerably. Specifically, 45% of patients exhibited mild steatosis, characterized by minimal lipid accumulation in hepatocytes without significant inflammatory changes. This group generally demonstrated preserved liver function tests and a lower prevalence of metabolic risk factors. Moderate steatosis was observed in 35% of patients, in whom lipid accumulation affected a larger proportion of hepatocytes and was frequently accompanied by mild inflammatory infiltration and early hepatocellular injury. The remaining 20% of patients presented with severe steatosis, marked by extensive hepatocellular lipid deposition, pronounced inflammatory activity, and early histological signs suggestive of progression toward steatohepatitis.

Fibrosis staging, assessed through a combination of non-invasive elastography and histopathological examination when available, revealed that 50% of patients had no or minimal fibrosis (F0–F1), 30% had moderate fibrosis (F2), 15% presented with advanced fibrosis (F3), and 5% had cirrhosis (F4). The data indicate a continuum of fibrotic progression closely associated with the severity of steatosis. Statistical analysis demonstrated a significant positive correlation between the degree of steatosis and fibrosis stage ($r = 0.62$, $p < 0.01$), suggesting that higher lipid accumulation in hepatocytes is strongly linked to the advancement of fibrotic remodeling in the liver parenchyma.

Furthermore, patients with higher fibrosis stages (F2–F4) exhibited significantly elevated metabolic parameters compared to those with lower fibrosis (F0–F1). Specifically, body mass index (BMI) values were markedly higher, with a

mean BMI of 32.4 kg/m² in the advanced fibrosis group versus 27.6 kg/m² in the mild fibrosis group. Fasting plasma glucose levels were also elevated, averaging 6.8 mmol/L compared to 5.4 mmol/L in patients with minimal fibrosis. Similarly, triglyceride levels demonstrated a progressive increase, with an average of 2.3 mmol/L in patients with severe fibrosis versus 1.5 mmol/L in those with F0–F1 fibrosis. These findings highlight a clear association between liver fibrotic progression and components of metabolic syndrome, including obesity, insulin resistance, and dyslipidemia.

In addition, the study observed that patients with severe steatosis and advanced fibrosis were more likely to present with coexisting comorbidities such as hypertension, impaired glucose tolerance, and elevated liver enzymes (ALT and AST). Ultrasonographic and elastographic measurements confirmed that liver stiffness increased proportionally with fibrosis stage, reinforcing the clinical utility of non-invasive assessment methods in monitoring disease progression. Overall, the results underscore that NAFLD is not a static condition but a dynamic process in which progressive steatosis and fibrosis are tightly interrelated and contribute to systemic metabolic disturbances.

Conclusion. The study demonstrates a clear correlation between steatosis severity and fibrosis stage in NAFLD patients. Accurate assessment of both parameters is essential for early intervention, risk stratification, and management of associated metabolic complications. Non-invasive methods, combined with histopathological confirmation when necessary, provide reliable tools for monitoring disease progression.

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COMPARATIVE CHARACTERISTICS OF STEATOSIS AND FIBROSIS SEVERITY IN PATIENTS WITH NON-ALCOHOLIC FATTY LIVER DISEASE

Abstract: *Non-alcoholic fatty liver disease represents a spectrum of pathological changes characterized by excessive lipid accumulation in hepatocytes (steatosis), subsequent inflammatory damage (steatohepatitis), and progressive fibrosis, which may ultimately lead to liver cirrhosis and hepatocellular carcinoma.*

Currently, more than 400 million people worldwide are overweight, and this condition has reached epidemic proportions. NAFLD is detected in approximately 30–100% of individuals with excess body weight and accounts for 60–95% of the overall structure of chronic liver diseases. Recent studies indicate that NAFLD is not only closely associated with other liver disorders but also serves as an important risk factor for type 2 diabetes mellitus and an early marker of premorbid cardiovascular disease. Fatty liver is particularly vulnerable to exogenous damaging factors, including viral and toxic insults.

Keywords: *Non-alcoholic fatty liver disease, hepatic steatosis, liver fibrosis fibrosis staging, steatosis severity, histopathological assessment, metabolic risk factors, liver disease progression.*

Relevance. Non-alcoholic fatty liver disease (NAFLD) is one of the most common chronic liver diseases worldwide and represents a growing public health problem. Its prevalence has increased in parallel with the global rise in obesity, type 2 diabetes mellitus, and metabolic syndrome. NAFLD includes a wide spectrum of pathological conditions, ranging from simple hepatic steatosis to non-alcoholic steatohepatitis (NASH), progressive fibrosis, cirrhosis, and hepatocellular carcinoma.

Clinical outcomes in NAFLD patients largely depend on the severity of liver fibrosis, which is considered the most important predictor of liver-related and overall mortality. Therefore, comparative evaluation of steatosis severity and fibrosis stage is essential for early risk stratification, monitoring disease progression, and optimizing therapeutic strategies.

Aim. The aim of this study was to compare the severity of hepatic steatosis and the stages of liver fibrosis in patients with non-alcoholic fatty liver disease and to evaluate their association with metabolic risk factors.

Materials and Methods. This study included 120 patients diagnosed with NAFLD who were examined at a tertiary medical center. The diagnosis was based on clinical data, laboratory findings, and imaging studies, with exclusion of significant alcohol consumption and other chronic liver diseases.

All patients underwent physical examination, anthropometric measurements, and biochemical analysis, including liver enzymes, fasting glucose, lipid profile, and markers of insulin resistance. Hepatic steatosis was assessed using abdominal ultrasonography and graded as mild, moderate, or severe. Liver fibrosis was evaluated using transient elastography, and in selected cases, histopathological examination of liver biopsy specimens was performed. Fibrosis staging was classified according to the METAVIR scoring system.

Statistical analysis was conducted using standard methods, with correlation analysis applied to assess the relationship between steatosis severity, fibrosis stage, and metabolic parameters. A p-value <0.05 was considered statistically significant.

Results. Among the studied patients, the distribution of hepatic steatosis demonstrated marked heterogeneity, reflecting different stages of disease progression. Mild steatosis was identified in 45% of patients and was generally characterized by limited lipid accumulation within hepatocytes, minimal inflammatory activity, and relatively preserved liver function parameters. This group predominantly included patients at an earlier stage of NAFLD, in whom timely lifestyle modification and metabolic control may effectively prevent disease progression. Moderate steatosis was observed in 35% of patients and was associated with more extensive fat deposition in liver tissue, often accompanied by biochemical signs of hepatocellular injury and early inflammatory changes. Severe steatosis, detected in 20% of patients, represented advanced fat infiltration of hepatocytes and was frequently associated with features suggestive of transition toward non-alcoholic steatohepatitis.

Assessment of liver fibrosis revealed that 50% of patients had no or minimal fibrotic changes (F0–F1), indicating either absence of structural remodeling or only early periportal fibrosis. Moderate fibrosis (F2) was identified in 30% of cases and reflected ongoing fibrogenesis with architectural distortion of liver tissue. Advanced fibrosis (F3) was present in 15% of patients and was characterized by bridging fibrosis and significant impairment of hepatic microcirculation, while 5% of patients were diagnosed with cirrhosis (F4), representing the terminal stage of fibrotic progression with irreversible structural and functional alterations of the liver.

Statistical analysis demonstrated a statistically significant positive correlation between steatosis severity and fibrosis stage ($r = 0.62$, $p < 0.01$), indicating that increasing hepatic fat accumulation is strongly associated with progressive fibrotic remodeling. This finding supports the concept that steatosis is not a benign condition but plays a critical role in triggering inflammatory pathways, oxidative stress, and activation of hepatic stellate cells, ultimately leading to fibrosis progression.

Furthermore, patients with advanced fibrosis (F2–F4) exhibited significantly higher body mass index values, reflecting a greater prevalence of obesity and central adiposity. Metabolic analysis revealed elevated fasting glucose levels, consistent with insulin resistance and impaired glucose metabolism, as well as increased triglyceride concentrations, indicating dyslipidemia. These metabolic abnormalities were significantly less pronounced in patients with minimal fibrosis (F0–F1). Collectively, these findings confirm a strong and clinically relevant association between the progression of NAFLD and key components of metabolic syndrome, underscoring the systemic nature of the disease.

Overall, the results emphasize the importance of integrated assessment of hepatic and metabolic parameters in NAFLD patients, as individuals with advanced steatosis and fibrosis represent a high-risk group requiring intensified monitoring and targeted therapeutic interventions.

Conclusion. The results of this study demonstrate a close relationship between the severity of hepatic steatosis and the stage of liver fibrosis in patients with NAFLD. Advanced fibrosis is strongly associated with metabolic abnormalities, including obesity, dyslipidemia, and impaired glucose metabolism. Comprehensive assessment of both steatosis and fibrosis using non-invasive methods is crucial for early diagnosis, risk stratification, and prevention of disease progression and complications in NAFLD patients.

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DIGITAL SOCIETY DEVELOPMENT REFORMS IN NEW UZBEKISTAN

Abstract. *This article analyzes the strategy of reforms aimed at the formation and development of a digital society in New Uzbekistan. It covers the implementation processes of the digital economy, e-government, and information and communication technologies, as well as their impact on social life, governance systems, and education. Furthermore, the article examines projects carried out under the “Digital Uzbekistan – 2030” strategy, their effectiveness, and state initiatives to enhance the digital competence of the population. The practical significance of this study lies in providing proposals and recommendations to ensure the success of digital transformation processes. The results highlight critical aspects of building a digital society in New Uzbekistan and outline prospective directions for further digital reforms.*

Keywords: *Digital society, digital government, digital governance, digital relations, digitalization, transformation.*

Introduction. In our country, reforms aimed at human development and enhancing human dignity are elevated to the level of state policy and are gaining importance in scope and coverage. Concepts such as “digital society,” “digital government,” “digital governance,” and “digital relations” are increasingly taking root in daily life.

Any country aiming for development and international presence must inevitably undergo this path and actively engage in digitalization processes. In other words, today digitalization has become the essential path that every country must follow to respond to global trends. The COVID-19 pandemic, which has significantly affected the global economy since 2020, further accelerated the need for digitalization. For example, the education system in Uzbekistan has experienced a significant leap toward digitalization starting in 2020 due to the pandemic.

Main Part. The COVID-19 pandemic affected over 190 countries worldwide. In Uzbekistan, cases became noticeable by mid-March 2020. Before the pandemic, the global economy was experiencing positive trends, with an average growth rate of about 3% in recent years. Countries such as China, Uzbekistan, Tajikistan, and Armenia showed especially high results. The onset of the pandemic led to a global economic crisis, forcing many countries to face the complex task of “survival.”

The importance and relevance of digitalization, i.e., “online service delivery,” in social life increased. Experts define digitalization as “the process of informatization of a specific sector or system and its transformation based on information technologies.” Today, digitalization is seen as a necessary stage to

improve people's daily life and ensure convenient, high-quality, and transparent government services.

Uzbekistan is actively following this global trend. Recently, special attention has been paid to integrating digital technologies into the economy. The digital economy is not limited to e-commerce and services but encompasses all sectors. Economic development is interdependent with all sectors, so digitalization has become one of the priority directions of the "New Uzbekistan Strategy." Over 220 priority projects have been implemented across various sectors, aiming to expand information and communication technologies.

To further enhance the competitiveness of the economy, e-government development has been intensified. High-quality, in-demand digital government services are being expanded, and all state services are planned to be digitized, with automated services reaching 90% by 2030.

The pandemic particularly highlighted the need to digitalize spiritual, educational, and cultural sectors. Following the Presidential Decree PQ-5040 of March 26, 2021, the "oyina.uz" electronic portal and the Digital Promotion Department were established to collect and disseminate articles, analyses, and public opinion on social and ideological topics.

Today, obtaining information via social networks, expressing opinions on socio-political events, forming online groups, and other internet activities are becoming widespread. In 2006, the world population was about 6.5 billion, with 18% using the internet; by 2013, 7 billion people with 39% internet penetration; by 2019, 50% were active internet users. In 2021, out of 7.83 billion people, 59.5% were internet users, 53.6% social network users, and 66.6% mobile subscribers. According to Websiterating.com, as of January 5, 2024, 5.30 billion people (66% of the global population) used the internet, averaging 7 hours per day. Digital advertising and PR in 2024 are projected at \$442.6 billion.

Digital technologies are increasingly integrated into everyday life, and the internet has become a strategic tool for states worldwide. Organizing spiritual, educational, and ideological work according to modern requirements helps protect youth from ideological attacks, raise awareness, and counter threats to the country's independence and security.

Integration into the global community and the use of digital technologies in public life enable a more advanced society and strategic reforms. Sustainable national development is driven by science, social-humanitarian technologies, and the digital economy. Thus, digitalization based on data creation, processing, exchange, and transmission is vital for implementing the "Uzbekistan – 2030" strategy. Digital knowledge and modern information technologies are key to advancing science, raising highly educated and cultured youth, developing a competitive economy, and continuing democratic reforms.

Conclusion. Digital reforms in New Uzbekistan are transforming the country's economic, political, and social life. Under the "Digital Uzbekistan – 2030" strategy, significant results have been achieved in modernizing technology

infrastructure, improving e-government, digitizing state services, and enhancing digital competence.

Implementation of digital solutions in education, healthcare, transport, and finance is improving citizens' quality of life and access to services. However, issues such as the digital divide, information security, and workforce capacity remain critical challenges.

Overall, the digital reform strategy strengthens global competitiveness, ensures citizens' welfare, and modernizes governance. Its consistent implementation lays a solid foundation for building a robust digital society.

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AI AND QUANTUM TECHNOLOGIES: A STEP TOWARD SUPERCOMPUTING

Annotation. *This article examines the relationship between artificial intelligence (AI) and quantum technologies as the foundation of a new era of computing. It describes the principles of quantum computing and its potential for solving problems inaccessible to classical computers. It analyzes areas of integration between AI and quantum systems, such as quantum machine learning, optimization, and big data processing. It emphasizes that the combination of AI and quantum technologies opens up opportunities for accelerated information analysis, modeling of complex systems, and the creation of intelligent computing platforms of the future.*

Keywords. *Artificial intelligence, quantum computing, quantum machine learning, big data, neural networks, quantum algorithms, digital future.*

Introduction

The modern world is undergoing a technological revolution in which artificial intelligence and quantum technologies occupy a central place. AI has already proven its effectiveness in data analysis, forecasting, and automation, but its further development is limited by the capabilities of classical computing architectures. Quantum technologies offer a solution to this problem. Using the principles of superposition and entanglement, quantum computers can perform millions of operations simultaneously, making them potentially thousands of times faster than traditional systems. Combining AI with quantum computing is becoming the key to creating next-generation intelligent systems capable of self-learning and analyzing extremely large data sets in real time.

Purpose of the study

The aim of this study is to analyze the prospects for the synthesis of artificial intelligence and quantum technologies and assess how their interaction can lead to a breakthrough in computing power and intelligent systems.

Objectives:

1. Review the principles of quantum computing and its advantages.
2. Analyze the application of AI in quantum information science.
3. Determine the role of quantum algorithms in training neural networks.
4. Assess the prospects of quantum machine learning.

Main part

1. PRINCIPLES OF QUANTUM COMPUTING

Quantum computers are based on qubits—quantum analogs of bits—that can exist in multiple states simultaneously thanks to the superposition effect.

Furthermore, entanglement allows qubits to interact non-locally, enabling the parallel processing of vast amounts of data. This architecture makes quantum computing indispensable for tasks that require trying a huge number of combinations: chemical reaction modeling, logistics optimization, cryptography, and machine learning.

2. ARTIFICIAL INTELLIGENCE AND QUANTUM SYNERGY

AI and quantum technologies mutually reinforce each other. On the one hand, AI helps develop algorithms that control quantum systems, increasing measurement accuracy and reducing decoherence errors. On the other hand, quantum computing accelerates the training of neural networks, improving the performance of optimization and data clustering algorithms. This interaction is shaping a new field: quantum artificial intelligence (quantum AI).

3. QUANTUM MACHINE LEARNING

Quantum algorithms such as variational quantum neural networks (VQNNs) and quantum support vector machines (QSVMs) can learn faster and more efficiently than their classical counterparts. Quantum models can process high-dimensional data inaccessible to classical architectures and apply them to tasks such as pattern recognition, forecasting, and complex relationship analysis. Major companies, including Google Quantum AI, IBM Quantum, and D-Wave, are actively investing in the development of quantum intelligence platforms.

4. BENEFITS AND CHALLENGES

The benefits of integrating AI and quantum technologies include:

- exponential growth in computing power;
- accelerated neural network training;
- the ability to model complex biological and physical systems;
- reduced energy costs for training models.

However, there are also challenges: the high cost of quantum systems, scalability issues, and the lack of stable quantum memory. Widespread adoption of quantum AI requires new coding methods, data protection, and interoperability standards.

Conclusion

The confluence of artificial intelligence and quantum technologies is ushering in a new era of supercomputing. This synergy will enable solutions to problems that today seem intractable—from accurately predicting the climate to modeling the human brain. However, the future of quantum AI requires not only technological progress but also an ethical approach. Only by combining scientific accountability and transparency can quantum intelligence become a tool for the sustainable development and intellectual evolution of humanity.

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ARTIFICIAL INTELLIGENCE IN EDUCATION: HOW AI IS CHANGING THE LEARNING PROCESS

Annotation. *This article examines the impact of artificial intelligence (AI) on the modern education system. Key areas of AI implementation in the educational process are analyzed: personalized learning, intelligent assistants, automated knowledge assessment, and student performance analysis. It is noted that the use of AI can improve learning efficiency and make the educational process flexible and adaptive. However, the author emphasizes the risks involved, including the loss of personal contact between teacher and student, the threat of technology dependence, and the need for digital literacy.*

Keywords. *Artificial intelligence, education, personalized learning, digitalization, adaptive systems, educational technologies.*

Introduction

Artificial intelligence is gradually becoming an integral part of the educational ecosystem. Every year, the number of schools, universities, and online platforms using AI to analyze data, adapt programs, and support teachers grows. The primary goal of implementing AI in education is to make learning more personalized, effective, and interactive. Modern systems can take into account the abilities, interests, and pace of each student, creating unique learning paths. However, along with opportunities come challenges—the need for ethical regulation, data protection, and the preservation of the human role in education.

Purpose of the study

The purpose of this study is to analyze the role of artificial intelligence in transforming traditional teaching methods and to determine how technology can improve the quality of education.

Objectives:

1. To study the key areas of AI application in education.
2. To assess the advantages and limitations of these technologies.
3. To examine examples of successful AI implementation in educational systems.
4. To identify prospects for the development of "smart learning."

Main part

1. Personalized learning

One of the main advantages of AI is the ability to personalize learning. Algorithms analyze student behavior, test results, and preferences, generating personalized recommendations. Examples of such systems include platforms like Coursera, Duolingo, and Khan Academy, where AI adapts assignment difficulty and

suggests materials based on students' knowledge level. This helps students progress at their own pace, reduces stress, and increases motivation.

2. Intelligent assistants and virtual mentors

AI is being used to create chatbots and virtual assistants that can answer student questions, explain complex topics, and even assist with exam preparation. These solutions allow teachers to focus on more complex tasks, such as creative learning, critical thinking, and research.

3. Automation and analytics

AI algorithms help analyze educational data, predict academic performance, and identify learning difficulties. Automatic grading saves teachers time and improves the objectivity of assessments. At the same time, it's important to maintain a balance between automation and a pedagogical approach to prevent learning from becoming mechanical.

4. Ethical and social aspects

The use of AI in education raises ethical and privacy concerns. Collecting data on student behavior requires strict data protection. Furthermore, there is a risk of overreliance on technology, which can lead to students losing their ability to think independently. Therefore, the implementation of AI must be accompanied by improved digital literacy and the development of a critical attitude toward technology.

Conclusion

Artificial intelligence opens new horizons for education, making the learning process more flexible, personalized, and effective. However, its implementation must occur in collaboration with teachers, not in their place. The human factor remains key—it is the teacher who guides, inspires, and develops the individual. The future of education is a partnership between humans and technology, where AI acts as an assistant, not a replacement.

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IMPLEMENTATION OF A MODEL FOR USING METHODS TO IMPROVE PROFESSIONAL COMPETENCE IN TEACHING SOCIAL AND HUMANITARIAN SCIENCES IN MEDICAL HIGHER EDUCATION INSTITUTIONS

Abstract: *The development of modern medical education requires an integrated approach to forming not only clinical knowledge but also essential social, ethical, and humanitarian competencies. Effective teaching of social and humanitarian sciences plays a critical role in preparing future medical professionals for complex interpersonal interactions, ethical decision-making, and culturally sensitive patient care. This article presents a pedagogical model designed to enhance professional competence through innovative teaching methods in medical higher education institutions.*

Keywords: *Professional competence, medical education, social and humanitarian sciences, pedagogical model, competence-based approach, interactive methods, problem-based learning, reflective practices, higher education.*

1. Introduction

The rapid transformation of modern healthcare systems places new demands on medical professionals, requiring them to demonstrate not only clinical proficiency but also strong social, ethical, and communication skills. These competencies are essential for effective patient-centered care, interprofessional collaboration, and socially responsible decision-making. As a result, medical higher education institutions must adopt pedagogical approaches that foster the development of comprehensive professional competence.

Social and humanitarian sciences—including ethics, medical psychology, sociology, philosophy, and communication studies—play an important role in shaping the social responsibility and professional culture of future physicians. However, traditional teaching methods often fail to develop students' practical and interpersonal skills. Therefore, implementing a pedagogical model that effectively integrates innovative teaching methods is essential for improving educational outcomes in this domain.

2. Theoretical Foundations

2.1 Professional Competence in Medical Education

Professional competence in medicine includes theoretical knowledge, practical skills, clinical reasoning, communication abilities, ethical awareness, empathy, and the ability to work effectively in diverse environments. Teaching social and humanitarian sciences supports these aspects by promoting humanistic values and reflective thinking.

2.2 Competence-Based Approach

The competence-based approach emphasizes measurable learning outcomes and the integration of theoretical and practical knowledge. This approach requires educators to design activities that help students apply academic concepts in real-life contexts.

2.3 Innovative Pedagogical Methods

Research in medical pedagogy highlights several effective methods:

- problem-based learning (PBL),
- case-study analysis,
- simulation and role-playing,
- multimedia and digital tools,
- collaborative and project-based learning,
- reflective writing and discussions.

These methods strengthen students' ability to apply socio-humanitarian knowledge in clinical practice.

3. Pedagogical Model for Improving Professional Competence

The proposed model includes three interconnected components: **conceptual**, **technological**, and **evaluative**.

3.1 Conceptual Component

This component defines the goals, principles, and expected outcomes of the learning process. It is based on:

- humanistic educational values,
- interdisciplinarity,
- student-centered learning,
- developmental pedagogy.

3.2 Technological Component

This component involves a set of teaching technologies aimed at competence formation:

a) Problem-Based Learning

Students work with ethical dilemmas and socio-medical problems resembling real clinical situations.

b) Case Studies

Analyzing authentic cases develops critical thinking and ethical decision-making.

c) Simulation and Role-Playing

Simulated interactions (doctor–patient, team communication) enhance communicative and behavioral skills.

d) Multimedia Tools

Digital resources support visualization of complex concepts and diversify the learning environment.

e) Reflective Practices

Reflection through journals, portfolios, and guided discussions promotes self-awareness and professional growth.

f) Collaborative Learning

Group projects strengthen teamwork, leadership, and interpersonal communication.

3.3 Evaluative Component

Competence assessment includes:

- formative assessment (observation, feedback),
- summative assessment (tests, analytical essays, presentations),
- competency rubrics,
- self- and peer-assessment methods.

4. Implementation Strategy

4.1 Curriculum Integration

Socio-humanitarian subjects should be integrated across the curriculum, synchronizing with clinical disciplines.

Conclusion

The proposed pedagogical model provides a comprehensive framework for enhancing professional competence in teaching social and humanitarian sciences at medical higher education institutions. By combining innovative teaching methods with systematic evaluation, the model contributes to the formation of well-rounded medical professionals capable of meeting contemporary healthcare challenges. The recommendations presented in this article may serve as a foundation for institutional reform and further improvement in medical pedagogy.

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НАИБОЛЕЕ ДОСТУПНЫЕ ДИАГНОСТИЧЕСКИЕ МЕТОДЫ ТУБЕРКУЛЕЗА У ВИЧ- ИНФИЦИРОВАННЫХ

***Аннотация.** В статье рассматриваются наиболее доступные и широко применяемые методы диагностики туберкулёза у ВИЧ-инфицированных пациентов. Проанализированы возможности раннего выявления туберкулёза, а также диагностические трудности, связанные с иммунодефицитным состоянием у больных ВИЧ-инфекцией.*

***Ключевые слова:** туберкулёз; ВИЧ-инфекция; диагностика; микроскопия мокроты; рентгенография; иммунодефицит.*

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THE MOST ACCESSIBLE DIAGNOSTIC METHODS OF TUBERCULOSIS IN HIV-INFECTED PATIENTS

***Abstract.** The article examines the most accessible and widely used diagnostic methods for tuberculosis in HIV-infected patients. The possibilities of early detection of tuberculosis are analyzed, as well as diagnostic challenges associated with immunodeficiency in patients with HIV infection.*

***Keywords:** tuberculosis; HIV infection; diagnostics; sputum microscopy; radiography; immunodeficiency.*

Актуальность: По данным ВОЗ во всем мире жили с ВИЧ в 2022 году- 39,0 миллиона [33,1 миллиона–45,7 миллиона] человек. 1,3 миллиона [1 миллион–1,7 миллиона] человек впервые заразились ВИЧ в 2022 году. В 2022 году 46% всех новых случаев ВИЧ-инфекции в мире были среди женщин и девочек (всех возрастов). 630 000 [480 000-880 000] человек умерли от болезней, связанных со СПИДом, в 2022 году [1,2,5]. По имеющимся оценкам, в Европейском Регионе насчитывается примерно 29 000 ВИЧ-положительных случаев ТБ. Как видно из приведенных данных проблема ВИЧ инфекции в сочетании с другими болезнями, в частности с туберкулезом имеет не только медицинскую, но и социальную значимость [1,2,3,6]. Республика Узбекистан не представляет исключения. По состоянию на 1 октября 2023 года в Узбекистане с диагнозом ВИЧ живут 48 658 человек. В стране ВИЧ-инфекция

распространена в основном среди лиц, относящихся к [группе риска](#), — 29%, а также среди трудовых мигрантов — 28%. Основной возраст инфицированных составляет 30–49 лет — их более 51% [6]. Президент страны на совещании 12 декабря 2022 года дал поручение: О том, что в Узбекистане с 2023 года будут организованы мобильные бригады “Здоровые легкие” для проведения скрининга детей в отдаленных районах, для расширения масштабов молекулярно-генетической диагностики инфекции, вызывающей туберкулез, выявления и профилактического лечения больных с латентным туберкулезом [4].

Цель исследования. Изучить структуру и информативность различных методов диагностики туберкулеза у ВИЧ- инфицированных лиц.

Материалы и методы исследования. В Андижанской области за последние 3 года выявлено 117 больных с ТБ ВИЧ, из них 14 детей (12 %). 2022 году-39/2, 2023 году-41/7 детей, 2024-37/5 детей. Туберкулёз органов дыхания зарегистрировано у 88 больных, внелёгочные формы заболевания у 29 больных.

В данную разработку включено 60 пациентов, живущих с ВИЧ-инфекцией и туберкулезом, получавших лечение в Андижанском областном Центре фтизиатрии и пульмонологии в течение последних 3 года. Пациентам кроме традиционных методов исследования на туберкулез: рентгено-томографическое исследование, проба Манту, бактериоскопия мазка, исследование патологического материала с помощью картриджной тест-системы Gene Xpert MTB/Rif для одновременного выделения и выявления ДНК *M. tuberculosis complex*, а также определения генетических детерминант (мутаций), ответственных за лекарственную устойчивость к рифампицину; посев на среду Левенштейна - Йенсена, посев на жидкую среду ВАСТЕС MGIT 960, при положительном результате бактериоскопии, проводилось исследование данного материала методом Haintest, с определением устойчивости микобактерий к препаратам первого и второго ряда.

Результаты исследования и их обсуждение. В исследование включено 55 (основная группа 50+5 контрольная группа) пациентов, получивших лечение в Андижанском центре фтизиатрии и пульмонологии в течение 2022-2024 годов из 117 пациентов с установленным ВИЧ- статусом и туберкулезом. В основной группе возраст пациентов составил от 15 лет до 65 лет. Среди обследованных: лица младше 20 лет- 9, от 21- 30 лет- 5, от 31- 40 лет- 12, 41- 50 лет-17, от 51-65 лет-7 больных. Лица мужского пола: - 31; лица женского пола -19. Т.е. мужчин было несколько больше, чем женщин. Путь заражения у лиц молодого возраста парентеральный из 9 (всем им проводили лечение путем введения препаратов капельно, в основном они получали лечение в частных клиниках в детском возрасте).

Таблица 1- переделать в графическую. Распределение по клиническим формам больных с коинфекцией ТВ+ ВИЧ с лекарственно - устойчивым туберкулезом

Клинические формы	Чувствительный туберкулез- 41		МЛУ ТБ n=7		ШЛУ ТБ n=2	
	всего	БК+	всего	БК+	всего	БК+
ТВГЛУ	1	-	-	-	-	-
диссеминированный	6	4	-	-	1	1
инфильтративный	29 / 7 с расп	21	6 / 6 с распа	6	-	-
Фиброзно-кавернозный	1	-	-	-	1	1
Экссудативный плеврит+эмпиема плевры	2	-	1	1	-	-
Цирротический туберкулёз	2	-				
Всего	41	25	7	7	2	2

О больных с латентным туберкулёзом информации в стационаре не было, так как диагностические методы проводились на уровне первичного звена.

Впервые выявленных - 32 больных, контингентных-13, рецидивных больных-5. Женщин 19, мужчин 31. 3 больных-911, умерло 4 больных (1жен+3 муж). Ведущей клинической формы был инфильтративный туберкулез у 35 (%) больных, с распадом лёгочной ткани 13, бациллярных больных было 27 (%). Диссеминированный туберкулёз у 7 больных (5 БК+, 2 БК-). ФКТ у 2 больных (БК+1, БК-1). Туб.плеврит+эмпиема плевры наблюдалось у 3 больных. Наиболее чувствительными методами были: ДНК Gene Xpert MTB/Rif, положительный результат у 34 пациентов (мокроты-32, ликвор-1, плевральная жидкость -1больного). Фиброзно-кавернозный туберкулёз выявлен у 2 больных (1-житель села, 1-г.Андижан), диссеминированный туб у 7 больных (5+,2-); в течение 1 месяца умерло 2 больных: ЛЧ ТБ -1больная, с лекарственной устойчивостью-1+ (ШЛУ) рецидивных больных, которые скончались от осложнений основного заболевания.

Выводы. Современные бактериологические и иммуно-генетические методы исследование патологического материала методами GeneXpert MTB/Rif, BASTEC MGIT 960, Haintest, позволяют в короткие сроки установить наличие устойчивости к противотуберкулезным препаратам. Что необходимо для проведения качественного лечения. Среди детей наиболее эффективным методом является постановка квантиферонового теста.

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ВАЖНОЕ ЗНАЧЕНИЕ ИЗУЧЕНИЯ ЕЕ ЭТИОПАТОГЕНЕЗА В СОВРЕМЕННОЙ ИНТЕРПРЕТАЦИИ ДЛЯ ОПРЕДЕЛЕНИЯ ВОЗМОЖНОСТЕЙ РАННЕГО ВЫЯВЛЕНИЯ ПРЕЭКЛАМПСИИ

***Аннотация.** Изучение этиопатогенеза преэклампсии критически важно для ранней диагностики, так как патологические изменения начинаются уже в первом триместре, позволяя прогнозировать риск на 10-14 неделях беременности и применять профилактику, например, низкие дозы аспирина, для снижения материнской и перинатальной смертности, хотя единого идеального биомаркера нет, и используется комплексный подход с учетом анамнеза, клинических, ультразвуковых и новых «омиксных» маркеров. Понимание механизмов (ангиогенез, гемодинамика, метаболизм) помогает разработать более точные прогностические модели и персонализированные стратегии.*

***Ключевые слова:** преэклампсия, беременность, фактор риска, материнская смертность.*

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THE IMPORTANCE OF STUDYING ITS ETIOPATHOGENESIS IN A MODERN INTERPRETATION FOR DETERMINING THE POSSIBILITIES OF EARLY DETECTION OF PREECLAMPSIA

***Abstract.** Studying the etiopathogenesis of preeclampsia is critical for early diagnosis, as pathological changes begin as early as the first trimester. This allows for risk prediction at 10-14 weeks of pregnancy and the use of preventive measures, such as low-dose aspirin, to reduce maternal and perinatal mortality. Although there is no single ideal biomarker, a comprehensive approach is used, taking into account medical history, clinical, ultrasound, and new "omics" markers. Understanding the mechanisms (angiogenesis, hemodynamics, metabolism) helps develop more accurate prognostic models and personalized strategies.*

***Keywords:** preeclampsia, pregnancy, risk factor, maternal mortality.*

Введение. Преэклампсия (ПЭ) – патологическое состояние, характеризующееся артериальной гипертензией и протеинурией на 20-й неделе беременности, часто заканчивающееся тяжелыми осложнениями, и встречающееся у 5–10% беременных. Эта проблема особенно актуальна в развивающихся странах, где частота осложнений и материнская смертность от преэклампсии во время беременности в 20 раз выше, и развитые страны не являются исключением. Заболеваемость артериальной гипертензией у беременных в различных регионах нашей республики составляет 15–25%. Согласно анализу Национального комитета Республики Узбекистан, смертность от преэклампсии в нашей стране составляет 22,8% [14].

Преэклампсия, являющаяся одной из ведущих причин перинатальной смертности, встречается у 8% всех беременностей в западных странах. Преэклампсия является одной из ведущих причин материнской смертности и заболеваемости во всем мире, составляя 10–15% случаев материнской смертности [11].

Преэклампсия остается одним из наиболее распространенных осложнений беременности на сегодняшний день, приводя к серьезным нарушениям у матери и плода. По мнению многих исследователей, преэклампсия занимает третье место среди материнских и перинатальных осложнений и смертности, составляя 11–16% всех родов. Исследования показали, что ежегодно во всем мире регистрируется более 8 миллионов случаев преэклампсии, что делает ее ведущей причиной материнской и перинатальной смертности, ежегодно унося жизни 60 000 молодых женщин [4].

Этиология преэклампсии остается спорной. Ведущие теории развития этого осложнения беременности основаны на неадекватном ремоделировании плодово-плацентарных артерий, плацентарной ишемии, окислительном стрессе, чрезмерной противовоспалительной реакции, генетической предрасположенности и процессах иммунологической толерантности [9].

Наиболее распространенной гипотезой является то, что причиной преэклампсии является неспособность спиральных артерий к адекватной регенерации, что приводит к нарушению формирования плаценты на ранних сроках беременности [2].

Факторы риска преэклампсии включают ожирение, инсулинорезистентность и гиперлипидемию, которые способствуют высвобождению воспалительных цитокинов и окислительному стрессу, приводящему к эндотелиальной дисфункции. Однако полная клиническая картина преэклампсии до сих пор неясна. Нарушение инвазии трофобласта и ремоделирование маточно-плацентарных артерий, возникающие при преэклампсии, усугубляют образование активных форм кислорода, гипоксию и эндотелиальную дисфункцию, возникающие при преэклампсии [6].

За последние несколько десятилетий было проведено множество исследований, направленных на определение этиологии преэклампсии как патологии беременности. Однако этот синдром во многом остается тем же,

что и гипотезы пятидесятилетней давности. Даже сегодня этиология и истинная причина синдрома, приводящего к клиническим проявлениям преэклампсии, остаются неясными [2].

Несмотря на открытие новых признаков преэклампсии, гипертония остаётся единственным постоянным симптомом, и сравнивать результаты и исследования становится всё сложнее, поскольку для диагностики преэклампсии используются разные методы [8].

Для диагностики преэклампсии необходимо наличие нового проявления (артериального давления 140/90 мм рт. ст.) при двукратном измерении на обеих руках с интервалом 6 часов и клинически значимой протеинурии (300 мг) в суточном анализе мочи после 20 недель беременности [10].

За последние двадцать лет был разработан ряд весьма перспективных гипотез и теорий, включая плацентарную и материнскую.

Существует множество гипотез развития преэклампсии. Однако сложно определить, какие механизмы возникновения и развития являются первичными. В качестве основы и основной причины формирования преэклампсии изучены многие факторы, включая:

- генетические;
- иммунологические;
- сосудистые;
- гуморальные.

Патогенез преэклампсии до настоящего времени остается неясным. По мнению ряда исследователей, плацента играет важную роль в развитии и развитии преэклампсии, поскольку после ее удаления у пациенток значительно уменьшаются симптомы [1-3,22]. Кроме того, ее происхождение может быть тесно связано с эндотелиальной дисфункцией и иммунными нарушениями [7].

У беременных женщин с преэклампсией развивается ряд осложнений, включая задержку внутриутробного развития плода, преждевременное излитие плодных оболочек, преждевременные роды и преждевременное изгнание нормально расположенной плаценты. Все эти причины связаны с нарушением архитектуры спиральных артерий матки и инвазией трофобласта [12].

Как правило, клетки цитотрофобласта проникают в медиальную оболочку спиральных артерий, замещая гладкомышечные и соединительнотканые элементы стенки, что приводит к потере сосудами способности к сокращению, приобретению мешковидной формы и увеличению их размеров [3].

При нарушении продукции биологических факторов происходит неполное проникновение эндovasкулярного трофобласта в спиральные маточные артерии, что приводит к изменению структуры плаценты, воспалительным реакциям, эндотелиальной дисфункции, обуславливающей хрупкость сосудов и клинические симптомы преэклампсии [13].

Широко распространена теория о том, что в основе преэклампсии лежит нарушение функции плаценты, и, в частности, клеток трофобласта. Эти клетки, составляющие основную часть плаценты, также могут возникать в результате слияния двух подтипов: синцитотрофобластов, ответственных за формирование первичного наружного слоя, находящегося в непосредственном контакте с материнской кровью, и цитотрофобластов, соответствующих внутреннему слою и строме, которая проникает в эндометрий матки. Нарушение кровоснабжения во время плацентации и инвазии трофобласта во время формирования плаценты также может вызывать гипертонию на ранних стадиях беременности [5].

Эти нарушения плацентарной перфузии могут привести к задержке роста плода или аномалиям, которые могут препятствовать нормальному развитию эндотелиальных клеток.

Маточный кровоток адаптируется к потребностям плода по мере развития беременности, что происходит посредством вазодилатации и образования новых кровеносных сосудов [1].

Начиная с третьей недели беременности хорионический ретикулум развивается из вторичной (аваскулярной) сети в третичную, на которую влияют ангиогенные факторы. Плацента человека является богатым источником ангиогенных веществ [5].

Согласно источникам, преэклампсия считается плацентарным заболеванием, обусловленным главным образом нарушением имплантации плаценты, а поздняя преэклампсия, скорее всего, связана с эндотелиальной дисфункцией матери [7].

В литературе широко обсуждается роль дисбаланса проангиогенных и антиангиогенных факторов как специфического механизма развития артериальной гипертензии и протеинурии у женщин с преэклампсией [3].

Исследования показали, что преэклампсия связана с дефицитом васкулоэндотелиального фактора роста (VEGF) при наличии рецепторов, конвертирующих VEGF, называемых растворимой fms-подобной тирозинкиназой (sFlt-1), которая синтезируется в ишемизированной плаценте с 5–6 недель беременности до появления клинических проявлений преэклампсии. Согласно данным одного из недавних систематических обзоров, факторы VEGF и PlGF (плацентарный фактор роста) обеспечивают нормальное развитие и функционирование плаценты, а их дисбаланс может способствовать развитию системной эндотелиальной дисфункции, которая лежит в основе всех клинических проявлений преэклампсии [11].

Дисбаланс ангиогенных факторов, таких как VEGF или PlGF, и факторов, препятствующих ангиогенезу, таких как sFlt-1, играет важную роль в патогенезе преэклампсии [10].

Таким образом, дисбаланс про- и антиангиогенных факторов считается основным патофизиологическим признаком преэклампсии, при этом в дальнейшем в патогенезе преэклампсии могут развиваться как ангиогенные, так и неангиогенные формы. Различия в ангиогенных факторах наблюдаются

также во время беременности, что характеризуется задержкой внутриутробного развития, что указывает на то, что дисбаланс про- и ангиогенных факторов является фактором, определяющим рост, развитие и функцию плаценты.

PlGF секретируется эндотелиальными клетками сосудов и цитотрофобластами. Он обнаруживается в сосудах трофобласта и в медиі крупных стромальных сосудов, что позволяет предположить его участие не только в формировании сосудов, но и в инвазии трофобласта. Концентрация PlGF при физиологической беременности.

Уровень преэклампсии у плода постепенно увеличивается, достигая максимума на 28–32 неделе, а затем снижается [9].

В то же время иммунологическая теория развития преэклампсии получает всё больше доказательств, рассматривая её как ответ матери на введение плодом чужеродных антигенов [25,26]. Известно, что риск развития преэклампсии у женщин с аутоиммунными заболеваниями в несколько раз выше, чем в общей популяции [12].

Также эпидемиологические наблюдения подтверждают иммунологическую теорию: у первородящих беременных, особенно забеременевших в течение короткого периода полового акта, наблюдается более высокая частота преэклампсии. Данные о высокой частоте преэклампсии у беременных женщин после экстракорпорального оплодотворения с использованием донорских ооцитов также являются косвенным следствием иммунологической теории [4].

На фоне преэклампсии наблюдается повышение концентрации воспалительных цитокинов при одновременном снижении противовоспалительных цитокинов, что свидетельствует о развитии воспалительной реакции [1].

У беременных с преэклампсией обнаружены антитела к рецепторам ангиотензина II типа [14]. Исследования показали, что введение таких белков в организм экспериментальных животных вызывает гипертензию, протеинурию и сосудистые повреждения.

Продолжается поиск специфических фетальных антигенов, запускающих каскад иммунологических процессов. Известно, что нейроспецифические белки развивающегося мозга плода обладают высокой иммуногенностью. Роль эндотелиальных активаторов в развитии преэклампсии могут играть различные вещества, включая цитокины, эндотелиальные антитела, липиды и липидные перекиси, молекулы адгезии, синцитиотрофобласты, гомоцистеин. Большое значение имеет патологический каскад перекисного окисления и нарушение антиоксидантной защиты плаценты с последующей генерализацией маркеров окислительного стресса в кровотоке [13]. Таким образом, в патогенезе преэклампсии важную роль играют нарушение инвазии трофобласта на ранних сроках беременности с развитием плацентарной ишемии, дисбаланс про- и антиангиогенных факторов, повреждение эндотелиального слоя сосудов, развитие системных

воспалительных реакций, общая вазоконстрикция, нарушение реологических свойств крови, полиорганная недостаточность.

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ВЛИЯНИЕ ГИПЕРТОНИЧЕСКОЙ БОЛЕЗНИ НА РАЗВИТИЕ КОГНИТИВНОЙ ДИСФУНКЦИИ ПОСЛЕ ХИРУРГИЧЕСКОГО ВМЕШАТЕЛЬСТВА

Аннотация. Послеоперационная когнитивная дисфункция (ПОКД) является частым и клинически значимым осложнением, наблюдаемым, у пациентов после крупных хирургических вмешательств. Среди основных факторов риска гипертония играет решающую роль в предрасположенности пациентов к ПОКД. Данная статья свидетельствует о том, что антигипертензивные препараты и их периоперационное управление могут влиять на динамику мозгового кровотока, что требует тщательного контроля артериального давления в периоперационный период.

Ключевые слова: Послеоперационная когнитивная дисфункция, гипертония, нейровоспаление, общая анестезия, церебральная перфузия, когнитивная оценка.

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THE EFFECT OF HYPERTENSIVE DISEASE ON THE DEVELOPMENT OF COGNITIVE DYSFUNCTION AFTER SURGICAL INTERVENTION

Abstract. Postoperative cognitive dysfunction (POCD) is a common and clinically significant complication observed in patients after major surgical interventions. Among the main risk factors, hypertension plays a decisive role in predisposing patients to PCD. This article shows that antihypertensive drugs and their perioperative management can affect cerebral blood flow dynamics, which requires careful control of blood pressure during the perioperative period.

Keywords: *Postoperative cognitive dysfunction, hypertension, neuroinflammation, general anaesthesia, cerebral perfusion, cognitive assessment.*

Введение. ПОКД относится к снижению когнитивных функций, которое объективно измеряется после операции по сравнению с предоперационным исходным уровнем [5]. Чаще всего она определяется с помощью нейропсихологического тестирования и может проявляться скрыто или явно, часто включая ухудшение памяти и замедленную обработку [1]. Проспективное исследование показало, что у пациентов с ПОКД в течение трех месяцев был значительно более высокий риск смерти в течение 7–10 лет (коэффициент риска $\approx 1,6$) [2].

Гипертензия вызывает повреждение микрососудов мозга и активацию глии, что усиливает нейровоспаление [3]. Гипертензия является распространенным сопутствующим заболеванием в хирургической популяции и хорошо известным фактором риска хронического снижения когнитивных функций. Она вызывает сосудистое ремоделирование, микроинфаркты и дисфункцию гематоэнцефалического барьера, тем самым снижая когнитивный резерв. Пациенты с гипертензией могут испытывать усиленные нейровоспалительные реакции или более слабую церебральную ауторегуляцию во время операции, что усиливает ПОКД.

Недавнее проспективное исследование сообщило о гипертензии как о независимом предикторе раннего ПОКД (коэффициент шансов $\sim 4,15$) [4]. Тем не менее, консенсус заключается в том, что гипертензия, вероятно, способствует увеличению бремени церебральных сосудистых заболеваний и снижению устойчивости к хирургическому стрессу [1,3].

Цель исследования: выявить выраженность и распространенность когнитивных нарушений у больных артериальной гипертензией после хирургических вмешательств, выполненных в условиях общей многокомпонентной анестезии.

Материалы и методы. Исследование проводилось с января 2024 года по декабрь 2025 года в хирургических отделениях центральной районной больницы. В исследование были включены пациенты обоего пола (62 женщины и 46 мужчин) в возрасте 20–59 лет, которым была проведена операция под общей анестезией. Критерии исключения не применялись — пациенты включались независимо от показаний к хирургическому вмешательству или сопутствующих заболеваний.

Пациенты были распределены на две группы: 1 группа ($n=40$) включала пациентов без гипертензии, а 2 группа ($n=68$) включала пациентов с диагностированной артериальной гипертензией (АГ). Две группы были схожи по возрасту и другим исходным характеристикам. Стандартный мониторинг включал ЭКГ, неинвазивное артериальное давление, пульсоксиметрию, температуру. Индукция анестезии достигалась с помощью внутривенных препаратов (пропофола 1,5–2,5 мг/кг, фентанила 1–2 мкг /кг) и миорелаксантов (рокурония 0,6–1,0 мг/кг). Анестезия поддерживалась с

помощью ингаляционного анестетика (например, изофлюрана в концентрации 1–2% в конце выдоха. Искусственная вентиляция легких была настроена на поддержание нормокапнии (дыхательный объем 6–8 мл/кг, частота дыхания была скорректирована для поддержания конечного уровня CO_2 ~35–40 мм рт. ст.). В конце операции пациенты были экстубированы в операционной.

Результаты и обсуждение: К послеоперационному 3 дню 2 группа продемонстрировала резкое снижение памяти. Средний балл теста из 10 слов упал до $2,2 \pm 0,8$ (снижение на ~69% от исходного уровня; парный t-критерий, $p < 0,001$), тогда как группа 1 не продемонстрировала существенных изменений ($8,7 \pm 0,9$ на 3 день против $9,0 \pm 0,7$ до операции, $p = 0,21$). На 5-й день память группы 2 частично восстановилась (среднее значение $3,0 \pm 1,0$), но оставалась намного ниже, чем у группы 1 (среднее значение $8,5$, $p < 0,001$). Таким образом, у пациентов с АГ наблюдалась резкая потеря памяти после операции, тогда как у пациентов с нормальным давлением — не имеется.

Параллельные паттерны были замечены в MMSE, MoCA и тесте на рисование часов. На 3 день группа 2 показала значительно более низкие баллы MMSE/ MoCA (MoCA 22 ± 3 против 27 ± 2 в группе 1, $p < 0,01$) и больше ошибок при рисовании часов (~30% увеличение ошибок, $p < 0,01$). Баллы группы 1 оставались близкими к исходному уровню. Эти результаты указывают на то, что внимание, скорость обработки и исполнительные функции были значительно нарушены в группе 2, но сохранились в группе 1. Группа 2 показала сниженную стабильность внимания и замедленную обработку информации после операции.

Заключение. АГ значительно усугубляет ПОКД у пациентов, перенесших операцию. В то время как у пациентов с нормальным артериальным давлением когнитивные функции сохранялись в течение раннего послеоперационного периода, у пациентов с гипертонией наблюдались существенные нарушения, особенно в кратковременной памяти, внимании и скорости обработки. Аналогичным образом, глобальные оценки когнитивных функций (MMSE, MoCA, тест рисования часов) показали значительное ухудшение только в группе с гипертонией.

АГ выступает в качестве основного фактора риска ПОКД, вероятно, из-за лежащего в основе цереброваскулярного нарушения и сниженного когнитивного резерва. Нейротоксические эффекты общей анестезии могут взаимодействовать синергически с гипертензивной сосудистой патологией, приводя к более выраженному когнитивному снижению. Важно, что этот эффект наблюдался в широком диапазоне операций, что указывает на его актуальность для общей хирургической популяции.

Целевые вмешательства, такие как периоперационный контроль АД, тщательный выбор анестетика и послеоперационный когнитивный мониторинг, могут помочь снизить частоту и тяжесть ПОКД в этой группе высокого риска.

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ПАТОЛОГИЧЕСКОЕ СОСТОЯНИЕ СЛИЗИСТОЙ ОБОЛОЧКИ ЖЕЛУДКА И ЕГО КЛИНИЧЕСКИЕ ХАРАКТЕРИСТИКИ У БОЛЬНЫХ В КРИТИЧЕСКОМ СОСТОЯНИИ В УСЛОВИЯХ ИВЛ

***Аннотация.** В статье рассматриваются клинические проявления патологий желудка у больных в критическом состоянии, находящихся на искусственной вентиляции лёгких. Отмечено, что наиболее частыми симптомами являются боли и дискомфорт в эпигастрии, тошнота, рвота с примесью крови, признаки желудочного кровотечения и нарушения пищеварения. Эти проявления обусловлены ишемическими и деструктивными изменениями слизистой оболочки, нарушением микроциркуляции и стресс-индуцированными повреждениями. Ранняя диагностика и коррекция данных нарушений позволяют снизить риск тяжёлых осложнений и улучшить прогноз у критических больных.*

***Ключевые слова:** желудок, критическое состояние, искусственная вентиляция лёгких, клинические проявления, осложнения.*

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PATHOLOGICAL CONDITION OF THE GASTRIC MUCOSA AND ITS CLINICAL CHARACTERISTICS IN CRITICALLY ILL PATIENTS UNDER VENTILATORY CONDITIONS

Abstract. *The article analyzes the clinical manifestations of gastric pathologies in critically ill patients undergoing mechanical ventilation. The most common symptoms include epigastric pain and discomfort, nausea, vomiting with blood, signs of gastric bleeding, and digestive disorders. These manifestations are associated with ischemic and destructive changes in the gastric mucosa, impaired microcirculation, and stress-induced injuries. Early diagnosis and therapeutic correction help reduce the risk of severe complications and improve prognosis in critically ill patients.*

Keywords: *stomach, critical condition, mechanical ventilation, clinical manifestations, complications*

Введение. Желудок является не только ключевым органом пищеварительной системы, обеспечивающим начальные этапы переваривания пищи, но и выполняет барьерную функцию, защищая организм от экзогенных инфекционных агентов. Слизистая оболочка желудка отличается высокой чувствительностью к гипоксии, ишемии и воздействию стрессовых факторов [1]. В условиях критического состояния организма и при проведении ИВЛ она подвергается выраженному воздействию неблагоприятных факторов: нарушению микроциркуляции, изменению кислотно-щелочного равновесия, снижению местных защитных механизмов и воздействию медикаментозных средств, используемых в интенсивной терапии [2].

Развитие современной интенсивной терапии и реаниматологии привело к значительному улучшению исходов у пациентов, находящихся в критическом состоянии [3]. Одним из наиболее распространённых методов жизнеобеспечения в условиях реанимации является искусственная вентиляция лёгких (ИВЛ), которая позволяет компенсировать дыхательную недостаточность и поддерживать газообмен при тяжёлых повреждениях дыхательной системы, сепсисе, полиорганной недостаточности, тяжёлых травмах и других жизнеугрожающих состояниях [5]. Вместе с тем применение ИВЛ, особенно длительное, сопровождается развитием ряда осложнений, среди которых важное место занимают патологические изменения со стороны желудочно-кишечного тракта, и прежде всего желудка [4].

Патогенез повреждений слизистой оболочки желудка у критических больных является многофакторным. В его основе лежат ишемия и гипоксия тканей, обусловленные нарушением системной и локальной гемодинамики, микротромбозами и дисфункцией эндотелия. Важную роль играют нарушения регуляции секреции желудочного сока, активация свободнорадикальных процессов, воспалительная реакция и снижение регенераторных способностей эпителия. Дополнительное значение имеют лекарственные воздействия: использование вазоактивных средств, антибиотиков, глюкокортикостероидов и седативных препаратов, что также влияет на морфофункциональное состояние слизистой оболочки [1].

Морфологические исследования показывают, что у пациентов на ИВЛ отмечаются выраженные изменения слизистой оболочки желудка: отёк, дистрофия и некробиоз эпителия, субэпителиальные кровоизлияния, воспалительная инфильтрация и микроэрозии. В более тяжёлых случаях формируются глубокие язвенные дефекты, сопровождающиеся высоким риском кровотечения и перфорации. Эти изменения могут протекать субклинически, что делает необходимым их целенаправленное выявление и своевременную профилактику [5].

Целью исследования явилось выявление основных клинических изменений слизистой желудка и их клинической значимости для диагностики и профилактики осложнений.

Материалы и методы: Настоящее исследование проведено на базе отделения общей реанимации РНЦЭМПНФ и охватывает клинимоρφологический анализ 67 пациентов, находившихся в критическом состоянии в период с 2022 по 2025 годы. Все пациенты были распределены на две основные группы по характеру дыхательной поддержки:

— 1-я группа (основная, n=34): больные, находящиеся на искусственной вентиляции лёгких. Лечение включало как стандартную терапию по клиническому протоколу, так и дополнительные мероприятия, направленные на защиту слизистой оболочки, включая гастропротекторы и нутритивную поддержку.

— 2-я группа (сравнительная, n=33): больные, находящиеся в тяжёлом состоянии, но не нуждавшиеся в инвазивной вентиляции лёгких. Морфологических изменений слизистой оболочки желудка у них не выявлено. Пациенты получали базовую терапию в соответствии с действующими стандартами.

Результаты и обсуждения. У пациентов группы I, находящихся в критическом состоянии и требующих ИВЛ, клиническая картина поражений желудка отличается малосимптомностью и специфическими проявлениями. Тяжёлый стресс и выраженные гемодинамические нарушения на фоне основного заболевания приводят к развитию острых повреждений слизистой желудка примерно у 60% больных при длительной ИВЛ. Кроме того, у большинства пациентов данной группы отмечались дополнительные факторы риска – шоковое состояние, коагулопатии и применение вазопрессоров – что усугубляет ишемию слизистой оболочки желудка. В подавляющем большинстве случаев первое клиническое проявление патологии желудка у интубированных критически больных связано с развитием желудочно-кишечного кровотечения (ЖКК).

В нашем исследовании открытые ЖКК отмечались значительно чаще у пациентов на ИВЛ, чем у больных без ИВЛ. Несмотря на проведение профилактики в первой группе, выраженность повреждений слизистой и объём кровопотери были выше, что свидетельствует о неблагоприятном влиянии факторов, сопутствующих ИВЛ, на риск геморрагических осложнений. При отсутствии явных симптомов «немые» кровотечения у

пациентов на ИВЛ выявлялись лишь при тщательном мониторинге: регулярной оценке показателей красной крови, исследовании испражнений на наличие мелены и анализе содержимого желудка на кровь.

Открытое желудочное кровотечение у интубированных больных проявляется появлением крови во внешних дренажах или выделениях при снижении глубины седации.

У пациентов на ИВЛ типичные гастроэнтерологические симптомы (тошнота, рвотный рефлекс, боль) практически отсутствуют, поэтому диагностика желудочных осложнений основывается преимущественно на данных инструментальных и лабораторных исследований. Обнаружение описанных признаков желудочно-кишечного кровотечения служит показанием к экстренному расширенному обследованию.

Для сравнения, у пациентов группы II (тяжелобольные не находящиеся на ИВЛ) клинические проявления желудочной патологии могут быть несколько более разнообразными за счет сохраненной возможности субъективно ощущать и сообщать о симптомах. Хотя в целом характеризуются отсутствием выраженной боли, некоторые больные группы II отмечали дискомфорт или чувство жжения в эпигастральной области, тошноту, ощущение переполнения желудка. Появление подобных неспецифических симптомов на фоне тяжелого состояния настораживало врачей относительно возможного повреждения слизистой желудка и служило основанием для более раннего проведения диагностических тестов.

Кроме того, у пациентов без интубации и с сохраненным глотательно-рвотным рефлексом чаще наблюдалась рвота. В ряде случаев возникала рвота пищевыми массами с примесью бурого содержимого типа «кофейной гущи» или даже алой крови, что прямо указывало на острое желудочное кровотечение. Наличие у пациента в сознании кровавой рвоты (гематемезиса) позволяло незамедлительно заподозрить язвенное поражение и инициировать проведение экстренной эндоскопии. Также у больных группы II визуально чаще выявлялась мелена, так как у них сохранялась активная перистальтика кишечника и самостоятельный стул. В противоположность этому, у пациентов на ИВЛ нередко развивается паралитический илеус (вследствие критического состояния и применения опиоидных седативных препаратов), из-за чего появление испражнений задерживается либо осуществляется только при декомпрессии желудочного содержимого через зонд. Такая задержка способна отсрочить обнаружение кровотечения по изменению цвета стула.

У пациентов 1-й группы, находящихся на ИВЛ в критическом состоянии, отмечалась выраженная тяжесть состояния с частым развитием синдрома полиорганной недостаточности (СПОН). У таких больных базовые гемодинамические показатели нередко поддерживались только с помощью вазопрессоров, что свидетельствует о глубокой степени шока и гипоперфузии тканей, включая органы пищеварения. На фоне искусственной вентиляции и седации клинические проявления патологии желудка были сглажены:

отсутствовали жалобы и болевой синдром, отражающие поражение слизистой, поэтому начальные признаки гастропатии часто оставались незамеченными. Тем не менее, уже в первые сутки пребывания в ОРИТ у значительной части пациентов наблюдались признаки снижения моторики желудочно-кишечного тракта: увеличение объема желудочного содержимого по назогастральному зонду, замедление пассажа пищи, вздутие эпигастральной области. Эти явления указывают на развитие острой стресс-индуцированной гастропатии и гастропареза, предшествующей более грубым повреждениям слизистой. В динамике у 1-й группы больных прогрессировали острые эрозивно-язвенные поражения слизистой оболочки желудка. По мере удлинения периода критического состояния под ИВЛ происходило нарастание ишемических повреждений слизистой, что к 3–5-м суткам приводило к формированию множественных эрозий и острых стрессовых язв. В совокупности острые эрозии и язвы желудка были выявлены примерно у 60% пациентов данной группы. При этом у подавляющего большинства случаев данная патология манифестировала именно кровотечением, как первичным заметным симптомом.

Гастродуоденальные кровотечения развились примерно у четверти пациентов 1-й группы – в 26,7% случаев (8 из 30 больных). Масштабная геморрагия, приводящая к гемодинамической нестабильности, имела место реже – у 2 пациентов (6,7%), однако даже относительно небольшая потеря крови в условиях тяжелого состояния могла ухудшать показатели кровообращения. Динамика гемодинамических и лабораторных показателей у пациентов 1-й группы отражала развитие желудочных осложнений. В момент эпизодов острых гастродуоденальных кровотечений отмечалось достоверное снижение артериального давления: систолическое АД падало в среднем на 20–30% от исходного уровня (до ~85–90 мм рт.ст.), сопровождаясь рефлекторной тахикардией (ЧСС увеличивалась до 120–130 уд/мин). Такие гемодинамические сдвиги требовали увеличения доз вазопрессоров и объёмной инфузионной поддержки. Параллельно выявлялись острые изменения лабораторных показателей: после эпизода кровопотери уровень гемоглобина снижался в среднем на 20–30 г/л (с 110 ± 5 до 80 ± 7 г/л), возникала гемодиллюционная анемия. Кроме того, у пациентов со значимой кровопотерей отмечалось удлинение времени свертывания крови и снижение количества тромбоцитов, отражающие сопутствующую коагулопатию. Эти изменения усугубляли кровоточивость и затрудняли эндоскопическую остановку кровотечения.

Эндоскопическая картина чаще всего представляла собой множественные поверхностные эрозии на фоне диффузной стресс-индуцированной гастропатии; однако в 3 случаях диагностированы более глубокие острые язвы дна и тела желудка диаметром 0,5–1,0 см, послужившие источником профузного кровотечения (Forrest Ia–Ib). Даже при современной профилактике кислотозависимых осложнений ряд критически больных на ИВЛ испытывают тяжелые желудочные кровотечения, протекающие скрыто

до достижения значительного объема кровопотери. Наличие сопутствующей полиорганной недостаточности существенно влияло на частоту и выраженность гастродуоденальных поражений. У пациентов со СПОН ишемия слизистой развивалась быстрее и глубже, что вело к более раннему (в первые 1–2 сутки) и распространенному возникновению острых эрозий. Соответственно, у больных со СПОН частота острых эрозивно-язвенных поражений желудка достигала 83%, что достоверно выше, чем у пациентов без СПОН (25%). Аналогичная тенденция отмечена и по отношению к кровотечениям: при наличии полиорганной недостаточности желудочно-кишечные кровотечения возникали значительно чаще – у 39% таких больных против лишь 8% при отсутствии СПОН. Развитие гемодинамически значимых гипотензивных эпизодов, требующих инотропной поддержки, также преобладало в группе со СПОН (67% против 25%). У этих тяжёлых пациентов отмечалось сочетание факторов риска: выраженная гипотензия, ДВС-синдром с коагулопатией, печеночная и почечная недостаточность, что в совокупности потенцировало повреждение слизистой и затрудняло компенсацию даже небольших кровопотерь. У пациентов без полиорганного синдрома желудочные поражения развивались реже и протекали более благоприятно: эрозии носили ограниченный характер, значимые кровотечения были единичны, и состояние удавалось стабилизировать преимущественно консервативными мерами.

Вывод. Клиническая картина поражений желудка у критических пациентов существенно зависит от наличия либо отсутствия искусственной вентиляции легких. У больных на ИВЛ гастропатия протекает скрытно, без болевых ощущений и с минимальными внешними проявлениями вплоть до развития осложнения в виде кровотечения. Диагностика в этой группе опирается на постоянный мониторинг состояния и данные инструментальных обследований. В то же время у пациентов, сохраняющих спонтанное дыхание (группа II), могут наблюдаться некоторые классические симптомы поражения желудка (тошнота, дискомфорт, рвота), что облегчает более раннее выявление патологии. Тем не менее, в обеих группах желудочно-кишечное кровотечение остается главным и наиболее опасным проявлением патологии желудка, во многом определяя тяжесть состояния больного и прогноз. По сведениям литературы, летальность при развитии массивного кровотечения из стрессовых язв у критически больных достигает 80%, что подчеркивает необходимость своевременного выявления и профилактики данных осложнений.

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ТЕОРЕТИКО-МЕТОДИЧЕСКИЕ ОСНОВЫ ПРЕПОДАВАНИЯ МЕДИЦИНСКОЙ И БИОЛОГИЧЕСКОЙ ФИЗИКИ НА ОСНОВЕ ИНТЕГРАЦИОННОГО ОБУЧЕНИЯ

***Аннотация.** В статье анализируются теоретико-методические основы преподавания медицинской и биологической физики на основе интеграционного подхода. Биомедицинская физика рассматривается как мост между фундаментальной физикой, биологией и клиническими науками и обосновывается её роль в формировании профессиональных компетенций будущих врачей и биомедицинских инженеров. Исследование опирается на работы Курбановой Н.И., Усмонова С.А. и иностранных авторов (Т. Вудин и др.) по интеграции физики с биологией и медициной.*

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THEORETICAL AND METHODOLOGICAL FOUNDATIONS FOR TEACHING MEDICAL AND BIOLOGICAL PHYSICS BASED ON INTEGRATIONAL LEARNING

***Abstract.** This article analyzes the theoretical and methodological foundations for teaching medical and biological physics using an integrated approach. Biomedical physics is viewed as a bridge between fundamental physics, biology, and clinical sciences, and its role in developing the professional competencies of future physicians and biomedical engineers is substantiated. The study draws on the work of N.I. Kurbonova, S.A. Usmanov, and international authors (T. Vudin et al.) on the integration of physics with biology and medicine.*

Введение

Современное медицинское образование осуществляется в эпоху стремительной цифровизации, когда границы между науками становятся прозрачными. В таких условиях традиционный сегментированный подход «физика отдельно – биология отдельно – клинические науки отдельно» недостаточен для формирования комплексных профессиональных компетенций будущих специалистов, что подтверждается многочисленными исследованиями.

Биомедицинская физика (медицинская и биологическая физика) по своей природе является интеграционной дисциплиной, которая связывает

законы классической и современной физики с процессами живых систем – на уровне клеток, тканей, органов, организма и населения. Гемодинамика, механика дыхания, биоэлектрическая активность, взаимодействие лазерного и ионизирующего излучения с тканями, визуальная и аудиометрическая диагностика объясняются именно на основе физических законов.

В работах Курбановой Н.И. и Курбановой Н.И. подробно рассмотрена необходимость преподавания биомедицинской физики в интеграции с медицинскими дисциплинами, её теоретические и методические основы. Авторы показывают, что существующие учебные планы часто преподносят физику как общетеоретическую дисциплину, не раскрывая клинический контекст, что приводит к разрывам при применении знаний в последующих профессиональных предметах.

В исследованиях Усмонова С.А. рассматривается пересмотр курса физики для направления «Биомедицинская инженерия» с точки зрения интеграции с биомедицинскими дисциплинами, а также повышение эффективности преподавания в условиях кредитно-модульной системы с высокой долей самостоятельной работы студентов.

Материалы и методы

Дизайн исследования. В исследовании использовался метод теоретико-методического анализа научных источников, охватывающих опыт высшего медицинского образования в Узбекистане и за рубежом.

Основные источники:

- Национальные исследования по интеграции биомедицинской физики и медицинских дисциплин (Курбанова Н.И., Усмонов С.А., Хакимова Г., Тохтабоева С. и др.);
- Международный опыт интеграции физики и биологии (Woodin T. и др., Brewe E. и соавторы);
- Общие методические источники по цифровому обучению, инновационным педагогическим технологиям и геймификации.

Критерии отбора источников:

- Актуальность темы (биомедицинская физика, междисциплинарная интеграция, медицинское образование, кредитно-модульная система, цифровое обучение);
- Временной период – работы, опубликованные в 2013–2025 гг.;
- Научная значимость – международные индексируемые журналы (CBE–Life Sciences Education, Science and Innovation и др.), национальные журналы, международные онлайн-конференции;
- Практическая значимость – опыт внедрения в медицинских вузах, учебные планы, интеграционные модули, методические рекомендации.

Результаты

Интеграционный потенциал медицинской и биологической физики. Анализ показал, что биомедицинская физика охватывает следующие интеграционные направления:

• **Механика и гемодинамика** – законы кровотока, давление, сопротивление, ламинарные и турбулентные потоки, модели стенозов и аневризм (интеграция с кардиологией, ангионеврологией);

• **Физика газов и дыхание** – альвеолярная вентиляция, законы диффузии газов, парциальное давление (интеграция с пульмонологией, анестезиологией);

• **Электричество и магнетизм** – биоэлектрические сигналы, мембранный потенциал, ЭКГ, ЭЭГ, ЭМГ (интеграция с кардиологией, неврологией, реаниматологией);

1. Биофизика сердечно-сосудистой системы

◦ Физическая основа: механика жидкостей, гидродинамика, теория упругости;

◦ Биологическая/физиологическая основа: сердечный цикл, структура сосудистой стенки, реология;

◦ Клинический компонент: артериальная гипертензия, стеноз, инфаркт, доплерография, ЭКГ.

2. Физические основы дыхательной системы

◦ Физическая основа: соотношение давление–объем, диффузия газов, теплообмен;

◦ Физиология: спирометрия, альвеолярная вентиляция, перфузия;

◦ Клинический компонент: бронхиальная астма, ХОБЛ, параметры искусственной вентиляции.

Обсуждение

Сравнение с национальными и международными исследованиями показало преимущества интеграционного подхода:

• Сокращение междисциплинарных пробелов;

• Раннее формирование клинического мышления;

• Развитие цифровых компетенций;

Заключение

• Медицинская и биологическая физика является центральным звеном интеграционного обучения, объединяя физику, биологию и клинические дисциплины в единую систему.

• Внедрение модульной интеграционной модели (гемодинамика, дыхание, биоэлектрические процессы, оптика и лазерные технологии) способствует гармоничному развитию теоретических, практических и клинических компетенций.

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ПРЕПОДАВАНИЕ ЕСТЕСТВЕННЫХ НАУК В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ НА ОСНОВЕ ИНТЕГРАЦИОННОГО ПОДХОДА

***Аннотация.** Данная научная статья посвящена теоретическим и практическим аспектам совершенствования качества учебнометодического обеспечения (УМО) в кредитно-модульной системе (КМС) современного высшего образования на основе интеграционных подходов. В исследовании анализируются пути повышения эффективности образовательного процесса путем применения методов междисциплинарной, вертикальной и цифровой интеграции, основанных на принципах КМС - гибкости, мобильности и ориентации на обучающегося. В статье рекомендуются инновационные модели совершенствования УМО, включая проектное обучение, технологии смешанного обучения и персонализированные системы обучения на основе искусственного интеллекта.*

***Ключевые слова:** кредитно-модульная система, учебнометодическое обеспечение, интеграционный подход, междисциплинарная интеграция, цифровые образовательные технологии, совершенствование качества образования.*

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TEACHING NATURAL SCIENCES IN HIGHER EDUCATION INSTITUTIONS BASED ON AN INTEGRATIONAL APPROACH

***Abstract.** This research article examines the theoretical and practical aspects of improving the quality of educational and methodological support (EMS) in the credit-modular system (CMS) of modern higher education using integrated approaches. The study analyzes ways to enhance the effectiveness of the educational process through the application of interdisciplinary, vertical, and digital integration methods based on the CMS principles of flexibility, mobility, and learner-centeredness. The article recommends innovative models for improving EMS, including project-based learning, blended learning technologies, and personalized learning systems based on artificial intelligence.*

***Keywords:** credit-modular system, educational and methodological support, integrated approach, interdisciplinary integration, digital educational technologies, improving the quality of education.*

Введение

В современной глобальной системе образования кредитно-модульная система (КМС) занимает важное место в системах высшего образования развитых стран в рамках Болонского процесса и стала одним из основных механизмов модернизации образования. Внедрение кредитно-модульной системы обеспечивает значительные преимущества, такие как стандартизация образовательного процесса, повышение академической мобильности студентов и гибкость учебных планов. Однако её эффективность в первую очередь зависит от качества учебно-методического обеспечения (УМО).

В настоящее время во многих высших учебных заведениях, внедривших КМС, УМО должно разрабатываться и постоянно совершенствоваться с учетом специфики модульного обучения, в отличие от традиционных методов преподавания. В противном случае могут возникнуть проблемы, такие как фрагментация знаний, недостаток междисциплинарных связей и негибкость учебных материалов.

Основная часть

Кредитно-модульная система (КМС) является одним из основных механизмов организации образовательного процесса в современных системах высшего образования и базируется на трёх фундаментальных принципах:

1. Принцип гибкости — обеспечивает адаптацию образовательного процесса к индивидуальным потребностям, позволяя студентам формировать персонализированные учебные планы в соответствии с уровнем знаний, интересами и профессиональной направленностью, а также обеспечивает оптимальное распределение учебной нагрузки, выбор дополнительных дисциплин и корректировку сроков обучения.

2. Принцип мобильности — обеспечивает перевод и признание кредитов между различными вузами, предоставляя студентам возможность учиться в разных образовательных учреждениях как на национальном, так и на международном уровне, включая программы двойных дипломов, международные обменные программы и межуниверситетское сотрудничество.

3. Принцип студентоцентричности — направлен на адаптацию образовательного процесса к индивидуальным потребностям, уровню знаний и стилю обучения каждого студента. Преподаватели выступают не только как носители знаний, но и как наставники, реализующие индивидуальный подход, что способствует развитию независимого мышления, креативного решения задач и самосовершенствованию студентов.

Современные требования к УМО включают следующие ключевые аспекты:

- **Обеспечение цифровыми образовательными ресурсами** предполагает эффективную организацию учебного процесса с использованием современных электронных платформ, интерактивных учебников, мультимедиа и виртуальных лабораторий. Этот подход повышает

качество образования, стимулирует интерес студентов и развивает их способность к самостоятельному обучению.

• **Внедрение междисциплинарной интеграции** позволяет студентам развивать многогранный подход к решению сложных задач путем обучения взаимосвязанным дисциплинам. Вертикальные связи между базовыми и профильными дисциплинами, а также горизонтальная интеграция взаимосвязанных предметов особенно важны, обеспечивая целостность знаний и укрепляя профессиональные компетенции.

Интегративные подходы считаются одними из наиболее эффективных методов обеспечения целостности знаний. Горизонтальная интеграция объединяет взаимосвязанные дисциплины (например, интеграция информатики и экономики позволяет студентам моделировать экономические процессы, анализировать данные и использовать современные ИТ-инструменты при принятии решений), а вертикальная интеграция обеспечивает непрерывность между базовыми и профильными дисциплинами, позволяя студентам применять знания, полученные в базовых предметах, в профильных дисциплинах, что обеспечивает глубокое и системное усвоение материала.

Заключение

Исследование показывает, что интегративные подходы являются стратегическим фактором значительного повышения качества УМО в кредитно-модульной системе. Они не только улучшают структурные компоненты образовательного процесса, но и повышают его эффективность. Экспериментальные исследования показали, что правильное применение интегративных подходов может повысить эффективность учебного процесса на 25–30%, что проявляется в улучшении уровня знаний студентов, академических успехов и укреплении профессиональных компетенций. В частности, междисциплинарная интеграция увеличила целостность знаний на 40%, цифровая интеграция повысила эффективность обучения на 35%, а педагогическая интеграция улучшила усвоение знаний студентами на 28%.

Практическая значимость интегративных подходов заключается в том, что они предлагают универсальные модели, применимые как на национальном, так и на международном уровне, что позволяет готовить конкурентоспособных специалистов в глобальной образовательной системе.

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РОЛЬ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА И СОВРЕМЕННЫХ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ЖИЗНИ ОБЩЕСТВА И ПЕРСПЕКТИВЫ ИХ РАЗВИТИЯ

***Аннотация.** В данной статье анализируются трансформации, произошедшие за последние десятилетия в сфере искусственного интеллекта и современных информационных технологий, а также их влияние на образование, здравоохранение, экономику и социальную сферу. Рассматриваются сущность искусственного интеллекта, процесс его создания, проблемы развития, применение в социальной сфере и вопросы безопасности. Кроме того, показано влияние цифровых информационных платформ на сознание человека, фильтрацию контента и процессы радикализации. Результаты исследования помогают определить значение искусственного интеллекта в развитии общества и способы его безопасного и эффективного использования.*

***Ключевые слова:** искусственный интеллект, машинное обучение, нейронные сети, цифровая трансформация, информационные технологии, онлайн-платформы, безопасность*

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THE ROLE OF ARTIFICIAL INTELLIGENCE AND MODERN INFORMATION TECHNOLOGIES IN SOCIETY AND THEIR DEVELOPMENT PROSPECTS

***Abstract.** This article analyzes the transformations that have occurred in the field of artificial intelligence and modern information technologies over the past decades, as well as their impact on education, healthcare, the economy, and the social sphere. It examines the nature of artificial intelligence, the process of its creation, development challenges, social applications, and security issues. It also examines the impact of digital information platforms on human consciousness, content filtering, and radicalization processes. The results of the study help determine the role of artificial intelligence in societal development and ways to use it safely and effectively.*

***Keywords:** artificial intelligence, machine learning, neural networks, digital transformation, information technology, online platforms, security*

Введение. Сфера информационных технологий за последние десятилетия претерпела огромные изменения и оказала влияние на все сферы нашей жизни. Искусственный интеллект (ИИ) рассматривается как основа четвертой промышленной революции. В развитых странах ИИ широко используется в образовании, здравоохранении, занятости, социальной защите и других направлениях.

Искусственный интеллект — это способность компьютерных систем выполнять функции, присущие человеческому разуму, такие как понимание языка, решение задач, принятие решений, перевод и другие. ИИ объединяет такие сложные технологии, как нейронные сети, машинное обучение, обработка естественного языка и когнитивные вычисления.

Основная часть. Сфера информационных технологий за последние десятилетия пережила масштабные трансформации, полностью изменившие нашу жизнь. Специалисты рассматривают искусственный интеллект как основу четвертой промышленной революции. В развитых странах ИИ активно внедряется в образование, здравоохранение, социальную защиту и другие сферы.

Искусственный интеллект (англ. Artificial Intelligence) — это отдельная область информатики, занимающаяся созданием компьютерных систем, способных выполнять функции, связанные с человеческим мышлением: понимание языка, обучение, рассуждение, решение задач, перевод и др. Проще говоря, искусственный интеллект — это способность компьютерных систем выполнять интеллектуальные и творческие функции, ранее присущие только человеку. Он объединяет такие направления, как нейронные сети, машинное обучение, обработка естественного языка, когнитивные вычисления, компьютерное зрение и др.

Наряду с развитыми государствами в Узбекистане также активно внедряются современные технологии. В частности, 17 февраля 2021 года в соответствии со Стратегией «Цифровой Узбекистан — 2030» был принят Указ Президента Республики Узбекистан №РQ-4996 «О мерах по созданию условий для ускоренного внедрения технологий искусственного интеллекта». Также была утверждена программа «Повышение позиции Республики Узбекистан в Индексе готовности к искусственному интеллекту».

Многие люди понимают искусственный интеллект как привлечение роботов в различные сферы. Однако понятие «искусственный интеллект» не означает замену человека роботами. Его основная цель — расширение возможностей человека. Поэтому ИИ является ценным ресурсом для бизнеса.

На сегодняшний день, несмотря на большие возможности ИИ, существуют и серьезные проблемы. Ученые, такие как Стивен Хокинг, Илон Маск и сотни исследователей в области ИИ и робототехники, предупреждают о возможных рисках. Развитие искусственного интеллекта оказывает значительное влияние на робототехнику, и во многих странах уже начались испытания роботов с элементами ИИ.

Современная цифровая пропаганда стала настолько незаметной, что, как отмечает профессор Корнелльского университета Мор Нааман, «человек может даже не осознавать, что подвергается воздействию определенной пропаганды».

Ребёнку, который ищет мультфильмы, ИИ рекомендует контент, похожий на ранее просмотренный. В соцсетях ИИ сортирует контент в зависимости от интересов пользователя. Интернет содержит огромное количество информации: в минуту в YouTube загружается более 500 часов видео, в Facebook за час публикуется 9 млн изображений, а в Instagram ежедневно размещается 500 млн историй. ИИ помогает пользователю находить информацию, соответствующую его предпочтениям.

Однако важно учитывать, что алгоритмы созданы людьми, и они также могут преследовать определённые цели. Например, большинство рекомендаций в соцсетях — это реклама, а не объективная информация. Исследования показали, что ложная информация распространяется быстрее, чем правдивая.

YouTube — один из самых популярных сайтов в мире. 70% всех просмотров основаны на рекомендациях алгоритмов. Аналитики отмечают, что для стран, где английский язык не является основным, YouTube может быть опасен. Аналогичная ситуация наблюдается в Facebook, где алгоритмы лучше обрабатывают только англоязычный контент.

Заключение. Искусственный интеллект и современные информационные технологии играют решающую роль в жизни общества. Их возможности способствуют повышению эффективности в сферах образования, здравоохранения, экономики и социальной жизни. Вместе с тем необходимо внедрять механизмы контроля рисков, связанных с искусственным интеллектом, и обеспечивать его безопасное использование. В будущем развитие ИИ станет важным инструментом для расширения человеческих возможностей и дальнейшего ускорения цифровой трансформации.

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ЦИФРОВАЯ ТРАНСФОРМАЦИЯ И РЕФОРМЫ В НОВОМ УЗБЕКИСТАНЕ

Аннотация: В данной статье анализируется стратегия реформ, направленных на формирование и развитие цифрового общества в Новом Узбекистане. В статье освещаются процессы внедрения цифровой экономики, электронного правительства, информационно-коммуникационных технологий, а также их влияние на общественную жизнь, систему управления и сферу образования. Кроме того, рассматриваются реализуемые в рамках стратегии «Цифровой Узбекистан – 2030» проекты, их эффективность и государственные инициативы по повышению цифровой компетентности населения. Практическая значимость статьи заключается в выдвижении предложений и рекомендаций, направленных на обеспечение успешности процессов цифровой трансформации. Результаты исследования выявляют актуальные аспекты построения цифрового общества в условиях Нового Узбекистана и способствуют определению перспективных направлений цифровых реформ.

Ключевые слова: цифровое общество, цифровое правительство, цифровое управление, цифровые отношения, цифровизация, трансформация.

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DIGITAL TRANSFORMATION AND REFORMS IN THE NEW UZBEKISTAN

Abstract: This article analyzes the reform strategy aimed at creating and developing a digital society in the New Uzbekistan. It covers the implementation of the digital economy, e-government, and information and communication technologies, as well as their impact on public life, governance, and education. It also examines projects implemented within the framework of the "Digital Uzbekistan 2030" strategy, their effectiveness, and government initiatives to improve the population's digital competence. The practical significance of this article lies in its proposals and recommendations aimed at ensuring the success of digital transformation processes. The results of the study identify relevant aspects of building a digital society in the context of the New Uzbekistan and contribute to identifying promising areas for digital reform.

***Keywords:** digital society, digital government, digital governance, digital relations, digitalization, transformation.*

Введение. В нашей стране реформы, направленные на развитие человеческого потенциала и повышение ценности личности, поднимаются на уровень государственной политики и приобретают все большее значение по масштабу и охвату. Понятия «цифровое общество», «цифровое правительство», «цифровое управление», «цифровые взаимодействия» с каждым днем всё глубже входят в нашу жизнь. Любая страна, стремящаяся к развитию и присутствию на международной арене, так или иначе должна пройти этот путь и активно участвовать в процессах цифровизации. Иными словами, на сегодняшний день цифровизация стала единственным путем, который любая страна должна пройти, чтобы соответствовать мировым тенденциям. Пандемия, оказывающая серьёзное влияние на мировую экономику с 2020 года, также ускорила необходимость цифровизации. Например, в Узбекистане уже в системе образования с 2020 года наблюдается значительный скачок в направлении цифровизации из-за пандемии.

Основная часть. Пандемия коронавируса охватила более 190 стран мира. В Узбекистане к середине марта 2020 года начали отмечаться случаи заражения коронавирусом. До начала пандемии в мировой экономике наблюдались положительные сдвиги, и в последние годы темп роста составлял в среднем около 3%. В таких странах, как Китай, Узбекистан, Таджикистан, Армения, особенно отмечались высокие результаты. Начало пандемии вызвало мировой экономический кризис. Это поставило перед многими государствами сложную задачу «выживания». В социальной жизни возросла значимость и актуальность цифровизации, то есть предоставления услуг в онлайн-режиме.

По мнению специалистов, цифровизация — это «информатизация определенной отрасли или системы и превращение её в новую форму на основе информационных технологий». Сегодня цифровизация рассматривается как необходимый этап, который должен пройти человек для улучшения повседневной жизни и обеспечения удобного, качественного и прозрачного предоставления государственных услуг населению. «...в то же время Узбекистан не остается в стороне от этой всемирной тенденции. В последние годы особое внимание уделяется внедрению цифровых технологий в экономику», — при этом цифровая экономика охватывает не только электронную торговлю и сервис, но и все сферы деятельности. Экономика страны не сможет развиваться самостоятельно, и каждая отрасль оказывает на неё определённое влияние.

Поэтому цифровизация сегодня признается одной из приоритетных направлений «Стратегии Нового Узбекистана», определены первоочередные задачи по развитию цифровой экономики. Для выполнения этих задач разработан комплекс мер по широкому внедрению информационно-

коммуникационных технологий во все сферы, на основе которых было реализовано более 220 приоритетных проектов. С целью повышения конкурентоспособности экономики страны намечено дальнейшее развитие электронного правительства, расширение качественных востребованных государственных электронных услуг, поэтапный перевод всех государственных услуг в цифровую форму, в том числе увеличение доли автоматизированных услуг до 90% к 2030 году.

Сегодня среди населения становится популярным получение информации через социальные сети, выражение мнения по социально-политическим событиям, создание онлайн-групп и другие интернет-активности. По данным, в 2006 году при населении мира около 6,5 млрд интернет-пользователи составляли 18%, в 2013 году при населении более 7 млрд — 39%, в 2019 году — 50%, а в 2021 году при населении 7,83 млрд доля интернет-пользователей составила 59,5%, пользователей социальных сетей — 53,6%, мобильной связи — 66,6%. По данным сайта websiterating.com на 5 января 2024 года число интернет-пользователей достигло 5,3 млрд, то есть 66% всего населения. В среднем один человек использует интернет 7 часов в день. В 2024 году на цифровую (онлайн) рекламу, PR и социальную пропаганду планируется выделить 442,6 млрд долларов.

Заключение. Реформы по развитию цифрового общества в условиях Нового Узбекистана вносят фундаментальные изменения в экономическую, политическую и социальную жизнь страны. В рамках стратегии «Цифровой Узбекистан – 2030» достигнуты значительные результаты в модернизации инфраструктуры технологий, развитии электронного правительства, цифровизации всех государственных услуг и повышении цифровой компетентности населения.

Цифровые решения внедряются в образование, здравоохранение, транспорт и банковско-финансовую сферу, улучшая качество жизни населения и доступ к государственным услугам. Тем не менее цифровой разрыв, информационная безопасность и потенциал кадров остаются важными задачами для формирования полноценного цифрового общества.

В целом стратегия цифровых реформ в Новом Узбекистане направлена на повышение глобальной конкурентоспособности страны, обеспечение благосостояния населения и создание современной системы управления, а её последовательная реализация служит укреплению фундамента цифрового общества

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МОРФОЛОГИЧЕСКАЯ ХАРАКТЕРИСТИКА СЛИЗИСТОЙ ОБОЛОЧКИ ЖЕЛУДКА У БОЛЬНЫХ В ТЯЖЕЛОМ СОСТОЯНИИ НА ИСКУССТВЕННОЙ ВЕНТИЛЯЦИИ ЛЁГКИХ В УСЛОВИЯХ РЕАНИМАЦИИ

Аннотация. Статья посвящена клиническому исследованию слизистой оболочки желудка у пациентов в тяжёлом состоянии, находящихся на искусственной вентиляции лёгких (ИВЛ) в условиях реанимации. Актуальность темы обусловлена высокой частотой развития гастроинтестинальных осложнений у критических больных, что связано с полиорганной дисфункцией, нарушением микроциркуляции и стрессовыми повреждениями слизистой оболочки.

Ключевые слова: слизистая желудка, искусственная вентиляция лёгких, реанимация, клинические изменения, осложнения.

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MORFOLOGICAL CHARACTERISTICS OF THE GASTRIC MUCOSA IN PATIENTS IN SEVERE CONDITION ON ARTIFICIAL VENTILATION IN THE RESUSCITATION UNIT

Abstract: *the article focuses on the clinical assessment of the gastric mucosa in critically ill patients undergoing mechanical ventilation in the intensive care unit (ICU). The relevance of this research is determined by the high incidence of gastrointestinal complications in critical illness, associated with multiple organ dysfunction, impaired microcirculation, and stress-induced mucosal injury. The aim of the study was to identify the main morphological alterations of the gastric mucosa and their clinical significance for the diagnosis and prevention of complications.*

Keywords: *gastric mucosa, mechanical ventilation, intensive care, clinical changes, complications.*

Введение. Одним из наиболее часто применяемых методов в ОРИТ является искусственная вентиляция лёгких (ИВЛ), позволяющая компенсировать дыхательную недостаточность различного генеза. Однако наряду с неоспоримой эффективностью ИВЛ как метода жизнеобеспечения её длительное применение сопровождается развитием осложнений, затрагивающих различные органы и системы, в том числе желудочно-кишечный тракт [1].

Желудок играет важнейшую роль в пищеварении, барьерной защите организма и регуляции гомеостаза. Слизистая оболочка желудка особенно чувствительна к ишемическим, гипоксическим и стресс-индуцированным повреждениям, которые в условиях критического состояния усугубляются воздействием факторов интенсивной терапии. У пациентов на ИВЛ формируется ряд патогенетических механизмов, приводящих к нарушению микроциркуляции, гипоксии тканей и дисбалансу между агрессивными и защитными факторами, что способствует развитию так называемых стрессовых повреждений слизистой оболочки [2-5].

По данным исследований, частота гастроинтестинальных осложнений у пациентов в условиях реанимации колеблется от 15 до 40%, а клинически значимые кровотечения встречаются в 5–10% случаев [3]. Морфологическое изучение слизистой оболочки желудка у критических больных позволяет глубже понять механизмы формирования данных нарушений и определить пути их профилактики [4].

Особый интерес представляет изучение морфологических изменений слизистой оболочки у пациентов, находящихся на ИВЛ, так как именно эта категория наиболее подвержена развитию ишемических и деструктивных процессов. Длительная гипоксия, метаболические расстройства, инфекционные осложнения и воздействие лекарственных препаратов усугубляют повреждение слизистой оболочки желудка. Морфологические исследования показывают наличие выраженного отёка, воспалительной инфильтрации, дистрофии эпителия, микроэрозий и язвообразования [5].

Целью исследования явилось выявление основных морфологических изменений слизистой желудка и их клинической значимости для диагностики и профилактики осложнений.

Материалы и методы: Настоящее исследование проведено на базе отделения общей реанимации РНЦЭМПНФ и охватывает клинико-морфологический анализ 67 пациентов, находившихся в критическом состоянии в период с 2022 по 2025 годы. Все пациенты были распределены на две группы по характеру дыхательной поддержки:

— 1-я группа (основная, n=34): больные, находящиеся на искусственной вентиляции лёгких. У данной категории были произведены заборы биоптатов слизистой оболочки желудка для гистологического исследования. Биоптаты были взяты на 3-й и 10-й день нахождения больного в отделении реанимации. Лечение включало как стандартную терапию по клиническому протоколу, так и дополнительные мероприятия, направленные на защиту слизистой оболочки.

— 2-я группа (сравнительная, n=33): больные, находящиеся в тяжёлом состоянии, но не нуждавшиеся в инвазивной вентиляции лёгких. Морфологических изменений слизистой оболочки желудка у них не выявлено. Пациенты получали базовую терапию в соответствии с действующими стандартами.

Результаты и обсуждение. Для распределения больных в соответствии с возрастом была использована классификация возрастных групп, принятая на семинаре Всемирной Организации Здравоохранения. Больные детского возраста составили – 0 (0 %), юношей – 10 (15%), молодые – 8 (11,9 %), больных среднего – 13 (19,4 %) и пожилого возраста – 34 (50,7 %), старческого возраста составил 2 больной (3 %) из общего числа поступивших в тяжёлом состоянии (67 больных) в отделения общей реанимации РНЦЭМП от 2022 по 2025 года (Таблица 1).

Таблица 1. Распределение больных по возрасту и полу

Категории	15 - 29	30 - 44	45 - 59	60 - 74	75 - 90	Итого
Мужчины	6	4	10	20	1	41
Женщины	4	4	3	14	1	26
Итого	10	8	13	34	2	67

Из 67 больных, которые были исследованы, на адекватной вентиляции легких находилось 39 тяжелобольных, 1 больной находился на SPAP режиме, у 27 больных дыхание было свободным, через носовые канюли увлажненным кислородом с аппаратом Боброва.

39 больным установлены различные режимы и конфигурации вдоха-выдоха. ИВЛ в целом — 39 из 67 (58%): подтверждает тяжесть состояний и важность контроля дыхания. Это свидетельствует о длительности ИВЛ или анатомических проблемах у части больных в связи с основной, сопутствующей, конкурирующей патологиями и её осложнениями с присоединением вторичных инфекций. У всех больных находящихся на адекватной искусственной вентиляции легких были установлены различные режимы и параметры в соответствии с основным заболеванием и имеющимися осложнениями. Причины перехода от самостоятельного

дыхания на аппараты ИВЛ варьировались от обструкции верхних дыхательных путей, угнетением сознания, остановкой сердечной деятельности, гипоксической энцефалопатии, апноэ и их осложнениями, т.е. острой дыхательной недостаточности II-III степени.

Гистологическое исследование было проведено у 34 больных на 3-й и 10-й день нахождения в ОРИТ. Гистологический метод исследования желудка включает в себя детальный анализ тканей с использованием микроскопии. Этот метод позволяет получить информацию о структуре клеток, тканей и органов, а также выявить патологические изменения.

Все больные на ИВЛ имеют воспалительные и деструктивные изменения ЖКТ, что подтверждает патогенез стрессовой гастропатии. Гистологическая триада — гиперемия сосудов, инфильтрация, гиперплазия — встречается у всех больных с тяжёлой патологией. Особенно тяжёлые морфологические изменения — при онкологии и тромбозе кишечника, что указывает на системный характер микроциркуляторных нарушений.

Практически у всех больных наблюдаются общие гистомаркеры ишемии, воспаления и компенсаторной гиперплазии — это аргумент в пользу антиоксидантной и гепатопротекторной терапии, особенно у ИВЛ-группы.

У пациентов с политравмой, ОЧМТ, отеком головного мозга и аспирационным синдромом наблюдается эрозивный и поверхностный гастрит, сопровождающийся переполнением кровью сосудов и дефектами слизистых оболочек, что приводит к подслизистой сосудистой воспалительной гиперемии. При ОНМК по ишемическому типу выявляются эзофагит и эрозивный гастрит, характеризующиеся железистой гиперплазией и лимфофолликулярной инфильтрацией с лейкоцитарной инфильтрацией подслизистого слоя. Тяжелые черепно-мозговые травмы и эпидуральные гематомы также вызывают эрозивный гастрит и инфильтрацию лейкоцитов. При сегментарном тромбозе восходящей части тонкой кишки и синдроме Меллори-Вейса регистрируется воспалительная гиперемия сосудов и лейкоцитарная инфильтрация, а у пациентов с опухолью толстой кишки наблюдаются субатрофический гастрит, железистая гиперплазия и воспаление в слизистом и подслизистом слое. Эти данные подчеркивают значимость комплексного подхода в диагностике и лечении заболеваний, включающего эндоскопическое, гистологическое и морфологическое исследование.

Заключение: Результаты исследования показали, что тяжёлые состояния, требующие госпитализации в ОРИТ, в большинстве случаев сопровождаются выраженными морфологическими изменениями желудочно-кишечного тракта. Наиболее выраженные повреждения слизистой оболочки желудка выявлены у пациентов, находящихся на ИВЛ. У данной группы больных отмечены морфологические признаки ишемических и воспалительных поражений, такие как эрозивно-геморрагический гастрит, лимфоцитарная и лейкоцитарная инфильтрация, гиперплазия желудочных желёз и сосудистая гиперемия. Эти изменения напрямую связаны с

нарушением регионарной гемодинамики, гипоксией и системным воспалением, обусловленными тяжестью основного заболевания и влиянием длительной респираторной поддержки. Анализ методов диагностики, включая гистологическое исследование и эндоскопию, выявил значительные структурные изменения в слизистой оболочке желудка, такие как эрозивный гастрит, гиперплазия слизистых желез, инфильтрация лейкоцитов и сосудистая гиперемия. Ультразвуковая и рентгенологическая диагностика подтвердили сопутствующие патологические изменения в брюшной и грудной полостях, включая пневмонию, перитонит и осложненный цирроз печени. Комплексный подход в диагностике и лечении, включающий использование ИВЛ, гастропротекторов, антацидов и методов нутритивной поддержки, способствовали стабилизации состояния пациентов и снижению осложнений, связанных с поражением ЖКТ. Пациенты, находящиеся на самостоятельном дыхании, демонстрировали значительно меньшую степень повреждений слизистой оболочки, что подтверждает роль ИВЛ как дополнительного фактора риска гастропатий и язвенных поражений.

Полученные данные обосновывают необходимость введения и расширения стандартных лечебных протоколов мер по гастропротекции, включая применение антиоксидантной терапии, цитопротекторов и специализированной нутритивной поддержки, что может значительно снизить риск развития тяжёлых осложнений со стороны желудочно-кишечного тракта у критических больных.

Эти данные подчеркивают значимость системного мониторинга своевременного вмешательства при лечении пациентов в критических состояниях.

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ИССЛЕДОВАНИЕ МЕТОДОВ АВТОМАТИЧЕСКОГО ПЕРЕВОДА ТЕКСТОВ НА ОСНОВЕ НЕЙРОННЫХ СЕТЕЙ

Аннотация. *Машиный перевод стал неотъемлемой частью цифровой коммуникации: он применяется в онлайн-сервисах, корпоративных платформах, автоматизации технической документации и образовательных системах. Развитие искусственного интеллекта привело к смещению парадигмы — от статистических алгоритмов и правил к нейронным моделям, способным обучаться на больших корпусах данных и адаптироваться к контексту текста.*

Цель статьи — исследовать методы автоматического перевода, определить факторы, влияющие на эффективность машинного перевода, и провести практическую реализацию нейронной модели, способной переводить выражения с английского языка на русский.

Ключевые слова. *машинный перевод, нейронный машинный перевод, рекуррентные нейронные сети, LSTM, Transformer, encoder–decoder, attention-механизм, параллельный корпус, токенизация, эмбединги.*

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RESEARCH OF AUTOMATIC TEXT TRANSLATION METHODS BASED ON NEURAL NETWORKS

Abstract. *Machine translation has become an integral part of digital communication: it is used in online services, corporate platforms, technical documentation automation, and educational systems. The development of artificial intelligence has led to a paradigm shift—from statistical algorithms and rules to neural models capable of learning on large data sets and adapting to text context.*

The aim of this article is to investigate automatic translation methods, identify factors influencing machine translation effectiveness, and conduct a practical implementation of a neural model capable of translating expressions from English into Russian.

Keywords: *Machine translation, neural machine translation, recurrent neural networks, LSTM, Transformer, encoder–decoder, attention mechanism, parallel corpus, tokenization, embeddings.*

Введение

Машинный перевод (МП) — это автоматическое преобразование текста с одного языка на другой с помощью программных алгоритмов, основанных на машинном обучении и обработке естественного языка. Применение МП становится повсеместным: он используется в глобальных платформах коммуникации, службах поддержки клиентов, переводе образовательного контента и научной документации.

Развитие нейронных алгоритмов позволило улучшить качество перевода, увеличить точность восприятия контекста и сделать текст более естественным. Тем не менее эффективность МП зависит от множества факторов: структуры фразы, сложности входного текста, контекста и уровня владения пользователем языком.

Цель исследования:

разработать и протестировать модель машинного перевода на основе нейронных сетей и систематизировать существующие подходы к автоматическому переводу.

Задачи:

1. Изучить основные модели машинного перевода.
2. Реализовать нейросетевую модель для перевода английских выражений на русский.
3. Провести анализ результатов модели.

Теоретические основы машинного перевода

Терминология

Термин	Определение
Машинный перевод (Machine Translation, MT)	Автоматический перевод текста между языками с помощью алгоритмов.
Encoder	Часть нейросети, кодирующая входное выражение в скрытое представление.
Decoder	Компонент, генерирующий перевод на основе информации, полученной от encoder'a.
LSTM (Long Short-Term Memory)	Тип рекуррентной нейронной сети, способный обрабатывать последовательность и учитывать контекст.
Dataset (корпус данных)	Набор параллельных предложений на двух языках для обучения модели.

Современный тренд — переход от LSTM к Transformer (GPT/DeepL), так как архитектура трансформеров лучше воспринимает контекст.

Машинный перевод как интеллектуальная система МП как лингвистический процессор

Система анализирует структуру предложения и генерирует перевод, опираясь на статистические закономерности.

МП как средство коммуникации

Перевод становится частью взаимодействия человека и системы: пользователь корректирует выход, формирует стиль.

Эксперимент: реализация нейросети для машинного перевода

Подготовка данных

Модель обучена на корпусе пар выражений «English → Russian». Данные очищались, токенизировались и преобразовывались в векторы.

144486	Please begin immediately.	Пожалуйста, начните немедленно.	CC-BY 2.0 (Fr
144487	Please behave yourselves.	Пожалуйста, ведите себя прилично.	CC-BY 2.0
144488	Please behave yourselves.	Ведите себя прилично, пожалуйста.	CC-BY 2.0
144489	Please buy me three pens.	Купи мне три ручки, пожалуйста.	CC-BY 2.0 (Fr
144490	Please buy me three pens.	Купите мне три ручки, пожалуйста.	CC-BY 2.0
144491	Please call an ambulance.	Вызовите скорую, пожалуйста.	CC-BY 2.0 (Fr
144492	Please call an ambulance.	Вызови скорую, пожалуйста.	CC-BY 2.0 (France
144493	Please choose one person.	Выберите одного человека, пожалуйста.	CC-BY
144494	Please choose one person.	Выбери одного человека, пожалуйста.	CC-BY 2.0
144495	Please come to my office.	Пожалуйста, приходите ко мне в офис.	CC-BY
144496	Please come to my office.	Изяснитесь удовлетворительнее.	CC-BY 2.0 (Fr
144497	Please come to the point.	Пожалуйста, говорите по существу.	CC-BY 2.0
144498	Please come to the point.	Пожалуйста, переходите к сути вопроса.	CC-BY
144499	Please come to the point.	Пожалуйста, переходите к сути дела.	CC-BY 2.0
144500	Please come to the point.	Прошу вас, ближе к делу.	CC-BY 2.0 (France

Рисунок 1. Скриншот из реализации модели.

Архитектура модели

- **Encoder (LSTM)** получает входную фразу и кодирует её.
- **Decoder (LSTM)** на основе скрытого состояния генерирует перевод.

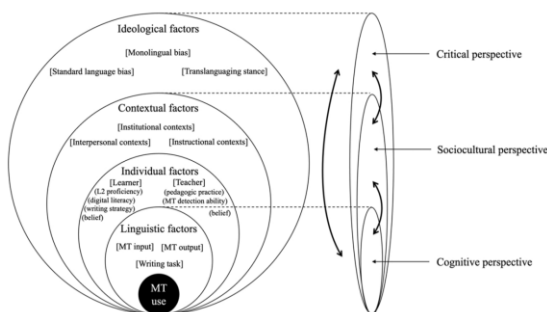


Рисунок 2. Скриншот из реализации модели.

Тестирование модели

Фраза (EN)	Перевод модели	Литературный перевод
Work hard. Dream big.	Работа трудная. Мечта большая.	смысл передан

Результаты

Нейросеть:

- успешно распознавала простые фразы,
- допускала погрешности при сложных конструкциях,

У всех конструкций, рассмотренных до этого, значения на выходах определялись тем, что у них на входах в данный момент. Соответственно, от порядка предъявления примеров ничего не зависело. Если же мы попытаемся работать с временными рядами, в них следующее состояние будет зависеть от предыдущего. Для того чтобы смоделировать это следующее состояние с помощью нейронной сети есть два варианта: указать предыдущее состояние к каждому имеющемуся примеру, либо сделать так, чтобы это помнил не пример, а сеть, – это можно обеспечить с помощью наличия обратных связей внутри самой сети. $y(t) = f[x(t), x(t-1), \dots, x(t-n), y(t-1), \dots, y(t-m)]$

Заключение

Машинный перевод прошёл путь от словарных таблиц к сложным нейросетям. Нейронные модели обеспечивают естественность перевода и способность учитывать контекст. Практическая реализация показала потенциал LSTM для перевода коротких фраз, однако масштабирование корпуса данных и переход к архитектуре Transformer значительно повысят качество.

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ИНФОРМАЦИОННЫЕ И КОММУНИКАТИВНЫЕ ТЕХНОЛОГИИ

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YANGI INDUKSION VIBRATSIYA O'ZGARTIRGICHLARINING KONSTRUKSIYASI VA STATIK XARAKTERISTIKALARINI TADQIQ ETISH

Annotatsiya. Ushbu maqolada yangi avlod induksion vibratsiya o'zgartirgichlarining (IVO') konstruksiyasi, ularning statik xarakteristikalarini shakllantiruvchi omillar hamda chiqish signallarining vibratsiya parametrlariga funksional bog'liqligi tadqiq etildi. Taklif etilgan o'zgartirgich modeli o'zaro perpendikulyar uchta o'q bo'yicha chiziqli va buralma vibratsiyalarni o'lchash imkoniyatiga ega bo'lib, inertion elementning mass-inertsia parametrlarini optimallashtirish va magnit zanjir geometriyasini takomillashtirish orqali sezgirlik oshirilgan. Statik xarakteristikaning analitik ifodasi ishlab chiqildi va uning asosida chiqish EYUKning vibratsiya amplitudasi hamda chastotasiga bog'liqligi aniqlandi. Analitik natijalar 1512-markali elektromagnit po'latdan tayyorlangan o'zgartirgich uchun o'tkazilgan tajribaviy o'lchovlar bilan solishtirildi. Natijalar yangi IVO' modeli keng o'lchash diapazonida chiziqlilikni saqlab qolishini va prototipga nisbatan sezilarli afzalliklarga ega ekanligini ko'rsatdi.

Kalit so'zlar: induksion vibratsiya o'zgartirgichi, statik xarakteristika, magnit zanjir, inersion element, amplituda, chastota, elektromagnit induksiya, EYUK, ko'p o'qli vibratsiya o'lchovi.

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INVESTIGATION OF THE DESIGN AND STATIC CHARACTERISTICS OF NEW INDUCTIVE VIBRATION TRANSDUCERS

Abstract. *This paper investigates the design of a new-generation inductive vibration transducers (IVTs), the factors determining their static characteristics, and the functional relationship between the output electromotive force and input vibration parameters. The proposed transducer model enables the measurement of both linear and torsional vibrations along three mutually perpendicular axes. Sensitivity has been improved through optimization of the inertial element's mass–inertia parameters and refinement of the magnetic circuit geometry. An analytical expression for the static characteristic has been derived, revealing the dependence of the output EMF on vibration amplitude and frequency. The analytical results were compared with experimental measurements obtained using a transducer manufactured from 1512-grade electrical steel. The findings demonstrate that the new IVT maintains linearity across a wide measurement range and provides significant performance advantages over the existing prototype.*

Key words: *Inductive vibration transducer, static characteristic, magnetic circuit, inertial element, amplitude, frequency, electromagnetic induction, EMF, multi-axis vibration measurement.*

Sanoat korxonalarida, transport vositalarida, energetik qurilmalarda va boshqa koʻplab texnik obyektlarda vibratsiya jarayonlari ularning ishonchliligi, xavfsizligi va ekspluatatsion xususiyatlariga sezilarli taʼsir koʻrsatadi. Shuning uchun vibratsiya parametrlarini aniqlik bilan oʻlchash va ularni monitoring qilish zamonaviy vibrodiagnostika va texnik holatni nazorat qilish tizimlarining ajralmas qismi hisoblanadi.

Vibratsiya parametrlarini (siljish, tezlik, tezlanish va h.k.) oʻlchashda turli xil oʻlchash oʻzgartirgichlari qoʻllaniladi. Ulardan induksion vibratsiya oʻzgartirgichlari IVOʻlar yuqori ishonchliligi, konstruktiv soddaligi, energiya manbaiga boʻlgan talabining pastligi, shuningdek, qattiq sanoat sharoitlarida ishlashga mosligi bilan ajralib turadi. Shu bilan birga, amalda qoʻllanilayotgan IVOʻlarning sezgirliigi, oʻlchash diapazoni, chiziqlilik darajasi va massa-inersion parametrlarini yaxshilash zaruriyati saqlanib qolmoqda.

IVOʻlarning statik va dinamik xarakteristikalarini ularning oʻlchash aniqligini, yaʼni chiqish signali bilan oʻlchanayotgan vibratsiya parametrlarining funksional bogʻlanish darajasini belgilaydi. Ayniqsa, statik xarakteristikaning chiziqliligi va sezgirlik koeffitsientining stabiligi vibrodiagnostika natijalarining ishonchliligiga bevosita taʼsir koʻrsatadi. Shu bois, induksion vibratsiya oʻzgartirgichlarining yangi konstruksiyalarini ishlab chiqishda ularning statik xarakteristikalarini nazariy va tajriba asosida chuqur oʻrganish dolzarb ilmiy-amaliy vazifa hisoblanadi.

Mazkur ishda yangi konstruktiv yechimlarga ega boʻlgan induksion vibratsiya oʻzgartirgichlari taklif etiladi. Ular yordamida oʻzaro perpendikulyar uchta oʻq boʻyicha yuzaga keladigan chiziqli tebranishlar hamda shu oʻqlar

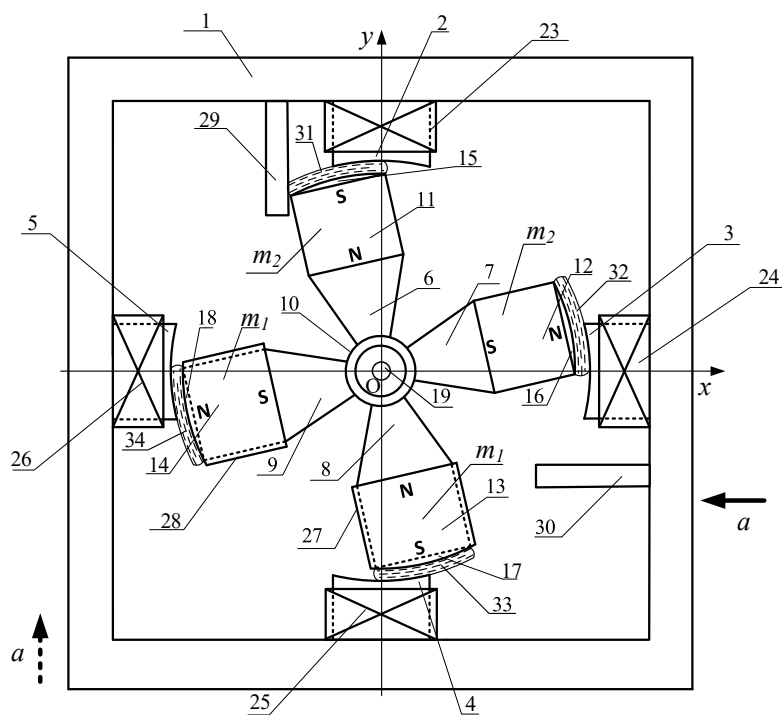
atrofidagi burama (buralish) vibratsiyalar parametrlarini o'lchash imkoniyati yaratiladi. Taklif etilgan IVO' konstruksiyalarida inersion elementning joylashuvi va massalar taqsimoti, magnit o'tkazgich shakli, ishchi havo oralig'ining geometriyasi hamda o'lchash chulgaamlarining joylashuvi shunday tanlanganki, bunda qurilmaning sezgirligi oshishi va statik xarakteristikaning chiziqliligi yaxshilanishi ta'minlanadi.

Tadqiqotning asosiy maqsadi – induksion vibratsiya o'zgartirgichlarining yangi konstruksiyalarini ishlab chiqish, ularning statik xarakteristikalarini analitik usulda aniqlash, parametrlarning ta'sirini baholash hamda nazariy natijalarni tajriba ma'lumotlari bilan solishtirish orqali taklif etilgan IVO'larning amaliy qo'llanishga yaroqliligini asoslashdan iboratdir. Mazkur ish natijalari vibrodiagnostika tizimlari, mashina va mexanizmlar texnik holatini masofadan nazorat qilish, shuningdek, murakkab mexanik tizimlarda vibratsiya jarayonlarini aniqlik bilan o'lchash talab qilinadigan boshqa sohalarda qo'llanishi mumkin.

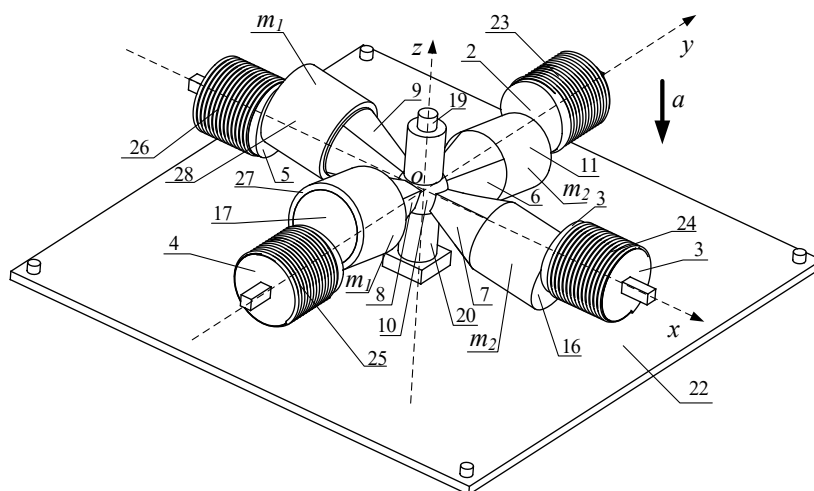
IVO'larning yangi konstruksiyalarini ishlab chiqish jarayonida muhandislik ijodiyotining energiya-axborot va morfologik yondashuvlaridan keng foydalanildi. Xususan, ixtirolar xalqaro tasnifida siljish, tezlik, tezlanish, vibratsiya va boshqa harakat parametrlarini o'lchovchi o'zgartirgichlar guruhlariga mansub qurilmalar hamda ularga eng yaqin analog (prototip)larning texnik xususiyatlari tahlil qilindi. Bu jarayonda professor Zaripov M.F. tomonidan ishlab chiqilgan "Umumlashgan usullarni aniqlash va ularni o'lchash qurilmalarini takomillashtirishda qo'llash" usulidan [1] metodik asos sifatida foydalangan holda optimal konstruktiv yechimlar tanlab olindi.

Yuqorida qayd etilgan yondashuvlarga asoslanib yaratilgan IVO'lardan birining konstruktiv sxemasi 1–3-rasmlarda keltirilgan [2, 3]. Yangi IVO' ni loyihalashda quyidagi asosiy vazifa qo'yilgan: "O'zaro perpendikulyar bo'lgan uchta o'q bo'yicha yuzaga keladigan chiziqli vibratsiyalarni hamda shu o'qlar atrofida burama vibratsiyalarni o'lchash, shu bilan birga o'zgartirgich sezgirligini oshirish".

Taklif etilgan yangi IVO' qurilmasida O-simon magnit o'tkazgich 1 ning qarama-qarshi tomonlarining o'rtalarida uchlari qavariq sferasimon bo'lgan qutb nakonniklari 2–5 joylashtirilgan. Ushbu qutb nakonniklari orasidagi havo oralig'ining markazida O-simon magnit o'tkazgich tekisligida yotuvchi o'zaro perpendikulyar o'qlar bo'ylab to'rtta magnit o'tkazgich sektorlar 6–9 joylashgan bo'lib, ular magnit materialdan tayyorlangan sharsimon asos 10 ga birlashtirilgan inersion element IEni hosil qiladi. Bo'ylama magnitlangan to'rtta doimiy magnit 11–14 tegishli sektorlar ustiga o'rnatilgan va ular botiq sferasimon qutb nakonniklari 15–18 ga ega. Sharsimon asos 10 esa ikki tomondan sektorlar...



1-rasm. IVO old tomondan ko‘rinishi (qopqoqlarsiz)



2-rasm. IVO‘ inersion elementining aksiometrik ko‘rinishi

Tekislikka perpendikulyar joylashgan ikkita qo‘zg‘almas yarim o‘q 19 va 20 inersion elementni magnit o‘tkazgichga sharnir orqali bog‘laydi hamda o‘zgartirgichning qarama-qarshi tomonlarida joylashgan qopqoqlar 21 va 22 ga mahkam o‘rnatilgan. O‘lchash chulg‘amlari 23–26 qutb nakonechiklari 2–5 ustida joylashtirilgan bo‘lib, ular o‘zaro ketma-ket ulanadi va induktiv jihatdan qarama-qarshi yo‘nalgan holda ulanishi ta‘minlanadi.

sektor massasi $\Delta m_{12} = m_1 - m_2$ ga ega, 6-sektor esa nol massa deb qaralsa, taklif etilgan IVO' ishlashi qanday ishlashi anglanadi.

Bunday burilish natijasida magnit o'tkazgich va inersion sektorlar qutb nakonechiklarining faol yuzalari kamayadi, bu esa ishchi havo oralig'ining magnit qarshiliklarini oshirib beradi. Shunga mos ravishda o'lchash chulg'amlaridan o'tuvchi ishchi magnit oqimlari kamayadi. Magnit oqimi qiymatlarining o'zgarishi elektromagnit induksiya qonuniga binoan, ketma-ket va induktiv jihatdan qarama-qarshi ulangan o'lchash chulg'amlarida bir-biriga qo'shiladigan EYUKlarning hosil bo'lishiga olib keladi.

IVO' ga ta'sir qilayotgan vibratsion tezlanish davomida IE va magnit o'tkazgich 1 qutb nakonechiklarining nisbiy davriy siljishi natijasida ishchi magnit oqimlari modulyatsiyalanadi. Natijada IVO' chiqishida hosil bo'ladigan EYUK ning amplituda va chastotasi o'lchanayotgan vibratsion tezlanishning amplitudasi va chastotasi bilan funksional bog'liq bo'ladi.

Xuddi shuningdek, agar chiziqli vibratsiya IVO' ga oy o'qi bo'ylab ta'sir ko'rsatsa (a tezlanish yo'nalishi 1-rasmda uzlukli o'q bilan ko'rsatilgan), inertsiya kuchlari IE ning 7 va 9-sektorlariga ta'sir qiladi.

Chiziqli vibratsiya IVO' ga ox o'qi bo'ylab ta'sir etganda (ya'ni tebranishning yarim davridagi tezlanish yo'nalishi ox o'qi bo'ylab yo'nalganida) inertsiya kuchlari inertion elementning 6 va 8-sektorlariga ta'sir qiladi. Xuddi shu tarzda, agar chiziqli vibratsiya oy o'qi bo'ylab yo'nalgan bo'lsa (tebranishning yarim davridagi tezlanish oy o'qiga qarama-qarshi bo'lganda), inertsiya kuchlari IE ning 7 va 9-sektorlariga ta'sir ko'rsatadi.

Agar chiziqli vibratsiya IVO' ga oz o'qi bo'ylab yo'nalgan bo'lsa, bunday holatda inertsiya kuchlari inertion elementning barcha to'rt sektoriga bir vaqtning o'zida ta'sir etadi (2-rasm).

IVO' magnit o'zgartirgichi 1, masalan, oy o'qi atrofida burama vibratsiya ta'sirida harakatlana boshlaganda, IE ning 7 va 9-sektorlarining qarshisida joylashgan qo'zg'almas qutb nakonechiklariga nisbatan holati o'zgaradi. Qutb nakonechiklarining faol yuzalari aylana shaklida bajarilgani sababli 15 va 2 hamda 17 va 4-qutblarning aktiv yuzalari o'zgarishsiz qoladi (3-rasm). IVO' ox o'qi atrofida burama vibratsiya ostida bo'lganda ham huddi shu kabi jarayon kuzatiladi. Bunday o'zgarishlar natijasida mos havo oralig'ining magnit qarshiligi ortadi va buning oqibatida ishchi magnit oqimlarining qiymati o'zgaradi, bu esa o'lchash chulg'amlarida EYUK induksiyalanishiga olib keladi.

IVO' oz o'qi atrofida burama vibratsiya holatida bo'lganda, inertion elementning barcha sektorlarining qo'zg'almas qutb nakonechiklariga nisbatan joylashuvi tebranish chastotasiga teng chastotada o'zgarib turadi (bu holatda IE harakati 1-rasmda tasvirlangan jarayonga mos ravishda kechadi).

Shuni alohida ta'kidlash lozimki, IVO' ga ta'sir etuvchi har bir turli chiziqli va burama vibratsion tebranishlar uchun o'zgartirgichning graudirovkasi alohida amalga oshiriladi.

Taklif etilgan yangi IVO' ning sezgirliги uning prototipiga nisbatan sezilarli darajada yuqori bo'lishining ikki asosiy sababi mavjud:

•vibratsiya natijasida inertion element burchakka burilganda **bir vaqtning o'zida barcha to'rt o'lchash chulg'amidagi ishchi magnit oqimlari o'zgaradi** va natijada har bir chulg'amda EYUK induksiyanadi;

•avvalgi IVO' konstruksiyalarida ishchi magnit oqimi sharnir birikma joyidagi havo oralig'ini kesib o'tganligi sababli sezilarli darajada kamayib ketgan bo'lsa, yangi IVO' konstruksiyasida **magnit oqimi sharnir bo'g'in hududini kesib o'tmaydi**, bu esa sezilarli foyda beradi.

Demak, yangi IVO' yordamida o'zaro perpendikulyar bo'lgan uchala o'q bo'ylab yuzaga keluvchi chiziqli vibratsiya parametrlarini, shuningdek, ushbu o'qlar atrofida yuzaga keladigan burama vibratsion tebranish parametrlarini bir qurilmada o'lchash imkoniyati yaratilgan.

Induksion vibratsiya o'zgartirgichlarining ishlash samaradorligini baholovchi eng muhim parametrlaridan biri – bu ularning **statik xarakteristikasi** hisoblanadi. Statik xarakteristika deganda, o'zgartirgichning chiqishidagi elektr signali bilan uning kirishiga ta'sir etayotgan vibratsiya parametrlarining (odatda tezlanishning amplitudasi yoki siljishning funksiyasi) orasidagi **funksional bog'liqlik** tushuniladi.

IVO' ning vazifasi – mexanik vibratsiyani magnit oqimining o'zgarishiga, so'ngra o'lchash chulg'amlarida induksiyanayotgan EYUKga aylantirishdir. Shu sababli chiqish signali qiymati magnit zanjiridagi ishchi oqimning vaqt bo'yicha o'zgarishiga to'g'ridan-to'g'ri bog'liq bo'ladi. Bunday bog'lanishning chiziqliligi, sezgirliги va barqarorligi o'zgartirgichning metrologik aniqligini belgilovchi asosiy omillardir.

Statik xarakteristika asosan quyidagi omillarga bog'liq:

- Magnit o'tkazgichning geometriyasi va material xossalari
- Inertsion elementning massa-inertsiya parametrlari
- Ishchi havo oralig'ining qiymati va uning dinamik o'zgarishi
- O'lchash chulg'amlarining o'ramlar soni ($w_{chiq.}$)
- Doimiy magnitlarning magnit maydoni kuchi
- Vibratsiya amplitudasi α_M va chastotasi ω_M

Statik xarakteristika odatda **amplituda bo'yicha** baholanadi, chunki vibrodiagnostikada ko'pincha tebranishning eng tipik parametri – uning **amplituda tezlanishi** α_M bo'ladi.

IVO ning statik xarakteristikasi chiziqli bo'lsa, demak chiqish signali kirish ta'siriga nisbatan mutanosib ravishda o'zgaradi va qurilma keng diapazonlarda yuqori aniqlik bilan ishlay oladi. Shu sababli yangi konstruksiyalarni ishlab chiqishda statik xarakteristikaning chiziqliligini ta'minlash muhim vazifa hisoblanadi.

Ma'lumki [4, 5], o'lchov o'zgartirgichlarining, jumladan, IVO' larning statik xarakteristikasi – bu uning chiqish kattaligi bo'lgan o'lchash chulg'amida induksiya qilinadigan EYUKning IVO' kirish kattaligi hisoblangan vibratsiya parametrlaridan biriga bog'liqligidir. Umumiy holda vibratsiya parametrlari sifatida uning amplitudasi $\alpha_M(t)$ va chastotasi $\omega_M(t)$ qiymatlari ko'rib chiqiladi.

Umumiy holda yangi IVO'larning statik xarakteristikasining analitik ifodasi quyidagicha aniqlanadi:

$$e_{chiq.} = -w_{chiq.} \frac{dQ_{\mu ish}[a_m(t), \omega_m(t)]}{dt}, \quad (1)$$

bu yerda $w_{chiq.}$ – o'lchash chulg'amlarining o'ramlar umumiy soni, [-].

VO'lar uchun ishlab chiqilgan Davlat standartiga ko'ra ularning statik xarakteristikalarini tadqiq etish jarayonida vibratsiya chastotasi o'zgarmas deb qabul qilinadi [6]. Shunga ko'ra yangi IVO'lar statik xarakteristikasining analitik ifodasi (2.32) ni inobatga olgan holda quyidagicha topiladi:

$$e_{chiq.} = -w_{chiq.} \frac{dQ_{\mu ish}(t)}{dt} = \frac{16F_K \mu_0 w_{chiq.} \delta_{ish} \pi \alpha_{m.m} a_m^* r R_{orr} \omega_m \cos \omega_m t}{180^0 \left[4\delta_{ish} + \mu_0 (4W_{\mu \Pi 1} + W_{\mu \Pi 2}) \left(\pi r^2 - \frac{\pi \alpha_{m.m} a_m^* r R_{orr}}{180^0} \sin \omega_m t \right) \right]^2}, \quad (2)$$

bu yerda $a_m^* = a_m / a_{m.m}$; a_m ; $a_{m.m}$ – tezlanishning mos ravishda nisbiy, amplituda va maksimal amplituda qiymatlari.

Yangi IVO'ning konstruksiyasi quyidagi parametr va o'lchamlarga ega: $R_1 = 30 \text{ mm}$; $R_2 = 31 \text{ mm}$; $\delta_{ish} = 1 \text{ mm}$; $R_{orr} = 30,5 \text{ mm}$; $r = 12,0 \text{ mm}$; $b = 40 \text{ mm}$; $H = 0,32 \text{ mm}$; $a = 12 \text{ mm}$; $l_{m1} = 10,01 \text{ mm}$; $l_{m1} = 10,015 \text{ mm}$; $h_2 = 10 \text{ mm}$; $l_{\mu \Pi 1} = 30 \text{ mm}$; $l_{\mu \Pi 2} = 137,82 \text{ mm}$; $r_{orr} = 2,5 \text{ mm}$; $\mu_{orr} = 1805$; $\alpha_{m.m} = 7 \text{ degri}$ ($\alpha_{m.m}$ – IE burilish burchagining IVO yuqori chegarasiga mos keluvchi maksimal qiymati).

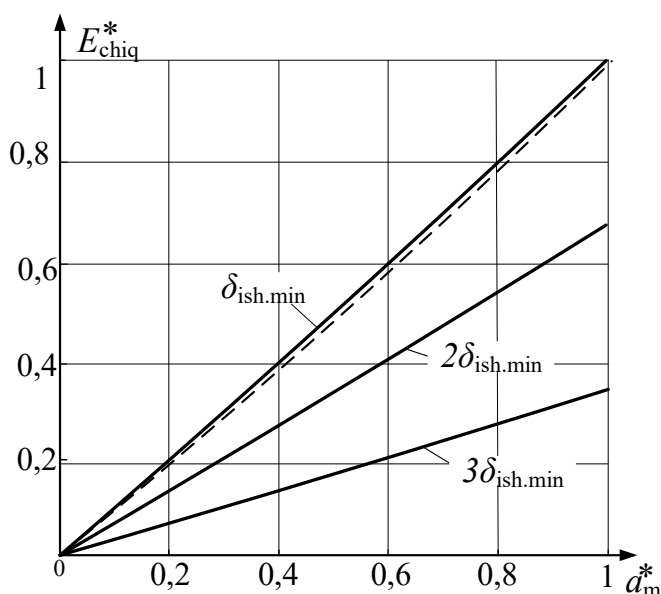
Yaratilgan IVO'lar manba MYUK, chulg'amlar soni, konstruktiv parametrlar va geometrik o'lchamlarning berilgan qiymatlari uchun chiqish signalining maksimal qiymati ($E_{chiq.max}$) sifatida ishchi havo oralig'ining minimal qiymati $\delta_{ish.min}$ va $a_m^* = 1$ holati qabul qilinadi.

Demak, yangi IVO'lar statik xarakteristikasining nisbiy birliklardagi analitik ifodasi quyidagicha aniqlanadi:

$$E_{chiq.}^* = \frac{\delta_{ish} \left[4\delta_{ish.min} 180^0 + \mu_0 W_{\mu \Pi} \left(180^0 \pi r^2 - \pi \alpha_{m.m} r R_{orr} (\sqrt{2})^{-1} \right) \right]^2 a_m^*}{\delta_{ish.min} \left[4\delta_{ish} 180^0 + \mu_0 W_{\mu \Pi} \left(180^0 \pi r^2 - \pi \alpha_{m.m} r R_{orr} (\sqrt{2})^{-1} \right) a_m^* \right]^2}. \quad (3)$$

bu yerda $E_{chiq.}^* = E_{chiq.} / E_{chiq.max}$.

(3) funksiya va undagi δ_{ish} ning turli qiymatlari, shuningdek, elektr o'lchash texnikasida keng qo'llaniladigan, magnit o'tkazgichning nisbiy magnit singdiruvchanligi 1805 ga teng bo'lgan 1512-markali elektrotehnika po'latidan tayyorlangan IVO' uchun qurilgan grafiklar (4-rasm)



4-rasm. Yaratilgan IVO'larning δ_{ish} ning turli qiymatlari uchun statik xarakteristikalari: uzluksiz chiziqlar – nazariy; uzlukli chiziqlar – tajriba asosida

tahlili shuni ko'rsatadiki, yaratilgan IVO'larning statik xarakteristikasi vibratsiya parametrlarini o'lchash diapazonida chiziqlilikni saqlab qoladi.

Xulosa

Yaratilgan yangi induksion vibratsiya o'zgartirgichlarining (IVO'larning) statik xarakteristikalari analitik va tajriba-uslubiy yondashuvlar asosida o'rganildi. Tadqiqot natijalari shuni ko'rsatadiki, ishlab chiqilgan IVO konstruksiyasi magnit o'tkazgichning geometrik parametrlari, inertion elementning mass-inertsia xususiyatlari va ishchi havo oralig'i bilan bog'liq bo'lgan o'zgarishlarga sezgir tarzda javob beradi.

Analitik ifodalardan olingan natijalar ham, tajribaviy grafiklardan olingan ma'lumotlar ham IVO' chiqishidagi EYUKning o'lchanayotgan vibratsiya parametriga mutanosib ravishda o'zgarishini tasdiqladi. Xususan, statik xarakteristikaning nisbiy birliklardagi ifodasi turli δ_{ish} qiymatlarida ham chiziqlilikni saqlab qoldi, bu esa qurilmaning metrologik barqarorligini belgilovchi asosiy afzalliklardan biridir.

Shuningdek, analitik modelda foydalanilgan parametrlarga mos tarzda tayyorlangan eksperimental qurilma uchun olingan grafiklar (4-rasm) nazariy hisob-kitoblar bilan yetarli darajada mos keladi. Bu esa ishlab chiqilgan matematik modelning real fizik jarayonni to'g'ri aks ettirishini va o'lchash jarayonidagi magnit oqimning o'zgarish mexanizmini aniq tasvirlashini ko'rsatadi.

Yangi IVO' konstruksiyasi ko'plab afzalliklarga ega bo'lib, ulardan eng muhimlari quyidagilardan iborat:

- statik xarakteristikaning chiziqliligi keng o'lchash diapazonida saqlanadi;
- magnit zanjirning konstruktiv takomillashuvi tufayli chiqish signalining barqarorligi oshirilgan;
- inertion elementning massalar farqi va magnit maydon konfiguratsiyasi sezgirlikni sezilarli darajada oshiradi;
- konstruksiyada qo'llanilgan materiallar va geometrik yechimlar magnit oqimining yo'qotilishini kamaytiradi va amplitudaviy aniqlikni oshiradi.

Umuman olganda, o'tkazilgan tadqiqotlar yangi IVO' konstruktsiyasining statik xarakteristikasi yuqori aniqlik va chiziqlilik talab qilinadigan vibratsiya monitoringi, texnologik nazorat, mashina va mexanizmlarning texnik holatini diagnostika qilish kabi amaliy sohalarda samarali qo'llanishi mumkinligini isbotladi.

Natijalar shuni ko'rsatadiki, taklif etilgan konstruktsiya o'zining prototipiga nisbatan sifat jihatdan ustun bo'lib, IVO'larning yanada sezgir, barqaror va keng funksional imkoniyatlarga ega bo'lishini ta'minlaydi.

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LEXICAL-SEMANTIC PATTERNS OF POLYSEMY IN KOREAN AND UZBEK: A COMPARATIVE STUDY

Abstract: Polysemy represents one of the most significant mechanisms of lexical development in natural languages. This article examines lexical-semantic patterns of polysemy in Korean and Uzbek through a comparative analysis focusing on semantic extension, functional meaning transfer, and contextual disambiguation. The study is based on material derived from a Bachelor's thesis and supported by contemporary theories of lexical semantics and regular polysemy. The findings indicate that while both languages rely heavily on metaphorical and metonymic extension, Korean demonstrates a particularly high degree of verb-centered polysemy. The results contribute to comparative linguistics, bilingual lexicography, translation studies, and foreign language pedagogy.

Keywords: polysemy; lexical semantics; Korean language; Uzbek language; semantic extension; functional meaning transfer; context.

1. Introduction

Polysemy, defined as the coexistence of multiple related meanings within a single lexical unit, plays a central role in language economy and semantic development [1]. Unlike homonymy, polysemy involves meanings that are historically and conceptually connected [2]. Numerous studies in lexical semantics emphasize that polysemy emerges as a result of metaphorical, metonymic, and functional extensions [3].

In Korean and Uzbek, polysemy is a productive and widespread phenomenon, particularly evident in verbs and high-frequency lexical items. The Bachelor's thesis underlying this article provides detailed examples of polysemous structures in both languages, highlighting semantic shifts in Korean verbs such as *먹다* (eat/use/drink) and *가다* (go/pass/occur) as well as Uzbek nominal and verbal polysemy [4].

The aim of this article is to systematize these observations within a comparative IMRAD framework and to relate them to modern linguistic theory.

2. Materials and Methods

This study employs a **qualitative comparative methodology**. The primary data consist of:

- Lexical examples documented in the Bachelor's thesis on Korean–Uzbek polysemy [4].

- Supplementary theoretical sources on lexical semantics, polysemy, and semantic ambiguity [1–3, 5–10].

The analytical framework integrates:

- Classical lexical-semantic theory [1,2]
- Regular polysemy models [6,7]
- Contextual semantics and functional transfer theory [8,9]

Lexical items were analyzed by identifying their basic meaning, derived meanings, and semantic extension mechanisms.

3. Results

3.1 Shared polysemy mechanisms

Both Korean and Uzbek demonstrate extensive use of metaphor and metonymy in meaning extension. For example, Uzbek lexical items frequently expand from physical to abstract domains, while Korean exhibits similar patterns in both nominal and verbal systems [4].

3.2 Verb-centered polysemy in Korean

The results show that Korean verbs display particularly productive polysemy. The verb *먹다* extends beyond physical ingestion to denote usage and consumption, while *가다* expresses motion, temporal progression, deterioration, and continuity [4]. Such extensions are consistent with regular polysemy models proposed in lexical semantics [6].

3.3 Functional meaning transfer

Functional similarity rather than physical resemblance motivates certain extensions, such as “leg” referring to both human limbs and table supports. This mechanism operates systematically in both languages and aligns with cognitive semantic principles [8].

4. Discussion

The findings confirm that polysemy is governed by universal cognitive mechanisms but shaped by language-specific grammatical and discourse structures. Korean shows higher flexibility in verb-based polysemy, whereas Uzbek displays stronger nominal polysemy patterns [4,10].

These differences have important implications for bilingual dictionaries, translation accuracy, and second-language instruction. Teaching strategies should emphasize semantic networks rather than isolated meanings [11–13].

5. Conclusion

This comparative study demonstrates that Korean and Uzbek share fundamental polysemy mechanisms while differing in their structural realization. Korean verb polysemy is especially productive, supported by contextual and functional extensions. The results support the integration of regular polysemy theory into comparative linguistics and applied language studies.

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FROM DIVERGENCE TO CATCH-UP: CONDITIONAL GROWTH DYNAMICS ACROSS COUNTRIES

Abstract. *This paper analyzes long-run growth dynamics across countries with a focus on conditional catch-up processes. Using data for 217 economies from 1971 to 2021, the study examines how initial income levels, human capital, macroeconomic conditions, and trade openness shape subsequent growth outcomes. To account for structural changes in the global economy, the analysis is conducted for three periods: 1971–1995, 1995–2021, and the full sample. The results provide consistent evidence that countries with lower initial income levels tend to grow faster once differences in education, inflation, trade exposure, and regional characteristics are controlled for. Human capital, measured by secondary school enrollment, plays a significant role in supporting growth across most specifications. Importantly, the strength of the catch-up effect increases in the post-1995 period, suggesting that globalization and technological diffusion have contributed to faster income convergence in recent decades.*

Keywords: *Economic growth, catch-up dynamics, initial income, human capital; global integration, cross-country evidence.*

Introduction. For much of the twentieth century, global economic development was widely perceived as a process of divergence rather than convergence. Early empirical evidence suggested that income gaps between advanced and developing economies were persistent and, in some cases, widening. For example, according to D.Patel (2021), in 1950 per capita income in the United States exceeded that of India by a factor of approximately 17 in purchasing power parity (PPP) terms. By 1990, this disparity had increased to nearly 30:1, reinforcing the view that rich and poor countries were evolving along fundamentally separate growth trajectories. Such observations appeared to contradict the predictions of neoclassical growth theory, particularly the Solow (1956) model, which implies convergence of income levels through diminishing returns to capital.

However, the global growth landscape began to change markedly from the mid-1990s onward. By 2017, the ratio of U.S. to Indian per capita GDP had declined to around 9:1 (D.Patel et.al.,2021), This pattern is not unique to India. A growing

body of empirical research documents that several developing countries have experienced sustained periods of rapid growth, enabling them to catch up partially with advanced economies.

The experience of Uzbekistan offers a relevant case study within this framework. Until the early 2000s, Uzbekistan's economic structure was dominated by agriculture—particularly cotton production—which accounted for a substantial share of employment and export revenues. This period was characterized by high inflation, limited foreign direct investment, underdeveloped infrastructure, and persistent structural inefficiencies.

Beginning in the 2000s, Uzbekistan initiated a gradual but increasingly comprehensive reform process aimed at liberalizing the economy and fostering long-term growth. Greater engagement in regional economic cooperation, notably through participation in the Shanghai Cooperation Organization (SCO), contributed to increased regional trade turnover. More recently, ongoing efforts to accede to the World Trade Organization (WTO) have strengthened reform credibility and signaled a commitment to deeper integration into the global economy. As a result, both domestic and foreign investment expanded, particularly in manufacturing and extractive industries.

These structural and institutional changes have been accompanied by notable improvements in Uzbekistan's relative income position. In the early 2000s, per capita income in the United States was approximately 38 times higher than that of Uzbekistan. By 2024, this ratio had declined to about 17:1. It suggests significant degree of income convergence over the past two decades

Against this background, this paper seeks to examine the determinants of conditional convergence with a particular focus on developing and transition economies. By combining theoretical insights from neoclassical and endogenous growth models with empirical evidence from selected country experiences, the study aims to identify the key economic and institutional factors that enable sustained catch-up growth.

Literature review

A central question in the literature on economic convergence is whether observed narrowing of income gaps between rich and poor countries is driven mainly by slowing growth in advanced economies, or accelerated growth in developing countries, or a combination of both. Using cross-country data for two periods (1960–2000 and 2000–2019), Patel, Sandefur, and Subramanian (2021) found that recent convergence reflects both accelerating per capita GDP growth in poorer economies and declining growth in wealthier ones, with the growth acceleration in the Global South being particularly important.

While evidence of convergence has gained traction, some scholars emphasize that apparent convergence patterns may be influenced by differences in institutions, policies, and measurement techniques. Acemoglu and Molina (2021) argue that failure to account for persistent institutional and policy differences across countries — or the influence of unobserved variables — can bias estimates of convergence and potentially create statistical artifacts. Their analysis suggests that institutional

heterogeneity and model specification are critical in interpreting convergence results.

A large body of literature explores structural determinants of convergence. One important channel is technological diffusion: prior to the 2000s, limited access to advanced technologies constrained growth in less developed countries, contributing to divergence. However, increased globalization, digitalization, and expanded access to international flows of information and technology have facilitated faster adoption of modern technologies in lagging economies. Technology spillovers — especially through trade and foreign direct investment (FDI) — can enhance productivity growth in developing countries, thereby contributing to convergence. (Neto, 2013)

Trade liberalization has also been identified as a driver of convergence. Ben-David (1993, 1996) and Sachs and Warner (1995) shows that countries with greater trade openness experienced faster income growth and reduced income dispersion among trading partners, suggesting that liberalized markets create conditions conducive to convergence.

Additionally, human capital accumulation, investment in infrastructure, and FDI inflows are widely recognized as factors that can accelerate growth in poorer countries. Empirical research indicates that FDI has a disproportionately positive impact on economic growth in low-income countries and is associated with faster convergence in per capita income across groups of countries. (Jawaid, 2012)

Finally, recent work highlights that while some forms of convergence (e.g., GDP per capita growth) may be observable, convergence in institutional quality and structural characteristics does not necessarily follow at the same pace. For example, Safdar (2025) found that institutional convergence is slower than income convergence, implying that financial, legal, and governance differences can continue to shape long-term growth outcomes.

Methodology

The study tests the conditional convergence hypothesis by examining the relationship between initial income levels, human capital, and subsequent economic growth across countries. Three periods are considered: 1971–2021, 1971–1995, and 1995–2021, capturing long-term, pre-globalization, and post-globalization dynamics.

All relevant data for 217 countries were obtained from the World Bank World Development Indicators (WDI) database, including GDP per capita (constant 2015 USD), secondary school enrollment (SE), inflation, trade openness, and regional classifications.

1. Basic Model. The basic model analyzes the effect of initial GDP per capita and initial human capital on subsequent economic growth. Human capital is proxied by the secondary school enrollment ratio. Growth is measured as the average annual growth rate of per capita GDP over each period. The model is specified as follows:

1) Long-term period (1971–2021): $GR_{p1} = \beta_0 + \beta_1 \ln GDP_{pc1971} + \beta_2 \ln SE_{71} + \mu,$

$$\text{here } GRp1 = \frac{\ln GDP_{pc2021} - \ln GDP_{pc1971}}{51}$$

$$2) \text{ Pre-globalization (1971–1995): } GRp2 = \beta_0 + \beta_1 \ln GDP_{pc1971} + \beta_2 \ln SE71 + \mu,$$

$$\text{here } GRp2 = \frac{\ln GDP_{pc1995} - \ln GDP_{pc1971}}{25}$$

$$3) \text{ Post-globalization (1995–2021): } GRp3 = \beta_0 + \beta_1 \ln GDP_{pc1995} + \beta_2 \ln SE95 + \mu,$$

$$\text{here } GRp3 = \frac{\ln GDP_{pc2021} - \ln GDP_{pc1995}}{27}$$

$\ln SE$ means natural log of School enrollment, secondary (% gross). β_1 captures the convergence effect, and β_2 represents the impact of initial human capital on growth.

2. Extended model

To account for additional determinants of economic growth, the extended model incorporates macro-structural variables and regional dummies such as inflation measured by the average annual growth rate of the Consumer Price Index (CPI), Trade openness defined as the ratio of exports plus imports to GDP and three categorical variables representing major world regions to control for unobserved regional heterogeneity.

$$4) GRp1 = \beta_0 + \beta_1 \ln GDP_{pc1971} + \beta_2 \ln SE71 + CPIp1 + TOp1 + EAP + LAC + SSA + \mu$$

$$5) GRp2 = \beta_0 + \beta_1 \ln GDP_{pc1971} + \beta_2 \ln SE71 + CPIp2 + TOp2 + EAP + LAC + SSA + \mu$$

$$6) GRp3 = \beta_0 + \beta_1 \ln GDP_{pc1995} + \beta_2 \ln SE95 + CPIp3 + TOp3 + EAP + LAC + SSA + \mu$$

here:

$$GRp1 = (\ln GDP_{pc2021} - \ln GDP_{pc1971})/51,$$

$$GRp2 = (\ln GDP_{pc1995} - \ln GDP_{pc1971})/25$$

$$GRp3 = (\ln GDP_{pc2021} - \ln GDP_{pc1995})/27$$

$$CPIp1 = (\log \text{ of } CPI_{2021} - \log \text{ of } CPI_{1971})/51$$

$$CPIp2 = (\log \text{ of } CPI_{1995} - \log \text{ of } CPI_{1971})/25$$

$$CPIp3 = (\log \text{ of } CPI_{2021} - \log \text{ of } CPI_{1995})/27$$

EAP – East Asia & Pacific, LAC – Latin America & Caribbean,

SSA – Sub-Saharan Africa

This approach allows the study to isolate the conditional convergence effect, controlling for human capital, macroeconomic stability, trade exposure, and regional characteristics. All variables are expressed in natural logarithms where appropriate to reduce heteroskedasticity and interpret coefficients as elasticities.

Results. We can see from the result in Table 1 that all models show a negative relationship between the initial GDP per capita and subsequent growth rates.

Table 1. Basic model results

VARIABLES	model 1	model 2	model 3
GDP per capita (log), 1971	-0.00700*** (0.001)	-0.00629*** (0.002)	
Secondary School Enrollment (log), 1971	0.01177*** (0.002)	0.01361*** (0.003)	
GDP per capita (log), 1995			-0.00808*** (0.001)
Secondary School Enrollment (log), 1995			0.01318*** (0.003)
Constant	0.03404*** (0.007)	0.02100* (0.011)	0.03481*** (0.008)
Observations	95	95	107
R-squared	0.342	0.244	0.272

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

For example, -0.007 for model 1 (1971-2021), -0.006 for model 2 (1971-1995), and -0.008 for model 3 (1995-2021). This suggests that countries with higher initial GDP per capita tend to grow more slowly. This is consistent with the concept of conditional convergence, where poorer countries grow faster than richer ones, all else being equal.

The coefficients for secondary school enrollment are positive and significant across all models, it means that higher levels of secondary school enrollment are associated with higher growth rates. This suggests that investment in human capital (education) positively impacts economic growth.

Comparison Between Model 1 (1971-2021) and Model 2 (1971-1995):

The coefficient decreases slightly from -0.00629 in Model 2 to -0.00700 in Model 1. This suggests that the negative impact of initial GDP per capita on growth is somewhat stronger when considering the longer period (1971-2021). It implies that over a longer horizon, the convergence effect might become more pronounced.

Model 1 (1971-2021) vs. Model 3 (1995-2021). The coefficient in Model 3 is -0.00808, which is larger in magnitude than -0.00700 in Model 1. This indicates that the negative relationship between initial GDP per capita and growth was

stronger in the more recent period (1995-2021) than over the entire period from 1971 to 2021.

Model 2 (1971-1995) vs. Model 3 (1995-2021). The coefficient increases from -0.00629 in Model 2 to -0.00808 in Model 3. This significant increase suggests that the negative impact of initial GDP per capita on growth has become more pronounced in the recent period (1995-2021) compared to the earlier period (1971-1995).

The stronger negative relationship in the more recent period (1995-2021) could indicate a strengthening of the convergence process. As globalization and technological diffusion have accelerated, poorer countries may be catching up more rapidly with richer countries.

Table 2 demonstrates results of extended model.

Table 2. Results of extended models

VARIABLES	model 4	model 5	model 6
GDP per capita (log), 1971	-0.00664*** (0.001)	-0.00475** (0.002)	
Secondary School Enrollment (log), 1971	0.00578*** (0.002)	0.00770** (0.003)	
CPI Growth Rate, 1971-2021	-0.01437 (0.018)		
Trade Openness avg, 1971-2021	0.00006** (0.000)		
East Asia & Pacific	-0.00091 (0.004)	0.00862 (0.006)	0.00043 (0.004)
Latin America & Caribbean	-0.00489 (0.003)	-0.00214 (0.005)	-0.00531 (0.004)
Sub-Saharan Africa	-0.01609*** (0.004)	-0.01448** (0.006)	-0.01479** (0.006)
CPI Growth Rate, 1971-1995		-0.03335*** (0.011)	
Trade Openness avg, 1971-1995		0.00008 (0.000)	
GDP per capita (log), 1995			- 0.00812*** (0.001)
Secondary School Enrollment (log), 1995			0.00638* (0.004)
CPI Growth Rate, 1995-2021			0.03673 (0.030)
Trade Openness avg, 1995-2021			0.00005* (0.000)
Constant	0.05258***	0.03099**	0.06206***

	(0.010)	(0.014)	(0.014)
Observations	64	67	87
R-squared	0.514	0.517	0.444

*Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

All three models show negative coefficients for GDP per capita, which indicates conditional convergence.

Model 4: -0.00664 (1971-2021)

Model 5: -0.00475 (1971-1995)

Model 6: -0.00812 (1995-2021)

The coefficients vary slightly, with Model 6 showing a stronger negative relationship compared to Model 5 and Model 4, suggesting a more pronounced convergence effect in the recent period (1995-2021).

Positive coefficients across all models indicate that higher secondary school enrollment is associated with higher growth rates. (0.00578, 0.00707 and 0.00638 respectively) The significance levels vary, but the positive impact of education on growth is consistently evident.

Mixed results for CPI growth rate indicate varying impacts on growth. The negative coefficient in Model 5 suggests that higher inflation rates could negatively impacted growth in the 1971-1995 period.

Positive coefficients for trade openness indicate that greater openness is associated with higher growth rates. The results suggest that trade openness positively impacts growth, though significance varies.

Regarding regional dummy variables:

East Asia & Pacific: Mixed and not significant across models.

Latin America & Caribbean: Negative but not significant across models.

Sub-Saharan Africa: Consistently negative and significant, indicating lower growth rates compared to other regions.

Conclusion. The empirical analysis carried out in this study lends strong support to the conditional convergence hypothesis. Across both the baseline and extended model specifications, a stable and negative relationship is observed between initial GDP per capita and subsequent economic growth. This pattern suggests that economies starting from lower income levels tend to grow faster than richer ones, and this result remains consistent regardless of the model framework or period under consideration.

Human capital also plays a meaningful role in shaping growth outcomes. Secondary school enrollment is found to have a positive association with economic growth in all estimations, although the size and statistical strength of this effect vary slightly across models. Even so, the overall results confirm that improvements in educational attainment contribute to higher growth rates over time. This result is consistent with earlier studies emphasizing education as a key driver of long-run growth, including Barro (1991), Mankiw, Romer, and Weil (1992), and Benhabib

and Spiegel (1994), all of whom highlight the contribution of human capital accumulation to productivity and income growth.

An important finding of the study is that convergence appears to have become more pronounced in the period from 1995 to 2021. The stronger negative coefficient on initial income during this later period points to faster catch-up dynamics, which may reflect increased globalization, structural changes in economies, and broader access to education and technology.

Finally, extending the model to include additional controls—such as inflation, trade openness, and regional characteristics—does not alter the main conclusions. While these variables influence the estimated coefficients to some degree, the fundamental relationships between initial income, education, and growth remain intact. Taken together, the results indicate that income convergence and human capital accumulation continue to be central factors in explaining long-term economic growth patterns.

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SYNONYMY IN CONTEMPORARY FRENCH LINGUISTICS: A THEORETICAL, PSYCHOLINGUISTIC, AND CORPUS-BASED ANALYSIS

Abstract: *Synonymy in French linguistics is a complex, context-dependent phenomenon that functions as a semantic continuum rather than a set of absolute identities. By integrating theoretical models with recent psycholinguistic and corpus-based data, this study shows that lexical substitution is governed by specific cognitive and pragmatic constraints. These insights provide essential frameworks for modern translation, lexicography, and applied linguistics.*

Keywords: *French synonymy, lexical semantics, semantic similarity, corpus linguistics, psycholinguistics, LSP*

Introduction

Synonymy is a core complexity of French linguistics, challenging the traditional view that synonyms are simply interchangeable. As highlighted by Rakhimova and Rakhmonkulova (2023), synonymy is defined by the "problem of choice," where speakers navigate the tension between identity and difference. While classical theory provides a philosophical foundation, modern psycholinguistic and corpus-based tools now allow for empirical validation through usage data. This study bridges the gap between these theoretical roots and modern data-driven findings.

Methods

DATA SOURCES

Three complementary data types were employed:

1. **Theoretical literature** on synonymy and lexical semantics
2. **Psycholinguistic norms** of semantic similarity in French
3. **Corpus-based examples** from general and specialized French discourse

PSYCHOLINGUISTIC DATASET

The study relies on the semantic similarity norms developed by Lakhzoum, Izaute, and Ferrand (2021), which provide similarity ratings for 630 French word pairs based on native speaker judgments. These ratings allow synonymy to be treated as a **measurable gradient variable** rather than a categorical relation.

TABLE 1.

EXAMPLE OF SEMANTIC SIMILARITY SCORES IN FRENCH.

Word Pair	Similarity Score (0–10)	Degree of Synonymy
<i>peur – terreur</i>	8.7	Near-synonyms
<i>maison – bâtiment</i>	6.1	Partial overlap
<i>liberté – justice</i>	4.2	Conceptually related
<i>table – nuage</i>	0.3	Unrelated

CORPUS DATA AND ANALYTICAL PROCEDURE

Corpus examples were drawn from contemporary French usage (press, literary prose, and specialized economic texts). Lexical items traditionally labeled as synonyms were examined in their **collocational environments**, syntactic patterns, and pragmatic contexts.

The analysis focused on:

- Substitutability in identical contexts
- Register sensitivity
- Semantic shifts in specialized discourse

Results

THE GRADIENT NATURE OF SYNONYMY

Empirical data confirm that synonymy in French is **graduated rather than absolute**. Even pairs traditionally described as full synonyms display measurable differences in usage probability and contextual acceptability. This observation supports Ullmann's view that synonymy forms a continuum, where lexical items cluster around a semantic core but diverge at the periphery.

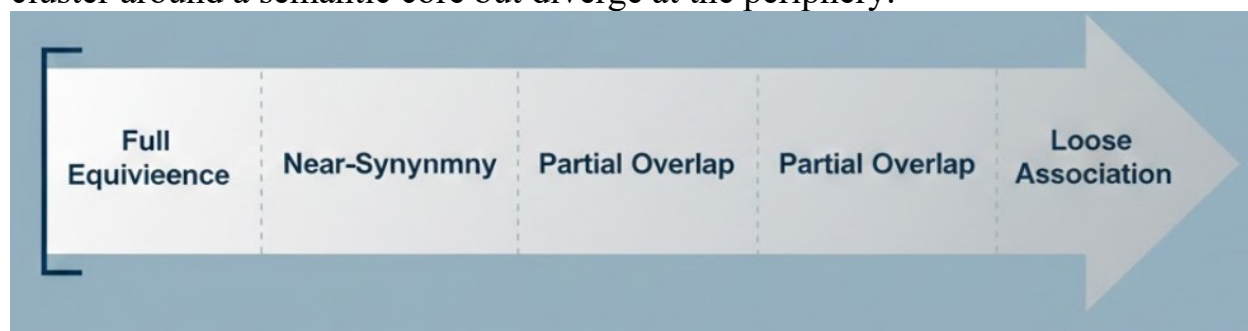


FIGURE 1. CONTINUUM OF SYNONYMY IN FRENCH LEXICAL SEMANTICS

The figure illustrates how lexical items move along a semantic continuum depending on context, register, and speaker intention.

Corpus Examples of Contextual Constraints

Example 1: Neutral Context

Je vais acheter du pain.

Je vais prendre du pain.

In everyday spoken French, *acheter* and *prendre* function as contextual synonyms. However, this equivalence disappears in more specific contexts:

✗ *J'ai pris une maison pour 200 000 euros.*

✓ *J'ai acheté une maison pour 200 000 euros.*

Here, *acheter* encodes a commercial transaction, while *prendre* fails to convey the same legal and economic meaning.

Example 2: Stylistic Differentiation

Il a mangé rapidement.

Il a bouffé rapidement.

Although semantically related, *manger* and *bouffer* differ sharply in register. Their interchangeability is restricted by social context and communicative norms.

Near-Synonymy in Cross-Linguistic Perspective: Adigüzel and Babanoğlu (2025) demonstrate that French often lexicalizes semantic distinctions differently from English. The adjective *profond* covers both physical and metaphorical depth, whereas English distinguishes between *deep* and *profound*. Corpus data show that *profond* remains constrained by collocational patterns (*sommeil profond*, *silence profond*), confirming that semantic breadth does not imply unrestricted synonymy.

Synonymy in Specialized Economic Discourse: In economic French, synonymy serves rhetorical and stylistic purposes but carries semantic risks. Bylina et al. (2021) show that terms such as *croissance* and *expansion* are often used interchangeably in journalistic texts, yet retain distinct technical meanings in economic analysis.

TABLE 2.

SYNONYMY IN GENERAL VS. ECONOMIC FRENCH

Lexical Pair	General Usage	Economic Usage
<i>croissance – expansion</i>	Near-synonyms	Distinct indicators
<i>action – titre</i>	Overlapping	Legal differentiation
<i>crise – récession</i>	Interchangeable	Non-equivalent

Discussion

Evidence confirms that French synonymy is a multi-layered interaction of cognitive perception and discourse rules rather than simple word replacement. While absolute synonymy remains a theoretical myth—as argued by Vinokur—psycholinguistic data proves that speakers perceive a measurable scale of "closeness" between words. This is critical in specialized fields like law or economics, where substituting even close synonyms can lead to significant semantic distortion.

Conclusion

This study establishes synonymy as a dynamic spectrum shaped by pragmatic and contextual factors. By merging classical theory with modern empirical research, it moves beyond the concept of absolute equivalence to provide a grounded model of semantic proximity. Future work should leverage computational models and

broader corpus data to further map these relationships across diverse professional domains.

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ИССЛЕДОВАНИЕ ПУТЕЙ ИННОВАЦИОННОГО РАЗВИТИЯ ЯЗЫКОВОГО ОБРАЗОВАНИЯ В СОВРЕМЕННЫХ ТЕХНОЛОГИЧЕСКИХ УСЛОВИЯХ

Аннотация.

В условиях одновременного развития глобальной цифровой трансформации и модернизации образования языковое образование переживает системные изменения — от теоретических парадигм к практико-ориентированным моделям. В данном исследовании рассматриваются возможности глубокой интеграции и инновационного обновления теоретических и практических подходов в языковом образовании с использованием современных технологий, таких как искусственный интеллект, виртуальная реальность, большие данные и когнитивные науки. На основе анализа научной литературы, кейс-стади и экспериментальных исследований проводится системный анализ внутренней логики и внешних проявлений «образования, основанного на технологиях». В рамках оригинального исследования разработана и верифицирована инновационная модель «трёхкомпонентной связанной динамики», в которой «глубокая интеграция интеллектуальных технологий» выступает в роли движущего механизма, «мультимодальное контекстное конструирование» — образовательного пространства, а «нейрообразовательные доказательные практики» — фундаментальной основы. Полученные результаты показывают, что данная модель эффективно повышает когнитивную эффективность языкового усвоения, способности к ситуативному применению знаний и навыки самостоятельного обучения, предлагая системные решения классических проблем языкового образования, таких как разрыв контекста, недостаточная персонализация и несоответствие между обучением и практическим применением. Полученные выводы обладают как теоретической, так и практической значимостью для развития органической интеграции массового образования и персонализированного обучения, а также для реконструкции экосистемы языкового образования в цифровую эпоху.

Ключевые слова: *языковое образование, образовательные инновации, искусственный интеллект, виртуальная реальность, мультимодальное обучение, нейрообразование, персонализированное обучение.*

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A STUDY OF PATHWAYS FOR THE INNOVATIVE DEVELOPMENT OF LANGUAGE EDUCATION UNDER CONTEMPORARY TECHNOLOGICAL CONDITIONS

Abstract: *In the context of global digital transformation and educational modernization converging, language education is undergoing systemic transformation from theoretical paradigms to practical models. This study explores how modern technologies—such as artificial intelligence, virtual reality, big data, and cognitive science—can deeply integrate and innovate theoretical and practical approaches in language education. Through literature review, case analysis, and experimental research, the study systematically analyzes the internal logic and external manifestations of "technology-enabled education." The original research constructs and validates an innovative "triple-drive linkage" framework, with "deep integration of intelligent technologies" as the engine, "multimodal contextual construction" as the field, and "neuro-educational evidence-based practices" as the foundation. Results demonstrate that this framework effectively enhances learners' language cognitive processing efficiency, situational application abilities, and self-directed learning competencies, providing systematic solutions to classic issues in language education such as contextual gaps, insufficient personalization, and the disconnect between learning and application. The findings hold theoretical and practical value for promoting the organic integration of large-scale education and personalized cultivation, as well as reconstructing the language education ecosystem in the digital era.*

Keywords: *language education, educational innovation, artificial intelligence, virtual reality, multimodal learning, neuro-education, personalized learning*

1. Введение

В начале третьего десятилетия XXI века новая волна научно-технической революции, ведущие её направления — искусственный интеллект, большие данные, виртуальная реальность (VR) и нейронаука, — кардинально меняет структуру человеческого общества, особенно в сфере образования. Языковое образование, являясь ключевой дисциплиной, объединяющей культуру, мышление и коммуникацию, в условиях глобализации и цифровизации сталкивается с очевидными ограничениями традиционных методик преподавания: противоречие между стандартизированным обучением и индивидуальными потребностями, разрыв между ограниченными учебными ситуациями и реальными, сложными коммуникациями[1][8]. Это — не просто методологические трудности, а

междисциплинарные научные вопросы, затрагивающие науку о обучении, когнитивную психологию и информационные технологии.

Современные технологии вовлекаются в образование не просто как вспомогательные инструменты, а становятся движущей силой перехода от «технической поддержки» к «интеллектуальной интеграции».[7][9]. Искусственный интеллект с помощью обработки естественного языка обеспечивает точные персонализированные пути обучения и мгновенную обратную связь; технологии виртуальной реальности создают высоко детализированную, интерактивную среду, максимально имитирующую реальное использование языка; анализ больших данных позволяет проводить всестороннюю количественную диагностику и прогнозирование процесса обучения; когнитивная нейронаука раскрывает нейронные механизмы приобретения языка на глубоком уровне, предоставляя биологические доказательства для оптимизации преподавания.[4][6]. Интеграция этих технологий способствует всестороннему инновационному развитию языкового образования — в целях, содержании, методах и системе оценки.

Данное исследование опирается на передовые достижения глубокой интеграции современных технологий и языкового образования и направлено на систематическое изучение и формирование инновационных подходов к развитию языкового образования в будущем. Основные задачи исследования: во-первых, разобрать ключевые технические принципы и механизмы действия, с помощью которых современные технологии поддерживают языковое образование; во-вторых, интегрировать междисциплинарные теории и построить системную инновационную модель, в которой технологии поддерживают языковое образование; в-третьих, с помощью дизайнерского исследования проверить эффективность этой модели в повышении конкретных языковых навыков и определить её границы применения. Данное исследование не только отвечает на практические потребности стратегии цифровизации образования[1], это также способствует теоретическому осмыслению сохранения сущности образования в технологической среде и содействия всестороннему развитию личности.

2. Методы и методология исследования

Для достижения поставленных исследовательских целей в настоящем исследовании применяется смешанная исследовательская парадигма, объединяющая теоретическую концептуализацию и эмпирическое исследование, которая реализуется в три последовательных этапа:

2.1 Первый этап: многомерный анализ литературы и кейсов (основа для построения теоретической модели). На этом этапе применяются методы анализа литературы и кейсов с целью выявления текущего положения дел, выявления проблем и выделения ключевых элементов.

Объём охвата литературного анализа: проведён систематический обзор ключевых отечественных и зарубежных публикаций за последние пять лет (с особым акцентом на период 2020–2025 гг.) в области применения

искусственного интеллекта в образовании, иммерсионных образовательных сред, анализа обучения, нейролингвистики и приобретения второго языка. На основе анализа выявлены актуальные направления исследований.(Применение генеративного ИИ в создании контента и практике диалогов[7][9])、瓶颈(поверхностное сочетание технологического применения и методики преподавания[8])и передовые направления(например, оценка эффективности обучения в виртуальной реальности на основе электроэнцефалограммы[6]).

Анализ типичных примеров: были выбраны и детально проанализированы представительные практические кейсы из Китая и за рубежом. Например, рассматривается «Международная система интеллектуального преподавания китайского языка», разработанная Пекинским университетом языков, включая её граф знаний, с целью понять, как она реализует интеллектуальное формирование заданий и анализ учебных процессов.[1] ; В лаборатории преподавания языка VR при Северо-Китайском университете аэронавтики и астронавтики исследовали, как студенты выполняют французский бронировальный процесс в виртуальном аэропорту, и выяснили, как сценическое погружение и мгновенная коррекция ошибок способствуют развитию устной свободы.[3][10] ; Анализировал логику эволюции продуктов — от «Байцзычжан» до «ИБэйцзыцзи» — и проследил путь развития изучения лексики: от графического и игрового подходов к персонализированным и контекстуальным форматам.[2]. Эти анализы создают прочную практическую основу для построения инновационной рамки.

2.2 Второй этап: теоретическая основа инновационной модели «трицепного взаимодействия». На основе результатов первого этапа в исследовании впервые была предложена модель инноваций в языковом образовании под названием «трицепное взаимодействие». Согласно этой модели, эффективное технологическое развитие образования — это не просто применение отдельных технологий, а синергия трёх ключевых движущих сил:

Драйвер А: глубокая интеграция интеллектуальных технологий. Основа — использование «интеллектуального» ядра искусственного интеллекта и больших данных для полной перестройки процесса от ресурсов до оценки. В частности, это означает создание динамического «цифрового портрета» на основе многомерных данных учащихся (поведение, успеваемость, взаимодействие) и рекомендацию персонализированных учебных путей с помощью адаптивных алгоритмов.[5] ; С помощью генеративного ИИ создаются бесконечно разнообразные диалоговые сценарии и учебные материалы, адаптированные под уровень и интересы учащихся.[7][9] ; С помощью технологий обработки естественного языка предоставляется диагностика произношения, грамматики и структуры текста в реальном времени, а также формирующая обратная связь. Драйвер В: мотивация к созданию мультимодальных ситуаций. Основная идея — использовать

«погружённость» виртуальной и дополненной реальности (VR/AR) и мультимодального взаимодействия для решения проблемы отсутствия реальных ситуаций. Это позволяет создавать виртуальные сценарии использования языка с высокой точностью и интерактивностью (например, в бизнес-переговорах, культурных интеракциях), позволяя учащимся «учиться, делая».[3][10] ; Разработка комплексных учебных заданий, объединяющих текст, изображения, аудио, видео и пространственную информацию, с целью развития мультимодального познания и языкового продукта.[7].

Драйвер С: нейропедагогический драйвер, основанный на доказательствах. Его суть — научное обоснование педагогических решений на основе доказательств из области когнитивной нейронауки. Это означает применение результатов исследований нейролингвистики в области лексической репрезентации, синтаксической обработки и билингвального контроля.(эффект когнитивного воплощения[4])включить в стратегию преподавания ; С помощью нейронауковых методов, таких как ЭЭГ, объективно оценивать когнитивную нагрузку и эффективность обучения при различных формах преподавания — в частности, традиционных и виртуальных (VR) — с целью предоставления физиологических показателей для оптимизации учебного дизайна.[6].

2.3 Третий этап: квазиэкспериментальное исследование на основе теоретической модели (эмпирическая проверка)

Для проверки эффективности сочетания «модального контекста» и «персонализированного обратного связи» в рамках концепции «трёхкомпонентного взаимодействия» в настоящем исследовании был разработан квазиэксперимент. Исследование проводилось среди студентов второго курса неанглоязычных специальностей одного из вузов. Для эксперимента и контроля случайным образом отобрали по 30 студентов из двух обычных групп. Уровень английского языка при поступлении у обеих групп не отличался. Проектирование эксперимента:

Контрольная группа проходила внеочередную программу устного обучения в формате традиционного мультимедийного занятия с использованием популярного приложения для изучения языка; тематика обучения совпадала с тематикой экспериментальной группы. Экспериментальная группа: обучение в рамках концепции «три в одном». Каждую неделю в VR-лаборатории выполняется тематическая задача — например, «презентация продукта» или «международная научная конференция» — с поддержкой распознавания речи и реального времени обратной связи. После занятий студенты выполняют целенаправленные упражнения на расширение навыков через интегрированную платформу диалога с генеративным искусственным интеллектом. ИИ анализирует слабые стороны учащихся в выполнении задач в VR-среде — например, определённые грамматические структуры или недостаток словарного запаса — и на их основе генерирует

Инструменты измерения:

1.Предварительное и последующее тестирование устной речи: применяется стандартизированный компьютерный тест, оценка по трём параметрам — свободе выражения, точности и сложности.

2.Оценка выполнения задач в контексте ситуации: процессуальная оценка результатов экспериментальной группы в задачах виртуальной реальности.

3.Опросник опыта обучения: оценка уровня когнитивной вовлечённости, тревожности и мотивации у двух групп.

4.Интервью: проведение полуструктурированных интервью с некоторыми студентами экспериментальной группы для более глубокого понимания их учебного опыта.

Анализ данных: с помощью SPSS проводится ковариационный анализ результатов тестирования, выполняется описательная статистика и проверка различий по данным анкетирования, а также качественный анализ текстов интервью.

3. Оригинальные результаты исследований и их обсуждение

На основе исследования с использованием вышеуказанного метода смешивания были получены следующие ключевые результаты:

3.1 Модель «трикомпонентного взаимодействия» эффективно интегрирует технологическую экосистему и способствует комплексному развитию языковых навыков. Анализ данных предэкспериментального исследования показал, что после учёта результатов предварительного тестирования экспериментальная группа демонстрировала значительно более высокий общий балл по устной речи по сравнению с контрольной группой ($F(1,57) = 9,87, p < 0,01$). Дальнейший анализ показал, что это преимущество проявляется в основном в двух аспектах — «плавности» и «сложности». Интервью раскрывают причины: виртуальные сценарии создают (степень свободы в выражении[3]) ; после занятий AI-тренировка, генерируя разнообразные диалоги, ориентированные на индивидуальные слабые стороны, расширяет ресурсный фонд языкового выражения (по сложности). Это подтверждает эффективность взаимодействия «создания ситуации» (В-двигатель) и «интеллектуальной обратной связи» (А-двигатель) в рамках. В отличие от контрольной группы, у которой наблюдается определённый прогресс, но в основном в виде повышения «точности», а гибкость использования языка остаётся ограниченной.

3.2 Мультимодальная иммерсивная среда ускоряет переход от «знания» к «прагматике» и демонстрирует уникальные преимущества в когнитивной обработке. В ходе эксперимента было показано, что эффективность выполнения задач студентами экспериментальной группы в VR-ситуациях быстро растёт по мере увеличения числа повторений. Студенты в целом отмечают, что при участии в виртуальных встречах или попытках найти дорогу на улице запоминание и воспроизведение слов и конструкций уже не сводится к изучению учебников, а становится естественной реакцией. Это соответствует[6]исследование—Обработка слов, усвоенных в виртуальной

реальности, становится всё более «автоматизированной» — это подтверждается взаимосвязью данных. В данном исследовании также предполагается, что такая автоматизация может быть обусловлена тем, что мультимодальные иммерсивные среды способствуют «догенерализованному познанию». Ученики не просто воспринимают информацию зрительно и слухово, но и «действуют» в контексте через виртуальных аватаров. Вовлечение в систему восприятия и движения, вероятно, укрепляет нейронные связи между языком и смыслом, что способствует формированию процедурных знаний.[4]. Это важное проявление движущей силы С (нейроэдукативная эвденс) в рамках концепции «трикомпонентного взаимодействия», а также яркий пример того, как технологии способствуют языковому обучению, выходящему за рамки поверхностной эффективности и достигающему глубоких когнитивных уровней.

3.3 Персонализированный AI-интерфейс кардинально меняет подход к обучению, формируя навыки самостоятельного обучения в цифровую эпоху. Результаты опроса по опыту обучения показали, что экспериментальная группа значительно превзошла контрольную по показателям «мотивации к обучению» и «самоэффективности». В ходе интервью студенты неоднократно отмечали, что AI-тренер «похож на всегда онлайн-партнёра с терпением», который помогает снять тревогу, возникающую при общении с преподавателем или одноклассником.[9]. Ещё важнее то, что студенты начинают уметь давать ИИ более точные команды — например, «создайте диалог с тем, кто сомневался в моём предыдущем ответе», — и сами проверяют информацию, которую предоставляет ИИ.[7]. Это показывает, что в условиях, созданных в рамках «трёхкомпонентного взаимодействия», технологии становятся не просто учебными инструментами, но и партнёрами в познании, а также мета-познавательными опорами. Благодаря глубокому взаимодействию с технологиями учащиеся постепенно формируют ключевые компетенции — умение управлять обучением в цифровой среде и критически использовать информационные ресурсы, — которые и являются основными навыками, необходимыми в будущем обществе.

3.4 Исследование выявило ключевые вызовы: этику использования технологий, роль учителей и цифровую пропасть. Оно также выявило трудности на пути инноваций. Прежде всего, особенно остро стоят этические вопросы: защита конфиденциальности данных об обучении, предвзятость контента, создаваемого искусственным интеллектом, а также риск поверхностного эмоционального взаимодействия из-за чрезмерной зависимости от технологий.[9]. Во-вторых, роль учителя подвергается пересмотру: педагог должен перестать быть просто носителем знаний и стать дизайнером учебного опыта, наставником в применении технологий и защитником гуманистического подхода.[8]. Эффективное развитие педагогов — ключ к успеху. Вместе с тем передовые технологии виртуальной реальности и искусственного интеллекта могут усугубить неравномерное распределение образовательных ресурсов, и вопрос о том, как обеспечить

справедливость и доступность инновационного образования, остаётся научной и социальной задачей, стоящей перед лицом лиц, принимающих решения.

4. Заключение и перспективы

На основе системного теоретического построения и эмпирического исследования в данном исследовании сделаны следующие выводы: 1. Теоретический вывод: внедрение современных технологий в языковое образование представляет собой системный процесс, инновационный путь которого должен строиться по логической схеме «трицепного взаимодействия» — глубокой интеграции интеллектуальных технологий (А), созданию мультимодальных ситуаций (В) и нейропедагогической практики, основанной на доказательствах (С), — три компонента, действующие в тесном согласии. Одномерное применение технологий не способно вызвать фундаментальные изменения в образовательной парадигме.

2. Практический вывод: применение данной педагогической модели позволяет значительно повысить языковую компетентность, мотивацию к обучению и цифровую грамотность учащихся, предлагая эффективное решение для устранения давних проблем в языковом образовании — «разрыв между обучением и применением» и «недостаток мотивации». Ключ к её реализации — создание замкнутой системы обучения «восприятие — действие — обратная связь», а также использование технологий как партнёра, способствующего глубокому познанию и самостоятельному обучению.

3. Применение: результаты данного исследования обладают широкой практической значимостью. (1) Инновации в образовательной модели: могут стать ориентиром для разработки гибридных курсов, сочетающих онлайн-интеллектуальную поддержку и офлайн-иммерсивный опыт. (2) Разработка образовательных продуктов: указывают направление для компаний в сфере образовательных технологий — переход от «набора функций» к «органической экосистеме» при создании продуктов следующего поколения для изучения языков. (3) Профессиональное развитие педагогов: в центре внимания — обновление содержания их профессиональной подготовки, с акцентом на развитие учителей навыков интеграции технологий, анализа данных и разработки учебных ситуаций. (4) Разработка образовательной политики: при планировании цифровизации образования на государственном и институциональном уровнях подчёркивается важность тройного единства «технологий, методики преподавания и когнитивных наук», что служит основой для принятия соответствующих решений.

4. Перспективы будущего: в дальнейшем исследованию следует углубить в следующих направлениях. Во-первых, необходимо проводить более длительные и масштабные прослеживающие исследования для изучения долгосрочных эффектов технологического усиления языкового образования. Во-вторых, следует глубже исследовать драйверы «нейропедагогического обоснования» и использовать более разнообразные

нейромаркетинговые показатели (например, fMRI, eye-tracking) для точного описания механизмов обучения в различных технологических условиях. В-третьих, необходимо активизировать междисциплинарное сотрудничество в целях совместного разработки этических норм и [8].

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ВЛИЯНИЕ САНКЦИЙ НА ЭКОНОМИКУ РОССИИ

Аннотация: В статье рассматривается влияние международных санкций на экономику России в современных условиях. Применяются методы статистического анализа и моделирования для оценки связи между ограничениями и динамикой ВВП. В результате выявлены особенности воздействия санкционных процессов на развитие национальной экономики, предложены рекомендации по управлению рисками для стимулирования устойчивого роста. Предложены практические рекомендации по управлению рисками для обеспечения устойчивого экономического роста в долгосрочной перспективе

Ключевые слова: санкции, экономика России, ВВП, макроэкономика, импортозамещение, экономическая стабилизация, макроэкономические модели.

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THE IMPACT OF SANCTIONS ON THE RUSSIAN ECONOMY

Abstract: *This article examines the impact of international sanctions on the Russian economy in modern conditions. Methods of statistical analysis and modeling are used to assess the relationship between restrictions and GDP dynamics. As a result, the features of the impact of sanction processes on the development of the national economy were identified, and recommendations for managing risks to stimulate sustainable growth were proposed.*

Keywords: *sanctions, Russian economy, GDP, macroeconomics, import substitution, economic stabilization, macroeconomic models.*

Международные санкции против России, введенные после 2014 года и значительно расширенные с февраля 2022 года, стали одним из наиболее значимых факторов внешнего воздействия на национальную экономику в постсоветский период. Эти ограничения охватывают широкий спектр направлений: от экспорта энергоносителей и доступа к международным финансовым рынкам до поставок высокотехнологичного оборудования и программного обеспечения. В результате санкционного давления наблюдается снижение прямых иностранных инвестиций на 70-80%, рост инфляционных ожиданий и вынужденная переориентация торговых потоков, что создает как краткосрочные вызовы, так и долгосрочные возможности для структурных преобразований. Актуальность темы исследования обусловлена необходимостью объективного анализа адаптационных мер российской экономики, оценки степени ее устойчивости к внешним шокам и разработки стратегий минимизации негативных эффектов при максимальном использовании возникающих возможностей.

Первоначальный эффект санкций 2022 года проявился в резком сокращении экспортных доходов от поставок нефти и газа в Европу, где ранее размещалось около 40-50% российских углеводородов. Введение ценовых

потолков G7 на российскую нефть (60 долларов за баррель) и эмбарго на морские поставки привело к падению бюджетных доходов от экспорта энергоносителей на 20-25% в первом полугодии 2022 года по сравнению с аналогичным периодом 2021 года.

Одним из наиболее успешных направлений антисанкционной политики стало ускоренное импортозамещение, которое охватило ключевые сектора экономики. В сельском хозяйстве Россия достигла полного продовольственного самообеспечения и превратилась в крупнейшего экспортера пшеницы с объемом поставок 50 млн тонн в 2023 году, что на 20% превышает прошлогодние показатели. В фармацевтической отрасли локализация производства достигла 85%, а в IT-секторе доля отечественного ПО в государственных закупках выросла до 95% благодаря переходу на платформы "1С", "МойОфис" и "Astra Linux". Коэффициент локализации в машиностроении увеличился с 40% до 70%, хотя сохраняется дефицит критически важных компонентов, таких как микрочипы и станки с ЧПУ, объем параллельного импорта которых превысил 60 млрд долларов в 2023 году.

Статистические данные Федеральной службы государственной статистики демонстрируют неожиданную устойчивость российской экономики: после первоначального спада ВВП на 2,1% в 2022 году темпы роста составили 3,6% в 2023 году и 2,5% в 2024 году, что превышает средние показатели развитых стран. Инфляция, достигшая пика 11,9% в марте 2022 года, была сдержана до 7,4% в 2024 году за счет жесткой денежно-кредитной политики Банка России, поднявшего ключевую ставку до рекордных 16%. Золотовалютные резервы ЦБ РФ достигли 650 млрд долларов, а доля рубля в международных расчетах выросла до 45%, что значительно снизило валютные риски. Экспорт сократился с 591 млрд долларов в 2022 году до 426 млрд в 2023-м из-за потери европейского рынка, но стабилизировался на уровне 450 млрд долларов в 2024 году за счет азиатских направлений.

Эконометрическое моделирование с использованием векторных авторегрессионных моделей (VAR) и моделей общего равновесия с динамикой (DSGE) подтверждает, что санкции снижают потенциальный рост ВВП на 1,5-2% ежегодно в среднесрочной перспективе, однако эффект смягчается фискальной политикой, включая национальные проекты, бюджетное правило и субсидирование стратегических отраслей. По оценкам Минэкономразвития, без адаптационных мер падение ВВП могло достичь 8-12%, тогда как фактические потери составляют около 3-4% потенциального роста.

Секторальные эффекты санкций оказались разнонаправленными: энергетический сектор потерял 30% доходов от Европы, но нарастил азиатский рынок на 45%; металлургия сократила экспорт в ЕС на 60%, перенастроив поставки в Турцию и Китай; химическая промышленность увеличила внутренние продажи на 25%; автомобилестроение упало на 70%, но восстановилось за счет сборки китайских брендов. Положительным

фактором стало ускорение цифровизации: объем IT-рынка вырос на 18%, а внедрение отечественных решений в госсекторе достигло 90%. Финансовая система адаптировалась через дедолларизацию платежного баланса и создание Системы передачи финансовых сообщений (СПФС) как альтернативы SWIFT

Государственная антисанкционная политика включает комплекс мер: правовое оформление параллельного импорта (ФЗ № 282), создание Фонда национального благосостояния для финансирования импортозамещения (1,5 трлн рублей), валютный контроль через продажу 80% валютной выручки экспортерами и налоговые льготы для резидентов особых экономических зон. В рамках ЕАЭС реализуется евразийская экономическая интеграция с объемом взаимной торговли 90 млрд долларов и планами создания единого рынка капитала к 2025 году. Рекомендации по дальнейшему развитию включают создание технологических кластеров, венчурное финансирование НИОКР (200 млрд рублей ежегодно), экспортно-ориентированное развитие несырьевых отраслей и стратегические партнерства с БРИКС для обхода западных ограничений.

Долгосрочные перспективы российской экономики в условиях санкций зависят от скорости достижения технологического суверенитета и диверсификации экспортной базы. По прогнозам экспертов, при реализации намеченных мер среднегодовой рост ВВП может составить 2,5-3% в период 2025-2030 годов с переходом к модели устойчивого развития, основанной на внутреннем спросе, несырьевом экспорте и инновационном развитии.

Заключение.

Международные санкции создают серьезные краткосрочные вызовы для российской экономики, но одновременно выступают катализатором глубоких структурных реформ и ускоряют переход к модели экономического суверенитета.

Достигнутые результаты импортозамещения, переориентации торговых потоков и финансовой стабилизации демонстрируют высокую адаптационную способность национальной экономики.

Обеспечение долгосрочного устойчивого роста возможно при последовательной реализации политики технологической независимости, диверсификации экспорта и укрепления стратегических партнерств с динамично развивающимися экономиками Азии, Ближнего Востока и Африки.

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ПРАВА НЕСОВЕРШЕННОЛЕТНИХ В СУДОПРОИЗВОДСТВЕ- НУЖНА ЛИ ЮВЕНАЛЬНАЯ ЮСТИЦИЯ

Аннотация: В статье рассматривается проблема правовой защиты несовершеннолетних в судебном процессе. Анализируются процессуальные гарантии прав детей в уголовном, гражданском и административном судопроизводстве, а также пробелы действующего законодательства. Актуальность выбранной темы обусловлена ростом количества правовых ситуаций, в которых подростки становятся участниками судебных процессов — как потерпевшие, свидетели или обвиняемые. Цель проекта заключается в изучении особенностей судебной защиты несовершеннолетних, анализе существующих проблем и определении необходимости внедрения ювенальной юстиции в России, а для достижения поставленной цели поставила перед собой несколько задач. Анализ данной работы показал, что несовершеннолетние действительно являются одной из наиболее уязвимых категорий граждан, а значит, требуют особого подхода, основанного на принципах гуманности, бережного отношения и профессиональной поддержки.

Ключевые слова: права несовершеннолетних, ювенальная юстиция, судопроизводство, российская дискуссия, гуманизм, государство, правовой статус

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THE RIGHTS OF MINORS IN LEGAL PROCEEDINGS – IS JUVENALE JUSTICE NEEDED?

Abstract: This article examines the legal protection of minors in court proceedings. It analyzes procedural guarantees for children's rights in criminal, civil, and administrative proceedings, as well as gaps in current legislation. The relevance of this topic is driven by the growing number of legal situations in which

adolescents become parties to court proceedings—as victims, witnesses, or defendants. The goal of the project is to study the specifics of judicial protection for minors, analyze existing problems, and determine the need for the implementation of juvenile justice in Russia. To achieve this goal, the project set several objectives. Analysis of this work revealed that minors are indeed one of the most vulnerable categories of citizens, and therefore require a special approach based on the principles of humanity, respect, and professional support.

Keywords: *minors' rights, juvenile justice, legal proceedings, Russian debate, humanism, state, legal status.*

Введение

В современном обществе особое внимание уделяется защите прав и интересов несовершеннолетних. Дети и подростки являются наиболее уязвимой категорией граждан, нуждающейся в особой правовой поддержке в ситуациях, когда они вступают в контакт с судебной системой. От того, насколько эффективно государство обеспечивает защиту их прав, зависит не только исход конкретных дел, но и дальнейшая социальная адаптация несовершеннолетних, их развитие как личности и полноценное участие в жизни общества.

Актуальность выбранной темы обусловлена ростом количества правовых ситуаций, в которых подростки становятся участниками судебных процессов — как потерпевшие, свидетели или обвиняемые. Стремительное изменение социальной среды, увеличение рисков девиантного поведения, распространение семейных конфликтов требуют повышения эффективности механизмов защиты ребёнка. Вопрос о необходимости внедрения или расширения системы ювенальной юстиции становится предметом широкой дискуссии в России.

Данная тема заинтересовала меня, потому что важно понимать, насколько существующие правовые инструменты действительно защищают несовершеннолетних и какие изменения могли бы улучшить ситуацию. Важно также представить, как сами граждане относятся к идее внедрения ювенальной юстиции и осознают ли её роль в защите детей.

Объектом исследования являются права несовершеннолетних в современном российском судопроизводстве.

Предметом исследования выступают особенности реализации прав ребёнка и эффективность механизмов их защиты, включая потенциал ювенальной юстиции.

Цель проекта заключается в изучении особенностей судебной защиты несовершеннолетних, анализе существующих проблем и определении необходимости внедрения ювенальной юстиции в России.

Для достижения поставленной цели необходимо решить следующие задачи:

1. охарактеризовать статус несовершеннолетних и особенности реализации их прав в судопроизводстве;

2. рассмотреть основные правовые гарантии защиты ребёнка на различных этапах судебного процесса;

3. выявить существующие проблемы и противоречия в защите прав несовершеннолетних;

4. изучить историю становления ювенальной юстиции и обозначить её ключевые принципы;

5. проанализировать аргументы сторонников и противников внедрения ювенальной юстиции;

6. провести социологическое исследование для выявления отношения граждан к ювенальной системе;

7. выполнить анализ полученных данных и сформулировать выводы о необходимости применения ювенальной юстиции в России;

8. разработать буклет, в котором в доступной форме будут представлены основные права несовершеннолетних в судопроизводстве.

Глава 1. Права несовершеннолетних в современном российском судопроизводстве

1.1 Понятие и особенности статуса несовершеннолетних

Чтобы говорить о защите прав ребёнка в судопроизводстве, прежде всего необходимо понять, кто относится к категории несовершеннолетних и какие особенности определяют их правовой статус. В российском законодательстве несовершеннолетними считаются граждане, не достигшие 18 лет. Это возрастная группа, которая отличается особым положением в обществе и нуждается в дополнительных гарантиях безопасности. Их психическое, эмоциональное и социальное развитие находится в активной стадии, поэтому участие в юридически значимых процессах требует особого подхода.

Несовершеннолетние не всегда способны полноценно оценивать последствия своих действий, что связано с особенностями их жизненного опыта, уровнем осознанности и степенью ответственности. Именно поэтому государство закрепляет для них специальные условия, которые должны смягчать возможные негативные последствия контакта с судебной системой и обеспечивать защиту интересов ребенка. Эти условия касаются не только уголовных, но и гражданских, административных дел, а также семейных споров.

Правовой статус несовершеннолетнего включает совокупность его прав, обязанностей и гарантий, которые обеспечивают безопасность, защиту и поддержку в процессе судебного разбирательства. Важной особенностью является то, что ребёнок всегда рассматривается как лицо, нуждающееся в защите, а значит, не может участвовать в процессе наравне со взрослым. Например, несовершеннолетние имеют право на обязательное присутствие законного представителя, защитника или специалиста, который поможет им корректно понимать происходящее и защищать свои интересы.

Также следует учитывать, что дети чаще испытывают эмоциональное напряжение и стресс при участии в судебных процедурах. Это делает их

особенно уязвимыми перед психологическим давлением, непониманием юридических терминов и сложных этапов процесса. По этой причине законодательство устанавливает дополнительные правила допросов, проведения экспертиз, а также ограничивает время взаимодействия несовершеннолетних с правоохранительными органами.

Таким образом, статус несовершеннолетних в российском судопроизводстве основан на признании их особой уязвимости и необходимости создания условий, которые позволяют обеспечивать справедливое, гуманное и безопасное участие ребёнка в судебных процедурах. Эти особенности служат основой для формирования системы защиты, включая обсуждаемую ювенальную юстицию.

1.2 Основные гарантии защиты прав ребёнка на судебных этапах

Защита прав несовершеннолетних в судопроизводстве строится на сочетании международных норм, федерального законодательства и специальных процедур, которые учитывают возрастные и психологические особенности детей. Эти гарантии направлены на то, чтобы участие несовершеннолетнего в судебном процессе было максимально безопасным, корректным и не нарушало его достоинства.

Одним из ключевых элементов защиты является обязательное участие законного представителя. Ребёнок не может самостоятельно участвовать в разбирательствах, поскольку не обладает достаточными знаниями и опытом. Родители, опекуны или представители органов опеки помогают ему правильно понимать происходящее, защищать свои интересы и принимать решение, соответствующее его благополучию. В ситуациях, когда интересы взрослых и несовершеннолетнего расходятся, суд обязан назначить независимого представителя.

Также действует гарантия обязательного участия адвоката или защитника. Она особенно важна в уголовных делах, где любое процессуальное нарушение может повлиять на судьбу подростка. Специалист помогает понять сущность обвинения, разъясняет права, следит за тем, чтобы к несовершеннолетнему не применялись незаконные методы воздействия и чтобы процесс проходил строго в рамках закона.

Большое значение имеет создание специальных условий при проведении следственных действий. Допросы несовершеннолетних проводятся в присутствии педагога или психолога, который помогает снизить стресс и предотвратить возможное давление. Время общения следователя с ребёнком ограничено, чтобы не нанести вред его эмоциональному состоянию. Важно также, что вопросы должны задаваться в ясной и простой форме, без сложной терминологии и двусмысленных формулировок.

Дополнительной гарантией является возможность проведения закрытого судебного заседания. Такое решение принимается для того, чтобы защитить личную жизнь ребёнка и предотвратить распространение сведений, которые могут навредить несовершеннолетнему или его семье. Закрытый

режим судопроизводства помогает устранить лишнее внимание общественности и средств массовой информации.

Значимую роль играет и право несовершеннолетнего на выражение своего мнения. В семейных делах, а также в некоторых гражданских процессах ребёнок может быть опрошен судьёй, если его возраст и состояние позволяют это сделать без вреда для психики. Мнение ребёнка не является решающим, но учитывается как один из факторов при вынесении решения.

Таким образом, система гарантий защиты прав несовершеннолетних направлена на создание условий, которые позволяют ребёнку безопасно и справедливо участвовать в судебных процедурах. Эти меры помогают не только обеспечить соблюдение закона, но и предотвратить психологические травмы, которые могут возникнуть при контакте ребёнка с судебной системой.

1.3 Проблемы реализации прав несовершеннолетних в судебной практике

Несмотря на наличие разветвлённой системы правовых гарантий, защита несовершеннолетних в судопроизводстве сталкивается с рядом трудностей. Практическая реализация прав ребёнка часто осложняется отсутствием необходимых условий, недостаточной подготовкой специалистов и противоречиями между нормами закона и реальной ситуацией.

Одной из наиболее распространённых проблем является недостаточная квалификация участников процесса, которые работают с несовершеннолетними. Не все следователи, педагоги и психологи обладают специальными знаниями для корректного общения с детьми. Это может приводить к неправильной оценке эмоционального состояния подростка, неоднозначному толкованию его слов или даже к неосознанному давлению во время допросов. В результате ребёнок может давать неверные показания, что впоследствии влияет на справедливость судебного решения.

Сложности возникают и в организации следственных действий. Несмотря на предусмотренные законом ограничения, не всегда соблюдаются требования к длительности допросов, присутствию специалистов или созданию спокойной обстановки. В некоторых ситуациях несовершеннолетние испытывают сильный стресс, что отражается на их поведении и восприимчивости. Отсутствие детских комнат, специальных помещений и необходимых условий делает проведение процессуальных действий для ребёнка особенно тяжёлым.

Отдельной проблемой является недостаточная информированность несовершеннолетних и их законных представителей о своих правах. Порой родители или опекуны не знают, какие гарантии предусмотрены законом, не понимают сути судебных процедур и не могут полноценно защитить ребёнка. Это приводит к ситуации, когда формально права существуют, но фактически не реализуются.

В семейных и гражданских делах сложности нередко связаны с необходимостью учитывать мнение ребёнка. Судьи не всегда обладают необходимыми навыками, чтобы корректно и бережно опрашивать несовершеннолетнего. Переживание семейного конфликта усиливает эмоциональное напряжение, и ребёнок может чувствовать себя неуверенно или бояться высказывать свою позицию. Кроме того, мнение ребёнка иногда зависит от давления взрослых, что осложняет объективную оценку ситуации.

Ещё одной проблемой является общественное отношение к правам несовершеннолетних, особенно в контексте обсуждения ювенальной юстиции. Существуют опасения и стереотипы, которые искажают понимание её целей. Это формирует недоверие к судебным механизмам защиты детей и затрудняет внедрение реформ.

Таким образом, существующие проблемы в реализации прав несовершеннолетних показывают, что одной лишь законодательной базы недостаточно. Требуется системная работа по подготовке специалистов, созданию необходимых условий и повышению уровня правовой грамотности, чтобы обеспечить реальную, а не формальную защиту ребёнка в судопроизводстве.

Глава 2. Ювенальная юстиция как правовой механизм защиты несовершеннолетних

2.1 История становления ювенальной юстиции

Для понимания роли ювенальной юстиции в современной правовой системе необходимо обратиться к истории её возникновения. Первоначально идея создания отдельной системы правосудия для несовершеннолетних возникла в связи с осознанием того, что дети и подростки принципиально отличаются от взрослых по уровню психического развития, жизненному опыту и способности отвечать за свои поступки. Эти особенности требовали иных подходов к рассмотрению правонарушений и судебных ситуаций с их участием.

Первые элементы ювенальной юстиции появились в конце XIX — начале XX века в США и странах Западной Европы. К этому времени сформировалось понимание того, что ребёнок, совершивший правонарушение, нуждается прежде всего не в наказании, а в поддержке и возможности исправления. В 1899 году в Чикаго был создан первый в мире специализированный суд по делам несовершеннолетних. Он стал основой для формирования новой модели правосудия, ориентированной на воспитание, социальную адаптацию и помощь подросткам.

Постепенно ювенальные суды начали появляться в других странах. Их главной особенностью стало сочетание юридического и социального подходов: помимо судей, в работе участвовали педагоги, психологи, социальные работники. Основным принципом стало понимание, что наказание должно сочетаться с мерами социальной поддержки, направленными на предотвращение повторных правонарушений.

В России интерес к идее ювенальной юстиции возник в начале XX века, однако полноценное развитие эта система не получила. Новая волна обсуждений началась уже в постсоветский период, когда проводились реформы в сфере защиты семьи и детства. В рамках пилотных проектов в некоторых регионах были созданы специализированные суды и комиссии, работающие с несовершеннолетними. Целью таких инициатив стало повышение эффективности защиты детей, сокращение количества правонарушений среди подростков и создание благоприятных условий для их дальнейшего развития.

Сегодня ювенальная юстиция рассматривается как одно из направлений совершенствования судебной системы. Она включает в себя набор правовых, психологических и социальных мер, объединённых общей задачей — обеспечить ребёнку защиту, поддержать его развитие и предотвратить негативные последствия участия в судебных процедурах.

Таким образом, становление ювенальной юстиции — это результат длительного процесса, основанного на развитии гуманистических идей и стремлении государств обеспечить всестороннюю защиту ребёнка. Исторический опыт показывает, что создание специализированной системы правосудия помогает более эффективно решать проблемы несовершеннолетних и способствует их социальной адаптации.

2.2 Цели и задачи ювенальной юстиции

Ювенальная юстиция представляет собой систему правосудия, направленную на защиту прав несовершеннолетних и создание благоприятных условий для их социализации. Её главная особенность заключается в том, что внимание уделяется не только самой правовой процедуре, но и психологическому состоянию ребёнка, его развитию и перспективам исправления. Подход ювенальной юстиции основывается на признании того, что подростки, оказавшиеся в трудной жизненной ситуации или совершившие правонарушение, нуждаются прежде всего в поддержке и помощи.

Основной целью ювенальной юстиции является защита интересов несовершеннолетнего. Это включает охрану психического и физического здоровья ребёнка, обеспечение его безопасности, корректное и гуманное отношение со стороны правоохранительных органов и суда. Важно, чтобы подросток, участвуя в процессе, не подвергался травмирующим воздействиям и мог свободно выражать своё мнение.

Значимым направлением является профилактика повторных правонарушений. Ювенальная юстиция стремится выявить причины, которые привели несовершеннолетнего к конфликту с законом: семейные проблемы, неблагоприятную среду, отсутствие поддержки или контроля, недостаток образования. Работа с этими факторами позволяет не только помочь конкретному ребёнку, но и снизить уровень подростковой преступности в целом.

Ещё одной задачей является восстановление социальной справедливости и поддержка семей, находящихся в трудной ситуации. Ювенальная юстиция взаимодействует с образовательными учреждениями, органами опеки, службами психологической помощи и социальными организациями. Такой подход помогает не только рассмотреть дело несовершеннолетнего, но и создать условия для улучшения его дальнейшей жизни.

Важно отметить, что ювенальная система учитывает индивидуальные особенности каждого ребёнка. Её задача — подобрать такие меры воздействия, которые будут способствовать исправлению, а не разрушению личности. Вместо строгих наказаний предпочтение отдаётся воспитательным, образовательным и социально ориентированным мероприятиям.

Особое внимание уделяется защите несовершеннолетних, ставших жертвами преступлений. Ювенальная юстиция обеспечивает особые условия их допроса, участие психологов, а также меры, направленные на предотвращение повторной травматизации.

Таким образом, цели и задачи ювенальной юстиции основаны на принципах гуманизма, защиты личности ребёнка и комплексного подхода к решению проблем несовершеннолетних. Эта система ориентирована не только на вынесение судебных решений, но и на создание условий, позволяющих подростку безопасно вернуться к нормальной жизни и избежать негативных последствий контакта с судопроизводством.

2.3 Российская дискуссия: аргументы «за» и «против» введения ювенальной системы

Вопрос о внедрении ювенальной юстиции в России остаётся одним из самых обсуждаемых в сфере защиты прав ребёнка. Несмотря на то, что во многих странах такая система успешно функционирует, в российском обществе сформировались различные точки зрения на необходимость её введения. Дискуссия строится вокруг оценки эффективности предлагаемых мер, возможных рисков и готовности государства обеспечить полноценную работу такой системы.

Сторонники ювенальной юстиции считают, что специализированная система правосудия позволит создать более комфортные и безопасные условия для детей, вовлечённых в судебные разбирательства. По их мнению, существующая практика не всегда учитывает особенности психики подростков и часто оставляет их без должной поддержки. Ювенальные суды, службы примирения, психологическое сопровождение и индивидуальный подход помогут снизить уровень подростковой преступности и предотвратить повторные правонарушения. Важно и то, что ювенальная юстиция делает акцент на воспитании и социальной реабилитации, а не на наказании, что соответствует международным стандартам защиты детства.

Одним из главных аргументов в поддержку ювенальной системы является необходимость комплексного подхода. Сторонники подчёркивают, что ребёнок, оказавшийся в конфликте с законом, редко действует из злого

умысла. Чаще причина — семейные проблемы, отсутствие внимания, трудности в обучении, неуверенность или нехватка поддержки. Ювенальная юстиция помогает выявить эти факторы и устранить их, привлекая педагогов, социальные службы и психологов. Такой подход способствует восстановлению социальной функции семьи и созданию условий для нормального развития ребёнка.

Противники введения ювенальной юстиции выражают опасения, связанные с возможным чрезмерным вмешательством государства в семейную жизнь. Некоторые считают, что расширение полномочий органов опеки и психологических служб может привести к ущемлению прав родителей, что создаёт угрозу разрушения семей. Существует и мнение, что российское общество не готово к полноценному внедрению такой системы из-за нехватки квалифицированных специалистов и отсутствия необходимой инфраструктуры.

Кроме того, часть критиков полагает, что ювенальная юстиция может стать инструментом давления на семьи, а отдельные механизмы использоваться неправильно или формально. Также выдвигаются опасения, что новый подход окажется слишком затратным и потребует значительных ресурсов, которые государство пока не может обеспечить на должном уровне.

Таким образом, российская дискуссия о ювенальной юстиции строится на противоположных взглядах: одни видят в ней эффективный механизм защиты детей, другие считают её риском для семейных ценностей и социальной стабильности. Эти аргументы показывают, что вопрос требует взвешенного анализа и постепенного внедрения тех элементов системы, которые действительно улучшат положение несовершеннолетних в судопроизводстве.

Глава 3. Практическая часть: анализ отношения общества к ювенальной юстиции

3.1 Мои ожидания и предположения относительно исследования

Перед началом практической части работы мне было важно сформировать предварительное представление о том, как общество относится к возможности внедрения ювенальной юстиции и насколько люди осведомлены о правах несовершеннолетних в судопроизводстве. Я предположила, что мнения участников опроса могут оказаться достаточно противоречивыми, поскольку тема вызывает широкий общественный резонанс и включает много спорных аспектов.

Мне казалось, что часть опрошенных поддержит идею создания специализированной системы защиты детей, поскольку она направлена на гуманное отношение к несовершеннолетним и помогает предотвратить повторные правонарушения. Также я ожидала, что многие участники укажут на необходимость психологической и социальной поддержки подростков, столкнувшихся с трудными жизненными обстоятельствами или ставших участниками судебного процесса.

В то же время я предположила, что значительная доля респондентов может высказать опасения, связанные с возможным вмешательством государства в дела семьи, что является распространённым аргументом противников ювенальной юстиции. Ожидаемо, что некоторые будут недостаточно хорошо понимать, что представляет собой эта система, и свои ответы будут основывать на устоявшихся мифах или неоднозначной информации из СМИ.

Мне также было интересно узнать, насколько люди считают защиту прав несовершеннолетних в суде актуальной проблемой и достаточно ли существующих правовых механизмов. Я предположила, что большинство участников укажут на необходимость реформирования существующей практики и усиления мер по защите детей.

Таким образом, мои ожидания относительно исследования заключались в том, что ответы респондентов покажут разнообразие взглядов, выявят уровень информированности о правах детей и помогут определить, насколько общество готово к внедрению элементов ювенальной юстиции.

3.2 Социологический опрос: описание и результаты

Практическая работа №1

В рамках практической части проекта мне предстояло выяснить, насколько общество осведомлено о правах несовершеннолетних в судопроизводстве и как люди относятся к идее внедрения ювенальной юстиции в России. В начале исследования я предположила, что большинство респондентов признают необходимость дополнительной защиты детей, но могут испытывать сомнения относительно вмешательства государства в семейную сферу.

В исследовании приняли участие 30 человек в возрасте от 14 до 40 лет. Анкетирование проводилось в свободной форме, респондентам предлагались

несколько ключевых вопросов. Ответы были собраны, сгруппированы и отражены в диаграммах.

Первый вопрос был направлен на выявление уровня осведомлённости граждан о правах несовершеннолетних. Результаты показали, что лишь 42% респондентов считают себя хорошо информированными о данной теме. 38% признали, что имеют лишь поверхностные знания, и 20% отметили, что никогда не задумывались об этом вопросе. Можно предположить, что недостаточный уровень правовой грамотности влияет на отношение людей к ювенальной юстиции.

Следующий вопрос касался оценки необходимости дополнительных мер по защите несовершеннолетних в судопроизводстве. Большинство опрошенных — 67% — считают, что существующих механизмов недостаточно и требуется модернизация системы. 23% указали, что меры достаточны, если их правильно применять, и только 10% считают, что изменений не требуется.

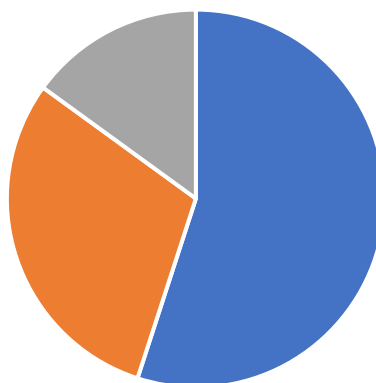
Особый интерес вызвал вопрос о внедрении ювенальной юстиции. 55% респондентов поддержали идею создания специализированной системы защиты детей, пояснив, что это поможет обеспечить гуманное отношение к несовершеннолетним и снизить риск ошибок в судопроизводстве. 30% высказали сомнения, связанные с опасениями вмешательства в дела семьи. Оставшиеся 15% отметили, что не обладают достаточной информацией, чтобы сформировать мнение.

На основе полученных данных можно сделать вывод, что общество в целом положительно воспринимает необходимость дополнительных мер по защите детей, но при этом испытывает настороженность из-за неполного понимания сути ювенальной юстиции. Уровень информированности напрямую влияет на отношение граждан к предлагаемым реформам.

По итогам работы была составлена Диаграмма №1

«Отношение респондентов к ювенальной юстиции»

Поддерживаете ли вы внедрение ювенальной юстиции в России?



- Поддерживаю
- Испытываю сомнения
- Нет мнения / недостаточно информации

Практическая работа №2

Вторая часть исследования была посвящена оценке того, как школьники воспринимают проблему защиты детей в судопроизводстве. В опросе участвовали 20 учащихся 10–11 классов. Перед анкетированием я предположила, что большинство подростков поддержат дополнительные меры защиты, так как сами относятся к группе несовершеннолетних.

Результаты исследования оказались следующими:

1. «Как вы считаете, нуждаются ли несовершеннолетние в особой защите при участии в судебных процессах?». Большинство участников — 17 человек — ответили «Да». Они считают, что подростки не обладают достаточным жизненным опытом, чтобы самостоятельно защищать свои интересы в суде. Трое респондентов полагают, что особые меры нужны только в отдельных случаях.

2. «Должны ли психологи и педагоги присутствовать во время допросов несовершеннолетних?». 18 человек выразили уверенность, что участие специалистов обязательно, поскольку подростки могут испытывать сильный стресс. Остальные 2 респондента считают, что участие взрослых достаточно.

3. «Поддерживаете ли вы внедрение ювенальной юстиции в России?». 11 респондентов ответили «Да», объясняя это тем, что система была бы нацелена на защиту детей. 7 человек затруднились с ответом, указав на отсутствие информации. 2 участника высказались отрицательно, опасаясь чрезмерного вмешательства государства.

4. «Считаете ли вы, что существующая система достаточно защищает детей?». 14 школьников считают, что текущие меры недостаточны, и необходима модернизация подходов. 6 участников полагают, что проблема заключается не в отсутствии норм, а в их несоблюдении.

5. «Опасаетесь ли вы, что ювенальная система может повлиять на семью?». 10 учащихся выразили определённые опасения, считая, что система может вмешиваться в личные дела семьи. Остальные участники не разделяли это мнение.

На основе этого исследования можно сделать вывод, что подростки в большинстве своём поддерживают меры по усилению защиты несовершеннолетних в судопроизводстве, но испытывают недостаток информации о сути ювенальной юстиции. Их взгляды совпадают с результатами первого исследования: необходимость защиты признаётся, но наблюдается осторожность в вопросе реформирования семейно-правовой сферы.

Таким образом, обе практические работы подтверждают актуальность темы и демонстрируют, что общественное мнение имеет неоднозначный характер, сочетающий поддержку гуманного подхода с опасениями относительно сопутствующих рисков.

Глава 4. Разработка буклета «Права несовершеннолетних в судопроизводстве»

4.1 Цель, структура и содержание буклета

Переходя от анализа полученных результатов опроса к созданию практического продукта, было важно обобщить ключевые выводы исследования и представить их в максимально доступной и наглядной форме. Именно поэтому в качестве итогового материала был разработан буклет «Права несовершеннолетних в судопроизводстве» (рис. 1, рис. 2).

Структура буклета была тщательно продумана, чтобы содержание воспринималось логично и постепенно раскрывалось от общих понятий к прикладным рекомендациям. На первой панели буклета размещены сведения о том, кто относится к несовершеннолетним и чем их участие в судопроизводстве отличается от участия взрослых. Этот раздел создаёт основу для понимания более сложных правовых вопросов, подчёркивая особый статус детей и необходимость внимательного отношения к ним со стороны государства.

Следующий блок посвящён основным правам несовершеннолетних. Здесь содержится краткое и доступное изложение гарантий защиты ребёнка. Такой подход позволяет юным читателям и их родителям быстро ориентироваться в своих правах, не обращаясь к большим объёмам сложной юридической литературы.

Центральное место в буклете занимает раздел, посвящённый ювенальной юстиции. Он объясняет, что представляет собой эта система, зачем она нужна и какие задачи выполняет. Важно, что информация подана нейтрально и объективно, позволяя формировать собственное мнение без давления.

Отдельная панель посвящена рекомендациям для родителей. Она содержит практические советы, которые помогают взрослым правильно вести себя, если их ребёнок участвует в судебном процессе. Данная часть делает

буклет особенно значимым, поскольку сочетает информационную и практическую ценность.

Завершающий блок буклета включает список организаций, куда можно обратиться за помощью. Наличие такого раздела обеспечивает применимость буклета в реальных жизненных ситуациях: читатель сразу понимает, куда обращаться и какие службы действительно могут помочь ребёнку.

Таким образом, структура буклета создаёт логичную и последовательную картину: от понимания статуса несовершеннолетнего и его прав — до конкретных действий и источников помощи.

4.2 Оформление и дизайн буклета

При создании буклета большое внимание было уделено его визуальному оформлению. В оформлении использована глубокая бордовая палитра в сочетании с мягкими кремовыми оттенками. Такое цветовое решение подчёркивает официальность темы и создает ассоциацию с правовой сферой, но при этом избегает излишней тяжеловесности.

Работа над буклетом велась в программе PowerPoint, что позволило создать аккуратный макет с чёткой структурой. Дизайн выполнен в формате трёхстворчатой конструкции, характерной для информационных буклетов. Каждая секция визуально выделена за счёт блоков с текстом, округлых элементов и разделительных линий. Это помогает не только создать порядок внутри макета, но и облегчить восприятие информации, так как каждый смысловой раздел имеет своё визуальное пространство.

Используемые шрифты отличаются хорошей читаемостью: заголовки выполнены крупным, контрастным начертанием, привлекающим внимание и структурирующим текст. Текстовые блоки выравнены по центру или по левому краю, что добавляет макету аккуратности и завершенности.

Особое внимание уделено графическим элементам. Иллюстрации подобраны таким образом, чтобы поддерживать смысл разделов, а не отвлекать от них. К примеру, изображение весов уравнивает текст о правах несовершеннолетних, а молоток судьи подчёркивает серьёзность раздела о ювенальной юстиции. При этом изображения расположены так, чтобы не загромождать страницы, сохраняя общий баланс макета.

В целом оформление буклета получило гармоничный и профессиональный вид. Он объединяет наглядность, аккуратность и структуру, создавая полноценный информационный продукт, который можно использовать как в учебной среде, так и в практической работе по повышению правовой грамотности несовершеннолетних и их родителей.



Рисунок 1 – Лицевая сторона буклета



Рисунок 2 – Внутренняя сторона буклета

Заключение

В ходе выполнения индивидуального проекта на тему «Права несовершеннолетних в судопроизводстве: нужна ли ювенальная юстиция» были изучены теоретические основы правового статуса детей, рассмотрены основные гарантии их защиты и выявлены существующие проблемы, возникающие при участии подростков в судебных процедурах. Анализ показал, что несовершеннолетние действительно являются одной из наиболее уязвимых категорий граждан, а значит, требуют особого подхода, основанного на принципах гуманности, бережного отношения и профессиональной поддержки.

В теоретической части проекта удалось раскрыть особенности статуса несовершеннолетних, определить ключевые правовые гарантии и обозначить трудности, с которыми сталкиваются дети в процессе судопроизводства. Также были рассмотрены цели, задачи и сущность ювенальной юстиции, а дискуссия вокруг её внедрения позволила увидеть, насколько неоднозначно общество воспринимает этот вопрос. Одни граждане считают ювенальную систему необходимой для реальной защиты интересов детей, другие опасаются чрезмерного вмешательства государства в семейную сферу. Анализ различных точек зрения помог сформировать объективное понимание проблемы.

Практическая часть исследования включала социологический опрос, результаты которого подтвердили, что тема защиты прав несовершеннолетних вызывает высокий интерес и в то же время остаётся недостаточно понятной для многих людей. Большинство респондентов признали необходимость усиления мер защиты детей в судопроизводстве, однако часть участников выразила опасения относительно последствий внедрения ювенальной системы. Это подтверждает актуальность проекта и необходимость расширения правовой грамотности населения.

Важным итогом работы стала разработка информационного буклета, который помогает подросткам и их родителям ориентироваться в вопросах защиты прав несовершеннолетних. Буклет обобщает ключевые положения проекта, содержит практические рекомендации и адреса служб помощи, что делает его удобным инструментом для использования в образовательной и социально-правовой среде. Такой итоговый продукт повышает практическую значимость проведённого исследования и позволяет применять его результаты в реальной жизни.

Считаю, что цель проекта достигнута, поставленные задачи выполнены. Работа позволила расширить знания о правовом положении несовершеннолетних, углубить понимание проблем их взаимодействия с судебной системой и сформировать представление о возможных направлениях совершенствования механизмов защиты детей в России. Проект подтвердил, что защита прав ребёнка требует комплексного подхода и взаимодействия юристов, педагогов, психологов и социальных служб, а также внимательного отношения со стороны общества и государства.

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СОВРЕМЕННЫЕ ТЕХНОЛОГИИ УПРАВЛЕНИЯ ОРГАНИЗАЦИЕЙ

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ОПТИМИЗАЦИЯ РАБОТЫ СЛУЖБЫ ПРИЕМА И РАЗМЕЩЕНИЯ ГОСТИНИЧНОГО ПРЕДПРИЯТИЯ НА ОСНОВЕ КОНЦЕПЦИИ БЕРЕЖЛИВОГО ПРОИЗВОДСТВА: ИНСТРУМЕНТЫ СНИЖЕНИЯ ЗАТРАТ

Аннотация. Статья посвящена результатам эмпирического исследования работы службы приема и размещения гостиницы, в ходе которого были выявлены потери времени и материальных ресурсов. На основе методологии бережливого производства предложены мероприятия по снижению затрат и повышению эффективности работы СПИР.

Ключевые слова: бережливое производство, затраты, гостиница, служба приема и размещения, 5S.

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OPTIMIZATION OF THE WORK OF THE HOTEL RECEPTION SERVICE BASED ON THE CONCEPT OF LEAN PRODUCTION: COST REDUCTION TOOLS

Abstract: *The article is devoted to the results of an empirical study of the work of the hotel reception service, during which losses of time and material resources were identified. Based on the lean production methodology, measures have been proposed to reduce costs and increase the efficiency of the hotel reception service.*

Keywords: *lean production, costs, hotel, hotel reception service, 5S.*

Введение. Одним из конкурентных преимуществ современной организации является низкая себестоимость товаров или услуг. Перспективным инструментом ее достижения выступает модель бережливого производства, суть которого заключается в эффективном использовании ресурсов через сокращение потерь. Перепроизводство, излишняя обработка изделий, переделывание уже сделанной некачественной работы, превышенное ожидание клиента ведут к чрезмерным потерям материальных и временных ресурсов. Принято считать, что в работе службы приема и размещения гостиничного предприятия непроизводительные потери минимальны. Это связано с наличием отраслевых стандартов особенно в сетевых отелях, а также программным обеспечением бизнес-процессов отеля. Тем не менее, мы предполагаем наличие потерь, связанных с объективными и субъективными факторами. Это могут быть проблемы, обусловленные противоречиями новых технологий и старой производственной базы, инновационной деятельностью и консервативными привычками и др. Выявление потерь и поиск возможности повышения эффективности работы службы приема и размещения гостиничного предприятия за счет их сокращения является целью нашего исследования.

Методы исследования. Определение эффективности функционирования службы приема и размещения велось на основе анализа нескольких отелей г. Ростов-на-Дону. В качестве инструментов исследования использовались интервью с работниками СПИР, наблюдение за работой сотрудников, а также были применены такие специфические инструменты бережливого производства, как диаграмма «спагетти» и хронометрирование выполнения операций. Хронометрирование устанавливает количественные характеристики потерь, а диаграмма «спагетти» позволяет выявить проблемы организации рабочего пространства, ведущие к потерям. Суть метода диаграммы «спагетти» заключается в том, чтобы определить путь и движения работника на рабочем месте, нанести их на схему (план помещения). Важно указывать реальные движения, а не идеальный вариант, только так можно выявить возможные потери (*muda, muri, mura* – виды потерь в терминологии концепции бережливого производства). К этим потерям можно отнести излишние движения, операции, проходы в пространстве, занимающие время и добавляющие усталость сотрудникам. Анализ полученной диаграммы показывает точки, в которых необходимы улучшения организации работы.

Обсуждение результатов исследования. Нами был выявлен ряд

проблем в процессах службы СПИР исследуемых гостиничных предприятий, которые ведут к потерям:

1. Рабочее пространство некоторых отелей не имеет специального места для важных и актуальных документов (регистрационные бланки, счета, туристская информация) и вещей (ключи для заселения, необходимая канцелярия), которые потребуются при работе. Всё это часто располагается в удалении от стойки ресепшен.

2. Виртуальное рабочее место сотрудника (электронное пространство) также часто плохо организовано. Актуальные и необходимые материалы располагаются достаточно хаотично на рабочем столе компьютера, не всегда размещены в нужных папках, иногда отсутствует синхронизация функций программы.

3. Сохраняется большое количество данных и документов, как актуальных в работе, так и тех, которые уже не нужны, что добавляет общего «мусора» в цифровом пространстве сотрудников.

4. Конструкция оборудования и рабочего места, размеры, взаимное расположение элементов зачастую не учитывают особенности рабочих операций, а также физические параметры работника. Так, принтер часто находится в удалении от стойки ресепшен, что приводит к тому, что затрачиваются силы и время на проход сотрудника к оборудованию. Стойка ресепшн, как правило, не учитывает параметры работника (рост, длина рук и др.), что ведет к снижению скорости и точности выполнения операций.

5. В процессе работы потребляется большое количество бумаги и происходит накопление черновиков, которые не нужны в работе, что ведет к заполнению пространства и перепроизводству документов.

6. Рабочий процесс заселения гостя осложняется долгим ожиданием. В это время сотрудник заполняет данные гостя для печати анкеты формы 5 при постановке гостя на учет в МВД.

Все вышеперечисленные проблемы нуждаются в решении, чтобы оптимизировать работу сотрудников службы приема и размещения гостиницы. Так, в первую очередь существует необходимость в улучшении рабочего пространства, поскольку в ходе анализа видно, что больше всего потерь ведет неправильно организованное рабочее место и электронное пространство. Для более качественного решения проблемы с организацией рабочего места необходимо прибегнуть к помощи эргономики, либо самостоятельно пересмотреть организацию рабочего пространства:

1. Использование регулируемой мебели и оборудования (выдвижной ящик для принтера, стул с подъёмно-поворотным механизмом и т.д.)

2. Четко разделить функциональные зоны для сотрудников

3. Наиболее действенным способом является применение инструмента 5S.

Метод 5S состоит из следующих шагов: сортировка (Sort), самоорганизация (Set in Order), систематическая уборка (Shine), стандартизация (Standardise), совершенствование (Sustain) [2]. В случае

применения данных принципов в организации рабочего пространства в службе приема и размещения потребуются выполнение следующих задач: удаление лишних предметов и документов, которые не используются ежедневно (старые регистрационные бланки, ненужные рекламные материалы, старые записи и выполненные задачи в журнале передачи смены). На рабочем месте потребуется оставлять только необходимые для работы инструменты и материалы: только актуальные ключи для заселения гостей на сегодняшний день, записи об актуальных задачах, только необходимая канцелярия. Организация рабочего пространства предполагает не только удаление лишних предметов, но и применение научных принципов, основанных на эргономике рабочего пространства. Элементы рабочего места должны располагаться с учётом основной рабочей позы «стоя». Компьютерная клавиатура и монитор должны иметь эргономические подставки, которые позволят настаивать рабочее место под удобное положение спины, рук и глаз сотрудника для профилактики утомляемости. Кроме того, необходимо определить частоту использования тех или иных элементов (инструментов, расходных материалов) и разработать стандарт их размещения с учетом этой информации. Так следует определить стандарт размещения на стойке папки с регистрационными бланками гостей, папки с документацией в работе – заявления на возврат или объяснительные, ключей, полки с актуальной туристской информацией. Возможно перемещение принтера под стойку ресепшен. Места хранения для каждого предмета можно обозначить с помощью ярких меток, подписей или этикеток по методу визуализации [3].

Однако метод 5S и визуализация не решают такие немаловажные проблемы, как перепроизводство и большое количество документов в электронном пространстве. Для их решения можно прибегнуть к следующим шагам и методам:

1. Переход на ЭДО и ЭПО (электронный документооборот, который позволит сразу и без печати актуализировать и подписывать документы).
2. Пользование онлайн-хранилищем.
3. Печатать документы на обеих сторонах листа (если для документа нет особых требований и стандартов).
4. «Система Точно-в-срок (Just-in-Time)» устанавливает требование печатать документы только при наличии реальной необходимости.
5. Использовать черновики (например, прямого запрета оформлять первичные документы на черновиках в законодательстве нет (ст. 9 Закона от 06.12.2011 № 402-ФЗ, п. 4–9 ФСБУ 27/2021)) [1].
6. Сканирование паспортов гостей и прикрепление скана к карточке гостя в программе (без печати).
7. Работа с миграционной службой через контур ФМС/скала ЕПГУ (проставление на миграционный учет российских и иностранных граждан через электронные сервисы).
8. Использование специализированных сканеров, которые считывают

информацию с паспортов и самостоятельно заполняют карточку гостя в программе и сервисе (скала ЕПГУ).

Несомненно, использование данных методов и инструментов способно принести положительный эффект для работы службы приема и размещения, однако у всего имеются особенности и сложности применения. Главная сложность применения состоит в человеческом факторе, т.е. самом человеке (сотруднике), у которого необходимо формировать новые привычки, поведение, образ действия и мысли, а не просто задать программу для выполнения. В связи с этим имеется риск долгого процесса внедрения концепции бережливого производства, постоянного контроля исполнения, поддержания и мотивации, как у руководителей, так и у сотрудников для внедрения. Помимо этого, потребуются финансовые затраты на подключения системы, приобретения оборудования, онлайн-хранилища и мебели.

Исходя из всего вышесказанного, можно сделать вывод о необходимости использования методов бережливого производства в организации рабочих процессов службы приема и размещения. При этом существует, с одной стороны, проблема преодоления сопротивления персонала изменениям, а с другой стороны, сложность убеждения владельцев бизнеса в необходимости дополнительных единовременных затрат на эргономические и процессные преобразования гостиничного предприятия.

Использованные источники:

1. Федеральный закон от 06.12.2011 N 402-ФЗ (ред. от 15.12.2025) "О бухгалтерском учете"
2. ГОСТ Р 56906-2016. Национальный стандарт Российской Федерации. Бережливое производство. Организация рабочего пространства (5S) (утв. и введен в действие Приказом Росстандарта от 31.03.2016 N 231-ст).
3. ГОСТ Р 56407-2023. Национальный стандарт Российской Федерации. Бережливое производство. Основные инструменты и методы их применения (утв. и введен в действие Приказом Росстандарта от 30.10.2023 N 1292-ст)
4. ГОСТ Р 56907-2016. Национальный стандарт Российской Федерации. Бережливое производство. Визуализация (утв. и введен в действие Приказом Росстандарта от 31.03.2016 N 232-ст)

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ЭНЕРГОСБЕРЕЖЕНИЕ И ПОВТОРНОЕ ИСПОЛЬЗОВАНИЕ ВОДЫ В СФЕРЕ ПРЕДОСТАВЛЕНИЯ ПРАЧЕЧНЫХ УСЛУГ

***Аннотация.** Статья рассматривает современные технологии и организационные решения, направленные на повышение энергоэффективности и внедрение систем повторного использования воды в коммерческих прачечных. Проанализированы методы снижения потребления электроэнергии за счёт оптимизации режимов стирки, применения высокоэффективного оборудования, рекуперации тепла и автоматизированного управления процессами. Особое внимание уделено технологиям водоподготовки, фильтрации, многоступенчатой очистки и циркуляции сточных вод, позволяющим существенно сократить расход свежей воды без ущерба для качества стирки. Рассматриваются экономические и экологические преимущества внедрения подобных решений, их влияние на себестоимость услуг и устойчивость предприятия. Представлены практические рекомендации по модернизации прачечных комплексов с учётом современных стандартов энергосбережения и ресурсной эффективности.*

***Ключевые слова:** энергосбережение, прачечные услуги, повторное использование воды, водоочистка, энергоэффективное оборудование, рекуперация тепла, ресурсосбережение, устойчивые технологии, оптимизация стирки.*

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ENERGY SAVING AND REUSE OF WATER IN THE PROVISION OF LAUNDRY SERVICES

***Abstract.** The article examines modern technologies and organizational solutions aimed at improving energy efficiency and implementing water reuse systems in commercial laundries. The methods of reducing electricity consumption by optimizing washing modes, using highly efficient equipment, heat recovery, and automated process control are analyzed. Special attention is paid to water treatment, filtration, multi-stage wastewater treatment and circulation technologies, which significantly reduce the consumption of fresh water without*

compromising the quality of washing. The economic and environmental advantages of implementing such solutions, their impact on the cost of services and the sustainability of the enterprise are considered. Practical recommendations for the modernization of laundry complexes, taking into account modern standards of energy saving and resource efficiency, are presented.

Keywords: *energy saving, laundry services, water reuse, water treatment, energy-efficient equipment, heat recovery, resource conservation, sustainable technologies, laundry optimization.*

Актуальность исследования. Проблема рационального использования энергоресурсов и воды в сфере прачечных услуг становится всё более значимой на фоне роста коммунальных тарифов, ужесточения экологических норм и увеличения объёмов потребления услуг стирки в бытовом и промышленном секторах.

Традиционные технологические процессы характеризуются высоким расходом электроэнергии и воды, что приводит к значительным эксплуатационным затратам и негативному воздействию на окружающую среду. Внедрение энергосберегающих технологий и систем повторного использования воды позволяет существенно сократить потребление ресурсов, повысить экономическую эффективность предприятий и снизить экологический след.

Актуальность исследования определяется необходимостью разработки оптимальных решений, позволяющих прачечным соответствовать современным требованиям ресурсосбережения и устойчивого развития.

Цель исследования. Цель исследования состоит в анализе существующих и перспективных технологий энергосбережения и повторного использования воды в коммерческих прачечных, а также в разработке практических рекомендаций по их интеграции в действующие технологические процессы с целью повышения эффективности, снижения затрат и уменьшения воздействия на окружающую среду.

Материалы и методы исследования. Материалами исследования служат данные о современных промышленных стиральных машинах, системах водоподготовки, технологиях фильтрации и рекуперации тепла, а также нормативные документы и статистические отчёты о потреблении ресурсов в прачечных.

В работе используются методы сравнительного анализа оборудования, оценки энергопотребления и водопотребления, изучения технических характеристик систем очистки и циркуляции воды, моделирования технологических схем и расчёта экономической эффективности внедрения энергосберегающих решений. Кроме того, применяются методы экспертной оценки и анализ практических кейсов модернизации прачечных комплексов, что позволяет сформировать комплексный подход к выбору оптимальных технологий.

Результаты исследования. История внедрения энергосберегающих технологий и повторного использования воды в прачечных тесно связана с развитием индустриального оборудования, ростом объёмов потребления коммунальных ресурсов и изменением экологических требований. На ранних этапах развития прачечных, в конце XIX – начале XX века, процессы стирки были преимущественно механизированы, но основывались на большом расходе горячей воды и ручном труде. Основной задачей было ускорение стирки, а не снижение затрат ресурсов, поэтому оборудование потребляло значительные объёмы воды и энергии [3].

Настоящий прорыв в области энергосбережения произошёл в начале XXI века с развитием систем рекуперации тепла и мембранных технологий очистки воды. Прачечные начали применять теплообменники, позволяющие использовать теплоту сточных вод для подогрева холодной воды, что снижало потребление энергии на нагрев. Параллельно внедрялись фильтрационные системы на основе ультрафильтрации и обратного осмоса, обеспечивающие глубокую очистку сточных вод и возможность их повторного использования в технологическом цикле без снижения качества стирки (табл. 1).

Таблица 1 – Подходы к определению сущности энергосбережения [2]

Автор	Сущность подхода
В.В. Ефремов, Г.З. Маркман	«Энергосбережение – реализация мер по повышению эффективности использования энергоресурсов, электрической и тепловой энергии»
В.С. Степанов	«Энергосбережение – следствие повышения эффективности энергоиспользования»
Б.В. Копейкин, Е.А. Смирнов	«Энергосбережение должно быть нацелено на экономию топлива за счет экономии конкретных видов энергии по этапам ее переработки»
А.А. Андрижиевский	«Энергосбережение – организационная, научная, практическая и информационная деятельность, направленная на эффективное использование энергетических ресурсов и реализуемая с применением технических, экономических и правовых методов»
О.Л. Данилов, П.А. Костюченко	«Энергосбережение – это система правовых, организационных, технических и экономических мер, направленных не только на эффективное использование первичных энергетических ресурсов, но и на вовлечение в хозяйственный оборот для снижения потребления органического топлива нетрадиционных и возобновляемых источников энергии»

Рост экологических стандартов, появление концепции устойчивого развития и ужесточение регулирования в 2010-е годы усилили мировой тренд на ресурсосбережение. Производители начали выпускать стиральные машины с интеллектуальными системами управления, которые автоматически подстраивают расход ресурсов под степень загрузки и тип загрязнения белья. Современные прачечные внедряют замкнутые

водооборотные циклы, в которых повторно используется до 70-90 процентов воды, а рекуперационные системы позволяют снижать энергопотребление на 30-50 процентов.

Комплексные меры экономии на прачечной действительно связаны с повышением производительности труда и оптимизацией технологических процессов. Основные направления экономии связаны со снижением потребления воды, энергии, увеличением производительности оборудования, вследствие чего наблюдается снижение расхода моющих средств.

Для примера можно привести традиционную прачечную, работающую на оборудовании с электронагревом. Важный момент, на который следует обратить внимание, если вы хотите сэкономить – подключение к горячей воде, так как при заливе холодной воды в стиральную машину, теряется много времени и энергии на нагрев. Средняя продолжительность стирки на весь ассортимент белья не должна превышать 60-70 минут.

Для экономии энергии также важно корректно использовать сушильные машины. Наиболее частая ошибка – это открывание дверцы сушильной машины в процессе сушки, что приводит к потере огромного количества энергии, и продлевает процесс сушки на 5 и более минут. В целом, для сушильного и гладильного оборудования, очень важна эффективность вытяжных систем, так как если сушильное или гладильное оборудование встречает сопротивление воздуха в вытяжной системе, скорость работы может уменьшаться в разы. Для завершения темы экономии энергии, важно сказать, что самые эффективные производства используют прямой газовый нагрев для гладильного и сушильного оборудования и газовые водонагреватели для подачи горячей воды в зону стирки. Паровой нагрев, так же имеет высокий КПД, но сама котельная требует огромных финансовых затрат.

В процессе стирки можно экономить время, воду и энергию за счет применения современных эффективных технологий. Например, для стирки хирургического белья оптимальным решением будет исключить предварительное полоскание белья в холодной воде и стирать его как обычное белье в две ванны. Первая ванна заполняется холодной водой с добавлением эмульгатора, который предотвращает заваривание белковых загрязнений.

Для стирки среднезагрязненного белого белья отелей, при использовании подогретой воды и комбинированного усилителя-эмульгатора, можно стирать при температуре 30° С, что позволяет сократить длительность программы до одного шага стирки в 10 минут и двух полосканий по 3 минуты. Итого, вместе с наполнением машины водой, сливом и отжимом программа займет не более 35-40 минут. Хочу обратить внимание, длительность наполнения сильно зависит от давления воды, диаметра труб и пропускной способности заливных клапанов [4].

Отметим, что современные технологии энергосбережения в сфере прачечных услуг представляют собой комплекс инженерных решений,

направленных на снижение эксплуатационных затрат, уменьшение нагрузки на коммунальные сети и повышение экологической устойчивости.

Одним из ключевых направлений стало внедрение систем рекуперации тепла, позволяющих использовать энергию горячих сточных вод для подогрева чистой воды, тем самым снижая потребность в электроэнергии или газе при нагреве до 30-50 процентов [1].

Интеллектуальные системы управления оборудованием играют не менее важную роль. Современные машины оснащены датчиками мутности, веса и химического состава воды, которые позволяют автоматически регулировать количество подаваемого моющего раствора, уровень воды и продолжительность циклов. Это снижает избыточное потребление, предотвращает перерасход химии и уменьшает количество стоков.

Кроме того, системы мониторинга в реальном времени позволяют контролировать расход воды и энергии, выявлять отклонения и оптимизировать работу оборудования. Прачечные, использующие подобные цифровые решения, добиваются сокращения ресурсопотребления в среднем на 20–30 процентов (рис. 1).

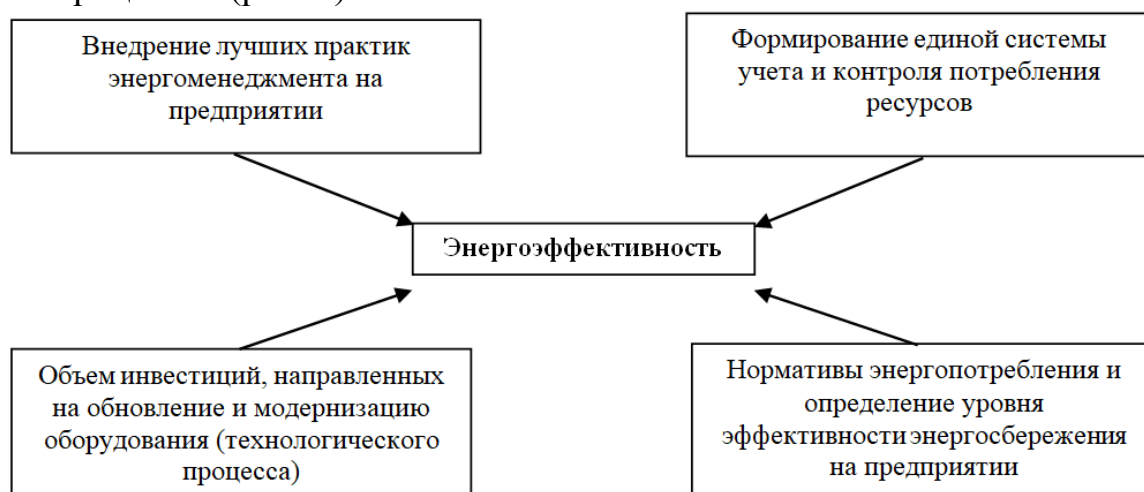


Рис. 1 – Факторы повышения энергоэффективности на предприятии

Значительное развитие получили технологии дозирования моющих средств, где автоматические станции подают точно рассчитанное количество химии в зависимости от состава белья и типа загрязнений. Это не только уменьшает расход воды, необходимой для полоскания, но и снижает общий объём загрязнённых стоков. В качестве дополнительной меры активно используется низкотемпературная стирка с применением ферментных средств, позволяющая экономить энергию без снижения качества обработки.

Следует отметить, что современные прачечные сталкиваются с целым комплексом проблем, затрудняющих внедрение и эффективную работу систем энергосбережения и повторного использования воды.

Одним из ключевых препятствий остаётся *высокая стоимость технологического оборудования*. Установка теплообменников, мембранных

систем очистки, озонаторов и интеллектуальных контроллеров требует значительных первоначальных инвестиций, которые особенно тяжело осуществить малым предприятиям.

Дополнительные расходы связаны с *заменой устаревших коммуникаций*, модернизацией электросетей и необходимостью регулярного технического обслуживания сложных аппаратов. Из-за этого многие прачечные продолжают работать на устаревших системах, потребляющих избыток воды и энергии.

Другой серьёзной проблемой является *сложность эксплуатации и обслуживания оборудования для водооборота*. Мембранные фильтры склонны к засорению остатками моющих средств, волокнами и жировыми соединениями, что снижает их эффективность и требует частой регенерации или замены.

Биологические системы очистки чувствительны к колебаниям температуры, химическому составу стоков и уровню pH, поэтому при нарушении баланса могут временно переставать работать. Озоновые генераторы требуют строгих мер безопасности и стабильных условий эксплуатации. В результате для корректного функционирования таких систем необходимо привлекать квалифицированных специалистов, что увеличивает затраты и усложняет организацию процесса.

Серьёзное препятствие создают и *нормативные ограничения*. В некоторых регионах требования к качеству очищенной воды слишком жёсткие для её многократного использования в технологическом цикле, а количество разрешённых к применению технологий строго ограничено. Экологические стандарты и санитарные нормы нередко обновляются, что заставляет предприятия проводить повторные проверки оборудования и корректировать процессы, что влечёт финансовые и организационные издержки. Неопределённость законодательства также сдерживает инвестиции в инновации.

Отдельным проблемным направлением остаётся *энергоэффективность*. Несмотря на наличие технологий рекуперации тепла, их реальная эффективность зависит от стабильности загрузки прачечной. В периоды низкой нагрузки уровень экономии резко снижается, а оборудование работает впустую, не окупая себя.

Также остаётся проблема *потерь энергии в сушильных процессах*, где внедрение систем утилизации тепла требует сложной перестройки вентиляционных контуров. Нередко энергосберегающие режимы в стиральных машинах не используются персоналом, поскольку они увеличивают продолжительность циклов и замедляют работу предприятия.

Проблемы в сфере энергосбережения и водооборота в прачечных обусловлены комплексом экономических, технологических, нормативных и эксплуатационных факторов. Несмотря на высокую эффективность современных решений, их внедрение требует значительных ресурсов, устойчивой инфраструктуры, грамотного управления и поддержки со

стороны регулирующих органов. Только при сочетании этих условий предприятия могут добиться устойчивой экономии и экологической эффективности.

По нашему мнению, решение проблем энергосбережения и повторного использования воды в сфере прачечных услуг требует комплексного подхода, сочетающего модернизацию оборудования, оптимизацию технологических процессов и совершенствование управления ресурсами.

Одним из наиболее эффективных направлений является внедрение современных систем очистки и рециркуляции воды, основанных на мембранных технологиях, многоступенчатой фильтрации и физико-химической обработке. Такие системы позволяют значительно сократить водопотребление, стабилизировать качество технологической воды и уменьшить нагрузку на канализационные сети. Для повышения эффективности их работы важно использовать предварительное удаление крупных загрязнений, контролировать состав моющих средств и поддерживать стабильный уровень pH, что уменьшает износ фильтров и позволяет увеличить ресурс систем.

Важную роль играет применение технологий энергосбережения. Использование теплообменников для утилизации тепла сточных вод, рекуператоров тепла в сушильных установках и интеллектуальных систем управления оборудованием позволяет существенно снизить энергозатраты.

Существенным шагом к решению проблем является выбор экологичных и низкопеннообразующих моющих средств, которые меньше загрязняют фильтры и облегчают процесс рециркуляции воды. Применение технологий озонирования и активации воды позволяет снизить потребность в химических реагентах и энергии за счёт более эффективного разрушения органических загрязнений. Такие методы повышают качество стирки, уменьшают количество ополаскиваний и снижают общий расход воды.

Большое значение имеет и организационный аспект. Регулярное техническое обслуживание оборудования, обучение персонала принципам ресурсосбережения и внедрение внутренних стандартов экологической эффективности позволяют обеспечить стабильность работы всех систем. Проведение энергетических и водных аудитов помогает выявлять слабые места, корректировать технологические схемы и принимать обоснованные решения о модернизации. Кроме того, использование систем мониторинга в режиме реального времени позволяет отслеживать расход воды и энергии, быстро реагировать на утечки, перегрузки и отклонения параметров.

Комплексное сочетание технических, организационных и управленческих решений позволяет эффективно преодолеть проблемы энергосбережения и водооборота в прачечных. Опираясь на современные технологии, грамотное управление и соблюдение нормативных требований, предприятия получают возможность снизить расходы, повысить экологическую устойчивость и улучшить качество предоставляемых услуг.

Заключение. Решение проблем энергосбережения и повторного использования воды в сфере прачечных требует продуманного и комплексного подхода, опирающегося на современные технологии и грамотную организацию процессов.

Применение энергоэффективного оборудования, систем рециркуляции и очистки воды, а также тепловой рекуперации позволяет существенно снизить эксплуатационные расходы и уменьшить воздействие на окружающую среду. Не менее важным остаётся внедрение автоматизированных систем контроля, обучение персонала и регулярный аудит производственных процессов, что обеспечивает стабильность работы и своевременное выявление отклонений.

Совмещение технических решений с управленческими мерами делает возможным достижение высокой экологической эффективности без ущерба для качества услуг. Такой подход создаёт условия для устойчивого развития предприятий, повышения их конкурентоспособности и выполнения современных требований ресурсосбережения.

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ВЛИЯНИЕ КАДРОВОЙ БЕЗОПАСНОСТИ НА ЭКОНОМИЧЕСКУЮ БЕЗОПАСНОСТЬ КОМПАНИИ

Аннотация: для эффективной работы компаний информация приобретает всё больший приоритет как ресурс, а конкуренция становится глобальной, понятие экономической безопасности компании выходит далеко за рамки финансовой устойчивости и защиты материальных активов. В статье рассмотрены каналы влияния кадровой безопасности на экономическую безопасность и роль человеческого фактора в обеспечении экономической безопасности.

Ключевые слова: кадровая безопасность, экономическая безопасность, кадровые риски, промышленный шпионаж.

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THE IMPACT OF HUMAN RESOURCES SECURITY ON A COMPANY'S ECONOMIC SECURITY

Abstract: For the effective operation of companies, information is becoming increasingly important as a resource, and competition is becoming global. The concept of economic security goes far beyond financial stability and the protection of tangible assets. This article explores the impact of human resources security on economic security and the role of the human factor in ensuring economic security.

Key words: personnel security, economic security, personnel risks, and industrial espionage.

Кадровая безопасность - это комплекс мер по защите организации от рисков, связанных с персоналом, таких как разглашение конфиденциальной информации, кража, мошенничество и некомпетентность [1]. В нынешних реалиях, где информация приобретает всё больший приоритет как ресурс, а конкуренция становится глобальной, понятие экономической безопасности компании выходит далеко за рамки финансовой устойчивости и защиты материальных активов.

Как отмечали Т.О. и В.Г. Соломадины «Всякий бизнес только тогда

имеет ценность, когда он надежно защищен. При этом различные бизнес-процессы должны защищаться необходимыми именно для него методами и средствами. Поэтому система корпоративной безопасности компании состоит из ряда подсистем, взаимосвязанных между собой» [2].

На современном этапе развития экономической безопасности компании неотъемлемой и критически важной составляющей является кадровая безопасность. Под последней понимается комплекс мер, направленных на сокращение издержек и рисков, связанных с персоналом: от утечки коммерческой тайны и саботажа до некомпетентности и внутреннего мошенничества.

Таким образом, кадровая безопасность является одним из ключевых элементов экономической безопасности компании, влияя на её финансовое состояние, репутацию, конкурентоспособность и долгосрочное развитие.

Экономическая безопасность компании - защищённость её важнейших подразделений и интересов от внутренних и внешних угроз. Кадровая безопасность, являясь одной из составляющих экономической безопасности, фокусируется на главном источнике, как рисков, так и возможностей: на работниках.

Человеческий фактор представляет уязвимость, хоть изредка и становится источником неожиданного успеха. Недовольный, нелояльный или неответственный сотрудник способен нанести ущерб, сопоставимый с действиями внешнего конкурента или масштабным рыночным кризисом.

Таким образом, влияние кадровой безопасности на экономическую безопасность проявляется через несколько ключевых каналов.

Наиболее очевидное влияние - финансовое, а именно: утечка информации о новых продуктах, стратегических планах, клиентской базе, несоблюдение техники безопасности или технологии производства может привести к расходам на ликвидацию инцидента. В первую очередь это связано с расходами на:

- восстановление систем и оборудования,
- судебные издержки,
- штрафы,
- писание сырья и закупка нового,
- внутреннее мошенничество, к которому относится хищение средств, манипуляции с отчётностью, коррупционные схемы.

В постиндустриальной экономике современного мира ценность компании всё чаще определяется её нематериальными активами:

- брендом,
- репутацией,
- корпоративной культурой,
- интеллектуальной собственностью.

Кадровые риски способны уничтожить эти активы. Скандал, связанный с действиями сотрудника таких как дискриминация, харассмент, коррупция, банальное невыполнение своих задач, мгновенно становится достоянием

общественности через социальные сети.

Падение доверия клиентов, партнёров и инвесторов напрямую сказывается на рыночной стоимости компании и её способности привлекать капитал и таланты.

Отсутствие внимания к внутреннему климату компании, несправедливая система мотивации, суровое руководство ведут к росту текучести кадров. Высокая текучесть, особенно среди ключевых специалистов - это колоссальные издержки на подбор и адаптацию новых сотрудников.

Под кадровой безопасностью понимают не только защиту, но и управление рисками, связанными с компетентностью и лояльностью.

По мнению Н.В. Кузнецовой с позиции обеспечения кадровой безопасности «важной задачей представляется систематизация основных угроз со стороны персонала организации и в его адрес, реализация которых может нанести потенциальный или реальный ущерб» [4].

Защита от некомпетентности, поможет минимизировать некоторые риски. Неквалифицированные или необученные сотрудники на критических позициях охрана и безопасность, снабжение, финансовое планирование могут по незнанию совершить ошибки, ведущие к технологическим сбоям, финансовым потерям или авариям.

Уход ключевых специалистов к конкурентам, особенно целыми командами, ставит под угрозу выполнение стратегических проектов, минимальных планов, жизнь организации.

Программы удержания талантов, non-compete соглашения (в рамках закона), создание среды для роста представляют меры по защите ключевых компетенций сотрудников.

Промышленный шпионаж, который проявляется в том, что конкуренты или злоумышленники часто используют персонал как канал для получения информации. Эффективная система безопасности персонала представляет собой проверку при приёме на работу и постоянный мониторинг сотрудников.

Таким образом, анализ влияния кадровой безопасности на экономическую безопасность компании подтверждает их неразрывную и стратегическую взаимосвязь.

В заключение, опираясь на позицию авторов А.П. Андруник, М.Н. Руденко, А.Е. Суглобов можно утверждать, что «современный подход последовательно выходит за рамки традиционного контроля и подозрительности» [1].

Как отмечают исследователи, ключом к обеспечению кадровой, а, следовательно, и экономической безопасности становится управление на основе инновационных технологий и проактивных методов.

Это означает эволюцию от простого «фильтра» рисков при найме к построению целостной системы, интегрированной в стратегию развития компании.

Как подчёркивают Андруник и соавторы, «такая система нацелена не на

подавление, а на создание условий, при которых сама корпоративная среда минимизирует риски и максимизирует лояльность» [1].

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АНАЛИЗ ПРОЕКТИРОВОЧНЫХ РЕШЕНИЙ КУХНИ ПРЕДПРИЯТИЯ ОБЩЕСТВЕННОГО ПИТАНИЯ В РАЗРЕЗЕ ЭФФЕКТИВНОСТИ ТЕХНОЛОГИЧЕСКИХ ПРОЦЕССОВ

***Аннотация.** В статье рассмотрены проектировочные решения кухни на примере различных предприятий общественного питания (ресторан гостиничного предприятия и кофейни демократичного формата). Сформулированы практические рекомендации по повышению производительности труда на основе эффективных проектировочных решений.*

***Ключевые слова:** технологический процесс, проектировочное решение, затраты времени, оптимизация*

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ANALYSIS OF DESIGN SOLUTIONS FOR A CATERING ENTERPRISE KITCHEN IN THE CONDITION OF THE EFFICIENCY OF TECHNOLOGICAL PROCESSES

Abstract: *The article examines kitchen design solutions in terms of the efficiency of technological processes using the example of various public catering establishments (a hotel restaurant and a democratic coffee shop). Practical recommendations for increasing labor productivity based on design solutions are formulated.*

Keywords: *technological process, design solution, time consumption, optimization*

Введение. Успешное функционирование предприятий общественного питания зависит от многих вещей: интересной привлекательной концепции, локации ресторана, маркетинговых инструментов продвижения услуг и привлечения гостей. Но есть еще одно важнейшее направление – оптимизация процессов, повышение эффективности деятельности персонала и снижение затрат. По мнению экспертов 80% затрат ресторана формируется на кухне. Поэтому так важно проанализировать проектировочные решения кухни как производственного пространства реализации технологических процессов кухни.

Методология исследования. Мы сформулировали основной принцип процессного подхода в организации пространства: определить, что здесь делают и какая последовательность работы. Базовым документом кухни, определяющим проектировочные решения и нашу методологию, является технико-технологическая карта, документ в котором описан процесс приготовления блюда. Для определения качества планировочных решений необходимо «наложить» процесс приготовления блюда, описанный в технологических картах, на пространство кухни. Таким образом мы сможем выявить точки пространства, где происходит замедление процессов, или возникновение прочих проблем (санитарно-гигиенических, пересечение потоков, поломки, затраты на дополнительные действия и пр.). Объектами нашего исследования выбраны кухня ресторана гостиничного предприятия «Котьярд» (Ростов-на-Дону) и ряд предприятий общественного питания демократичного формата в том же городе. «Котьярд» изначально проектировался под свою основную функцию, в то время как кофейни сети «Кекс» часто располагаются в помещениях, адаптированных под новую функцию предприятия питания. Предполагаем, что производственное пространство таких предприятий имеет ошибки, связанные с непрофильным проектированием что создает проблемы для реализации процессов.

Результаты исследования. После тщательного рассмотрения размеров и расстояний, становится ясно, что кухня ресторана в отеле «Котьярд» как производственная зона грамотно спроектирована. На каждом из этапов производства происходит минимальное количество потерь времени. К

примеру, потраченное на подготовку сервировочной тарелки поваром время может быть компенсировано, если заранее в зоне раздачи подготовить некоторое количество разной посуды. Проведя анализ оснащения ресторана, были также сделаны следующие выводы: вся техника соответствует современным стандартам пищевого производства, находится в исправном состоянии и оптимально адаптирована к рабочей нагрузке ресторана. Весь инвентарь удобно расположен для комфортной работы. Ключевые инструменты (ножи, доски, терки) размещены в зоне быстрого доступа, что минимизирует простои в работе. Кроме того, наличие специализированного оборудования, такого как вакууматор и протирочная машина, позволяет стандартизировать процессы приготовления и сократить время на подготовку полуфабрикатов. Все элементы оснащения проходят регулярное техническое обслуживание, что подтверждается журналом проверок и отсутствием сбоев в работе. Что касается планировки, то разделение кухни на функциональные зоны позволяет оптимизировать перемещение персонала и товаров, сокращая время, затрачиваемое на выполнение различных задач.

Кофейня-пекарня «КЕКС» представляет собой современное заведение, объединяющее в себе искусство приготовления кофе и свежей выпечки. При этом современные потребители стали более требовательными – они обращают внимание не только на вкусовые качества продукции, но и на безопасность, скорость обслуживания, а также общий комфорт пребывания в заведении. Эргономика пространства в кофейне-пекарне «КЕКС» требует детального рассмотрения, поскольку текущая планировка содержит ряд существенных недостатков, влияющих на эффективность работы, безопасность персонала и соблюдение санитарных норм. Основные проблемы сосредоточены в зонировании, организации рабочих процессов и соблюдении требований НАССР.

В зоне приготовления кофе расположены кофемашина, холодильник для молочных продуктов и сиропов, а также рабочее место бариста. Главная проблема – теснота. Расстояние между кофемашиной и холодильником недостаточное, что вынуждает бариста совершать лишние движения, замедляя процесс приготовления напитков. Кроме того, сиропы и топпинги хранятся в отдаленном шкафу, из-за чего сотруднику приходится отвлекаться от основного рабочего места. Серьезное нарушение НАССР наблюдается в отсутствии выделенной поверхности для грязной посуды – использованные кружки и стаканы часто оказываются рядом с чистыми, что создает риск перекрестного загрязнения.

Зона выпечки, включающая стол для замеса теста, печь и расстоечный шкаф, также имеет значительные недочеты. Наиболее критичная проблема – расположение печи в непосредственной близости от холодильника. Это приводит к перегреву холодильного оборудования, увеличению энергопотребления и потенциальному нарушению температурного режима хранения продуктов. Проход между печью и рабочим столом слишком узкий (менее 80 см), что не только затрудняет перемещение сотрудников с горячими

противнями, но и создает угрозу ожогов. Еще одно упущение – отсутствие четкого разделения зон для сырого и готового теста, что противоречит принципам НАССР и повышает риск микробиологического загрязнения.

Особого внимания заслуживает зона мойки, которая в текущей планировке расположена крайне неудачно – в углу помещения, в отдалении от основных рабочих зон. Это вынуждает персонал переносить грязную посуду через всю кухню, пересекая зоны приготовления и хранения. Подобная организация потока явно нарушает санитарные нормы, так как увеличивает вероятность контакта грязной посуды с чистыми поверхностями и продуктами. Отсутствие отдельной раковины исключительно для мытья рук – еще одно грубое нарушение, которое необходимо устранить в первую очередь.

Зона хранения также требует пересмотра. В текущем варианте сырые и готовые продукты зачастую хранятся вместе, что категорически запрещено стандартами НАССР. Отсутствие системы маркировки FIFO (первый пришел – первый ушел) приводит к тому, что персонал не всегда может оперативно отследить сроки годности, а перегруженные стеллажи усложняют поиск нужных ингредиентов и создают риск падения упаковок. Что касается зоны обслуживания клиентов, то здесь основная проблема заключается в том, что очередь у кассы часто перекрывает проход на кухню, мешая сотрудникам оперативно доставлять ингредиенты. Кроме того, недостаточное освещение витрины снижает привлекательность товаров и увеличивает время принятия решения покупателями.

Заключение. Для устранения выявленных недостатков необходимо предпринять ряд мер. В первую очередь, требуется перепланировка пространства с расширением проходов до 90-100 см, особенно в зоне между печью и холодильником. Мойку следует перенести ближе к выходу с кухни, организовав отдельный «грязный» контур, а также установить дополнительную раковину исключительно для мытья рук. Для соблюдения принципов НАССР необходимо ввести цветную маркировку инвентаря (например, красный для сырых продуктов, зеленый – для готовых) и разделить холодильное оборудование по типу хранимой продукции. Установка вытяжки над печью снизит тепловую нагрузку на холодильник, а внедрение журналов контроля температуры поможет соблюдать требования к хранению скоропортящихся продуктов.

Внедрение системы НАССР (Hazard Analysis and Critical Control Points) необходимо для минимизации рисков, связанных с безопасностью пищевых продуктов. В кофейне «Кекс» возможны следующие нарушения, которые могут привести к порче продуктов, пищевым отравлениям или снижению качества блюд.

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**ФАКТОРЫ, ВЛИЯЮЩИЕ НА ЭФФЕКТИВНОСТЬ
ОРГАНИЗАЦИОННОГО ВЗАИМОДЕЙСТВИЯ В УСЛОВИЯХ
УДАЛЁННОЙ РАБОТЫ, И СТРАТЕГИИ ИХ ОПТИМИЗАЦИИ — С
УЧЁТОМ РЕГУЛИРУЮЩЕГО ЭФФЕКТА ТЕХНОЛОГИЙ
СОВМЕСТНОЙ РАБОТЫ**

Аннотация: с нормализацией удалённой работы в постпандемический период организационная коммуникация сталкивается с беспрецедентными вызовами. Целью данного исследования является систематический анализ ключевых факторов, влияющих на эффективность коммуникации в отдалённых условиях, а также изучение модулирующего влияния технологий сотрудничества. Кроме того, предлагается комплексная модель оптимизации. В данном исследовании с использованием смешанного метода, включающего анализ литературы, кейс-стадии и дедуктивное рассуждение, выявляются ключевые препятствия и механизмы. Результаты показывают, что основными вызовами являются асинхронное взаимодействие, фрагментация информации и ослабление социальной присутственности. Тем не менее такие технологии, как видеоконференции и инструменты управления проектами (например, Asana, Trello), способны эффективно снизить эти проблемы за счёт повышения прозрачности информации и синхронизации процессов. На этой основе исследование разрабатывает оригинальную трёхмерную модель оптимизации «Технология–Персонал–Учреждение». Эта модель предлагает практические стратегии для организаций по повышению эффективности коммуникации: интеграция технологических инструментов, переосмысление подходов сотрудников к сотрудничеству и формирование чётких институциональных норм.

Ключевые слова: удалённая работа, организационная коммуникация, эффективность коммуникации, технологии совместной работы, инструменты управления проектами, видеоконференции, цифровая совместная работа

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THE INFLUENCING FACTORS AND OPTIMIZATION STRATEGIES OF ORGANIZATIONAL COLLABORATION EFFICIENCY IN THE REMOTE WORK ENVIRONMENT-BASED ON THE MODERATING EFFECT OF COLLABORATIVE TECHNOLOGY

Abstract: *With the normalization of remote work in the post-pandemic era, organizational communication faces unprecedented challenges. This study aims to systematically analyze the key factors affecting communication efficiency in remote settings and explore the moderating role of collaboration technologies. It further proposes a comprehensive optimization model. Employing a mixed-methods approach combining literature analysis, case studies, and deductive reasoning, this research identifies core obstacles and mechanisms. The findings reveal that asynchronous collaboration, information fragmentation, and weakened social presence are primary challenges. However, technologies like video conferencing and project management tools (e.g., Asana, Trello) can actively mitigate these issues by enhancing information transparency and process synchronization. Building on this, the study constructs an original "Technology-Personnel-Institution" three-dimensional optimization model. This model provides actionable strategies for organizations to enhance communication efficiency by integrating technological tools, reshaping employee collaboration mindsets, and establishing clear institutional norms.*

Keywords: *remote work, organizational communication, communication efficiency, collaboration technology, project management tools, video conferencing, digital collaboration*

1. Введение

С начала глобальной пандемии дистанционная работа перешла от статуса чрезвычайной меры к статусу нормального рабочего режима во многих организациях. Этот переход, обеспечивая гибкость и потенциальную экономию, одновременно ставит перед традиционными механизмами корпоративного общения фундаментальные вызовы. В условиях физической дистанции мгновенность, разнообразие и неформальность общения существенно ослабевают. «Информационные острова», задержки в сотрудничестве, снижение ощущения присутствия в коллективе и, как следствие, возникновение у сотрудников чувства выгорания стали распространёнными проблемами[6]. Например, исследование удалённых команд показало, что более 67 % задержек в проектах обусловлены несинхронизацией информации[7].

В этом контексте технологии совместной работы, такие как видеоконференции, мгновенные сообщения (IM), программы управления проектами (например, Asana, Trello) и облачные платформы для документов, рассматриваются как ключевые инструменты для поддержания и повышения эффективности удалённого взаимодействия. Эти технологии призваны с

помощью цифровых средств имитировать или усилить личное общение, объединяя разрозненных сотрудников в единый виртуальный рабочий пространство[8][10]. Однако простое накопление технологий не обязательно повышает эффективность. Напротив, при отсутствии эффективной интеграции и чётких правил использования избыток инструментов может привести к «бесконечным совещаниям и бесконечным сообщениям», что усугубляет коммуникационную неясность и цифровую перегрузку.[6].

Таким образом, цель данного исследования — глубоко проанализировать ключевые вопросы: какие факторы влияют на эффективность организационного общения на фоне нормализации удалённой работы? Какую роль играют в этом сопутствующие технологии? Усугубляют ли они проблемы или, напротив, способствуют устранению коммуникационных барьеров? Что ещё важнее — как системно создать оптимизированную структуру, объединяющую технологии, персонал и институциональные механизмы, с целью максимального усиления положительного регулирующего эффекта синергетических технологий? В данном исследовании, объединяя существующие практические примеры и теоретический анализ,

2. Методы и методология исследования

Для системного решения вышеуказанных исследовательских вопросов в настоящем исследовании применяется комплексный методологический подход, основанный преимущественно на качественном анализе и включавший кейс-стадии, который реализуется в три этапа:

Первый этап: обработка литературы и анализа кейсов (выявление проблем и анализ текущего положения). Была проведена обширная сборка и анализ литературы на китайском и английском языках за последние три года по темам удалённой работы, организационной коммуникации, внедрения технологий и использования инструментов совместной работы. Особое внимание уделено отчётам и кейсам, основанным на практике предприятий, включая исследование Гарвардского бизнес-журнала о нормах коммуникации[6], Описание функций и результатов совместной платформы Хуаньсинь ИМ и Чжиюань Хулянь[2][5], а также применение Filez в управлении проектами[7]. Цель на данном этапе — выявить ключевые проблемы дистанционного взаимодействия, такие как асинхронность и фрагментация информации, а также проанализировать достоинства и недостатки существующих технических решений, с тем чтобы заложить основу для построения теоретической модели.

Второй этап: выявление ключевых факторов и анализ механизмов их действия (основа для построения модели). На основе анализа первого этапа в данном исследовании выявлены три основные категории ключевых факторов, влияющих на эффективность дистанционного взаимодействия. 1. Технические факторы инструментов: степень интеграции инструментов (создана ли единая платформа), функциональная совместимость

(поддерживается ли определённая сценария совместной работы) и пользовательский опыт (простота использования и стабильность)..

2. Человеческие и командные факторы: цифровая грамотность сотрудников, их привычки общения, уровень командного доверия, а также особенности, характерные для удалённой работы — так называемая «ударность от видеоконференций» (Zoom Fatigue) и тревожность перед социальным взаимодействием.[9].

3. Факторы организационной структуры: включают наличие чётких ожиданий в области коммуникации и реагирования, нормативов использования коммуникационных каналов, системы управления собраниями и процесса накопления знаний[6].

В данном исследовании отмечается, что синергетические технологии не действуют в изоляции, а модулируют коммуникационные барьеры в рамках взаимодействия «характеристики инструмента — поведение в использовании — институциональная среда». Например, хорошо продуманный инструмент управления проектами, такой как DingTalk Tower, может активно снижать коммуникационные трудности, вызванные поиском информации и неясностью состояния, благодаря функциям доски задач и ассоциации файлов[4].

Третья стадия: построение трёхмерной оптимизированной модели и стратегическое планирование (предложение решений). На основе чёткого определения всех факторов и их взаимодействий в исследовании проводится теоретическая интеграция и инновации, в результате чего оригинально формируется модель «технология-персонал-институт» (Technology-Personnel-Institution, трёхмерная оптимизационная модель TPI. Эта модель выходит за рамки подхода, ориентированного исключительно на технические инструменты, и предлагает синергетическое вмешательство по трём направлениям и системную оптимизацию для создания совместного эффекта повышения эффективности дистанционного взаимодействия. В последующих главах подробно рассматриваются суть модели и конкретные стратегии оптимизации по каждому из этих направлений.

3. Оригинальные результаты исследования: регулирующее воздействие синергетических технологий и трёхмерная модель «технология–персонал–институт»

На основе глубокого анализа ситуаций удалённой работы и коммуникации исследование показало, что технологии совместной работы играют ключевую регулирующую роль в преодолении коммуникативных барьеров через следующие механизмы, на их основе была построена системная модель оптимизации.

3.1 Механизм регуляции ключевых коммуникативных барьеров с помощью синергетических технологий

Исследование показывает, что тройная модель «коммуникация — задача — документ» позволяет устранить «пробелы в информационном потоке» в процессе[4][7]. Исследование показывает, что тройная модель

«коммуникация — задача — документ» позволяет устранить «пробелы в информационном потоке» в процессе[2].

Регулирование «непрозрачности процесса и «чёрного ящика» срока выполнения»: удалённые руководители зачастую не могут оценить ход работы. Инструменты управления проектами предлагают визуальные доски (Kanban) и дисплеи с текущим прогрессом, которые прозрачно отображают состояние, степень выполнения и взаимозависимости отдельных задач. Благодаря такому «визуальному взаимодействию» члены команды могут синхронизировать ход работ без частых совещаний или запросов, а руководители — быстро выявлять узкие места.[2][8]. Например, производственная компания с помощью платформы совместной работы получила полную картину хода проекта, а эффективность межотделовой коммуникации выросла на 80%[7].

Регуляция «слабого социального присутствия и трудностей с установлением доверия»: чисто текстовое общение склонно к недопониманию и не предусматривает неформального взаимодействия. Видеоконференции и ИМ-инструменты с поддержкой богатых медиа (аудио, видеоклипов, совместного просмотра экрана) частично восстанавливают неязыковые сигналы и мгновенную интерактивность, способствуя формированию эмоциональной связи. Однако следует учитывать, Неправильное использование (например, постоянное включение камеры) может привести к усталости от видеоконференций[9]. Более продвинутые «виртуальные рабочие места» или интеллектуальные функции, такие как интеллектуальное маршрутизирование на основе состояния, призваны создавать более естественное ощущение совместной работы на расстоянии[3][5].

Регулирование «трудностей с накоплением и передачей знаний»: уход сотрудников или смена проектов часто приводят к утрате знаний. Совместная платформа автоматически архивирует весь процесс проекта — документы, записи диалогов, журналы принятия решений — и формирует поисковую, повторно используемую организационную базу знаний[2][4]. Это привело к смене подхода к управлению знаниями — от пассивного архивирования к активному накоплению, позволив олицетворить скрытые знания и обеспечить непрерывность организационной памяти.

3.2 Создание трёхмерной оптимизационной модели «технология — персонал — система»

На основе анализа вышеуказанных механизмов регулирования в настоящем исследовании предполагается, что для максимальной эффективности синергетических технологий необходимо применять системное управление, а не изолированное внедрение инструментов. В связи с этим была разработана трёхмерная оптимизационная модель ТРІ, показанная на рис. 1.

(1Технологический аспект: от простого накопления инструментов к интегрированному «пространству цифрового сотрудничества»

Суть оптимизации заключается в создании единой, интеллектуальной и ориентированной на сценарии цифровой рабочей платформы, а не в использовании множества разрозненных индивидуальных инструментов.[10].

Интеграция на платформенной основе: углублённая интеграция ключевых инструментов совместной работы — таких как мессенджер, видеоконференции, управление проектами, облачные документы и облачные хранилища — с целью обеспечения взаимодействия между аккаунтами, данными и уведомлениями и снижения затрат на переключение между ними.[8][10]. Например, можно тесно интегрировать файловый сервис Filez с системой управления задачами Jira, чтобы обеспечить взаимосвязь между файлами и задачами[7].

Сценарное настраивание: для типичных сценариев совместной работы (например, оценка проектов, взаимодействие между подразделениями, дистанционное обучение) разрабатываются специальные шаблоны и процессы, в которые интегрируются лучшие практики[2].

Например, с помощью шаблона «Проектное пространство» в совместной платформе можно быстро запустить новый проект с чёткой структурой и чётким распределением обязанностей и полномочий.[4].

Интеллектуальная поддержка: внедрение технологий искусственного интеллекта — автоматическое создание протоколов совещаний, интеллектуальное обобщение диалогов, интеллектуальное распределение задач и прогнозирование рисков — позволяет сотрудникам освободиться от обработки низкодоходной информации и сосредоточиться на принятии решений и творческой деятельности[5].

(2) Человеческий аспект: переход от пассивной адаптации к активному освоению цифровой компетентности в сотрудничестве. Использование технологий в конечном счёте зависит от пользователей. Организация должна активно развивать цифровую компетентность сотрудников в области сотрудничества. Обучение навыкам и руководство: не только освоение инструментов, но и развитие навыков дистанционного общения (включая эффективные методы проведения встреч и правила асинхронного взаимодействия), методы работы на основе досок управления (например, агилный разработчик) и стратегии управления временем и определения границ в цифровую эпоху.

Смена ментальной модели: поощрять сотрудников к формированию привычки сотрудничать активно, прозрачно, с приоритетом асинхронных действий и оформлением в письменной форме. Руководителям следует переходить от роли контролёра процессов к роли лидера и эмпайлора, доверяя систематическому и прозрачному представлению, а не постоянному присутствию в сети. Обращайте внимание на психологическое благополучие: признать и противостоять усталости от видеоконференций[9] и чувство социальной изоляции. Рекомендуется использовать режим «тихо» или виртуальный аватар, когда это необходимо, чтобы снизить уровень

тревожности[9], рекомендуется организовывать онлайн-мероприятия, не связанные с рабочей деятельностью, чтобы укреплять сплочённость команды.

(3) Коммуникационный кодекс: переход от расплывчатых соглашений к чёткому консенсусу

Цифровое сотрудничество без чётких правил неизбежно ведёт к хаосу. Организация должна создать чёткую систему цифровой коммуникации.[6]. Нормы коммуникации: чётко определить официальные задачи каждого инструмента общения и ожидаемые сроки ответа. Например, для экстренных вопросов — телефон или мессенджер (ответ в течение 2 часов), для неэкстренных — электронная почта (ответ в течение 24 часов). Обновления в рамках проектного взаимодействия осуществляются в инструментах управления проектами, а передача важной информации в частных чатах запрещена.[6].

Правила проведения совещаний: разработать правила дистанционных совещаний, включая обязательное наличие чёткого повестки дня и материалов для изучения до начала; строго контролировать продолжительность и количество участников; поощрять применение принципа «асинхронное — приоритет», при котором, если вопрос можно решить в комментариях к документу, совещание не проводится; использовать видеоконференции с осторожностью и уважать личные выборы участников[9].

Система интеллектуальной собственности и безопасности: чёткое определение права собственности на результаты работы, созданные на совместной платформе; разработка строгой политики защиты данных и конфиденциальности, а также внедрение детализированного контроля доступа к документам и операций с правами[7]; Организация процесса передачи знаний и возврата полномочий при увольнении сотрудников[4].

4. Заключение и рекомендации

В ходе глубокого анализа эффективности организационного взаимодействия в условиях дистанционной работы исследование выявило следующие ключевые выводы:

Прежде всего, основные барьеры в дистанционном обмене информации обусловлены разрывом между временем и пространством, что проявляется в асинхронности, фрагментарности, непрозрачности процесса и отсутствии ощущения присутствия. Современные технологии совместной работы, такие как видеоконференции, инструменты управления проектами и облачные платформы совместной работы, способны эффективно справляться с вышеуказанными трудностями, обеспечивая единый контекст, визуальное отслеживание, интерактивные функции с использованием мультимедиа и автоматическую архивацию.

Во-вторых, положительная эффективность технологий не реализуется автоматически. В данном исследовании впервые предложена трёхмерная оптимизационная модель «технологии–персонал–система», которая

указывает, что повышение эффективности дистанционного взаимодействия представляет собой системный процесс. Организация должна:

На техническом уровне мы стремимся создать интегрированное, сценарно-ориентированное и интеллектуальное «цифровое пространство для сотрудничества», преодолевая изоляцию инструментов.[10].

2. На уровне персонала необходимо системно повышать цифровую компетентность сотрудников в области сотрудничества, способствуя модернизации их менталитета и рабочих привычек.

3. На институциональном уровне необходимо разработать чёткий, общепризнанный и реализуемый «основной кодекс коммуникации», в котором будут чётко определены правила и ожидания в цифровой рабочей среде.[6].

Результаты данного исследования имеют прямую практическую ценность для организаций, стремящихся повысить эффективность удалённой команды в постпандемический период. Руководители могут с помощью модели TPI провести диагностику текущего состояния удалённого сотрудничества в организации и разработать план совместного улучшения по трём направлениям. Например, можно начать с создания единой технологической платформы и упрощения стандартов реагирования на каналы, а затем постепенно переходить к обучению и формированию корпоративной культуры. В будущих исследованиях можно будет применить эмпирические методы для

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ИССЛЕДОВАНИЕ ПОСРЕДНИЧЕСКОГО ЭФФЕКТА ЦИФРОВОЙ ГРАМОТНОСТИ СОТРУДНИКОВ НА РЕЗУЛЬТАТИВНОСТЬ ИННОВАЦИЙ В ОРГАНИЗАЦИИ — С ПОЗИЦИЙ ОРГАНИЗАЦИЙ, ОРИЕНТИРОВАННЫХ НА ОБУЧЕНИЕ

Аннотация: В эпоху цифровой экономики цифровая грамотность сотрудников стала ключевым фактором, влияющим на инновационную активность и конкурентоспособность организаций. В настоящем исследовании анализируется влияние цифровой грамотности сотрудников на инновационную эффективность организации, а также, с точки зрения концепции организаций, ориентированных на обучение, проверяется посредническая роль культуры обучения в этой взаимосвязи. В исследовании использовался метод анкетирования, а данные сотрудников из 23 организаций различных отраслей — включая технические, финансовые и медицинские сферы — анализировались с помощью модели структурных уравнений. Результаты показывают, что цифровая грамотность сотрудников оказывает значимое положительное влияние на инновационную эффективность организации (коэффициент путьвого эффекта $\beta = 0,525$, $p < 0,001$), при этом культура организационного обучения играет ключевую посредническую роль в этом пути влияния. Исследование показало, что создание организационной структуры, способствующей обмену знаниями и непрерывному обучению, является основой для расширения ценности цифровых навыков сотрудников и стимулирования системных инноваций в организации. Данное исследование углубило понимание механизмов взаимодействия между цифровым человеческим капиталом и организационными инновациями, предоставляя руководителям теоретическую основу и практические рекомендации по формированию организаций, ориентированных на обучение, и повышению эффективности инноваций в процессе цифровой трансформации.

Ключевые слова: эффективность организационных инноваций, цифровая грамотность сотрудников, обучаемая организация, промежуточный эффект, модель структурных уравнений, управление человеческими ресурсами

**RESEARCH ON THE MEDIATING EFFECT OF EMPLOYEES'
DIGITAL LITERACY ON ORGANIZATIONAL INNOVATION
PERFORMANCE-BASED ON THE PERSPECTIVE OF LEARNING
ORGANIZATION**

Abstract: *In the digital economy era, employees' digital literacy has become a key determinant of organizational innovation and competitiveness. This study investigates how digital literacy impacts organizational innovation performance and examines the mediating role of organizational learning culture through the lens of learning organizations. Using structural equation modeling with questionnaire surveys, we analyzed data from 23 organizations across multiple industries including technology, finance, and healthcare. Results demonstrate that digital literacy significantly enhances organizational innovation performance (path coefficient $\beta=0.525$, $p<0.001$), with organizational learning culture serving as a critical mediating factor. The research further reveals that establishing organizational structures that facilitate [5][6]. This study deepens the understanding of the mechanism between digital human capital and organizational innovation, and provides theoretical basis and practical enlightenment for managers to cultivate learning organizations and improve innovation efficiency in the process of digital transformation.*

Keywords: *organizational innovation performance, employee digital literacy, learning organization, mediating effect, structural equation modeling, human resource management*

1 Введение

В настоящее время мировая экономика вступила в новую фазу, полностью опирающуюся на цифровые технологии, а волны развития знаниевого общества 5.0 и промышленности 5.0 кардинально меняют структуру отраслей и организационные модели.[10]. На этом фоне выживание и развитие организаций всё больше зависят от их способности к постоянным инновациям. При этом источник инноваций всё быстрее смещается от традиционных факторов — капитала и технологий — к человеку как к ключевому элементу. Способность сотрудников, как носителей знаний и создателей ценности внутри организации, адаптироваться к цифровой эпохе — то есть их цифровая грамотность — становится ключевым предпосылкой эффективности инноваций в организации.

Цифровая грамотность уже вышла за рамки простых навыков работы с цифровыми инструментами: это комплексные способности человека в цифровой среде — безопасно и уместно получать, управлять, понимать и интегрировать информацию, а также эффективно общаться, сотрудничать,

создавать контент и защищать свою приватность.[2][5]”Для организации уровень цифровой грамотности всего персонала является важной основой человеческого капитала, необходимой для адаптации к технологическим изменениям, выявления рыночных возможностей и реализации инноваций в сфере услуг и продукции.[10].Однако наличие у сотрудников высоких цифровых навыков не обязательно приводит к развитию сильных инновационных потенциалов в организации. Как индивидуальные способности объединяются и превращаются в результаты инноваций на уровне организации, — этот механизм до сих пор требует более глубокого изучения.

Теория организаций, ориентированных на обучение, предлагает убедительное объяснение этого явления. Согласно этой теории, организация должна постоянно адаптироваться к изменениям в окружающей среде и обеспечивать самореформу, формируя повсеместную атмосферу обучения и создавая механизмы, стимулирующие обмен знаниями и совместные эксперименты.[6].Сегодня, когда такие цифровые технологии, как искусственный интеллект, активно внедряются, стратегией, обеспечивающей успешную трансформацию и стимулирующую совместные инновации человека и машины, является создание «организационной структуры с возможностью саморегуляции».[6].Это означает, что организация, которая поощряет непрерывное обучение и открытость, может стать мостом между цифровой грамотностью сотрудников и эффективностью инноваций в компании. В культурной среде обучающейся организации цифровые навыки сотрудников эффективнее применяются для решения задач, создания идей и внедрения практик, что способствует системным инновациям.

Тем не менее в существующей литературе по-прежнему недостаточно исследований, в которых цифровая грамотность сотрудников, характеристики организаций, ориентированных на обучение, и эффективность организационных инноваций объединяются в единый эмпирический подход.[10].С учётом этого, центральным вопросом, который ставится в настоящем исследовании, является: как цифровая грамотность сотрудников влияет на инновационную эффективность организации? Исходя из концепции организаций, ориентированных на обучение, играет ли в этом процессе посредническую роль культура обучения?Целью данного исследования является выявление внутренних механизмов преобразования цифрового человеческого капитала в инновационное преимущество организации, а также предоставление управленческих рекомендаций по развитию инновационных потенциалов в условиях цифровой экономики.

2 Обзор литературы и теоретическая основа

2.1 Сущность и измерения цифровой грамотности сотрудников

Понятие цифровой грамотности прошло эволюцию от «литературной грамотности» в бумажную эпоху, через «медиаграмотность» в эпоху массовой коммуникации до «цифровой грамотности» в цифровую эпоху.[2].Ранние исследования были сосредоточены на базовых навыках человека —

получении, понимании и интеграции цифровой информации.[2].С развитием технологий Web2.0 и искусственного интеллекта их содержание постоянно расширяется и превращается в комплексный понятие, охватывающее такие аспекты, как знания, сознание, навыки и социальная ответственность.

На основе анализа существующих исследований цифровая грамотность сотрудников может быть разложена на следующие ключевые аспекты:

1 Цифровые знания и навыки: включают базовые теоретические знания в области цифровых технологий, навыки работы с программным и аппаратным обеспечением, а также профессиональные компетенции по использованию цифровых инструментов для выполнения конкретных рабочих задач.[2][7].

2. Цифровые приложения и инновации — это способность использовать цифровые инструменты для эффективного взаимодействия и совместной работы, а также применять цифровые ресурсы для решения задач, оптимизации процессов и разработки новых продуктов и услуг.[2][5].Межнациональное исследование 2024 года показало, что уровень цифровой грамотности сотрудников напрямую связан с их отношением к работе и инновационной активностью, а также косвенно способствует успеху организации за счёт повышения качества человеческого капитала.[5].

3. Цифровая осознанность и социальная ответственность: это восприятие цифровой среды, внимание к конфиденциальности и безопасности данных, а также соблюдение этических норм в цифровой деятельности и осознанное отношение к выявлению и противодействию фейковым новостям.[2][6].

2.2 Организационная инновационная эффективность и обучающаяся организация

Эффективность организационных инноваций — это совокупность реальных результатов, достигнутых организацией в области внедрения новых продуктов, услуг, технологий, систем управления или операционных моделей. В условиях динамической конкуренции постоянные организационные инновации играют ключевую роль в поддержании конкурентного преимущества.[10].

Обучающаяся организация — это управленческая концепция, предложенная Питером Сэнджи и другими, которая означает способность организации постоянно совершенствовать свою структуру и поведение за счёт систематического обучения, тем самым повышая свою адаптивность и творческий потенциал.[6].Ключевые черты включают системное мышление, самовыражение, улучшение модели мышления, формирование общей визии и командное обучение. В контексте цифровой трансформации концепция «обучаемой организации» приобретает новое значение. Согласно последним исследованиям, при интеграции генеративного искусственного интеллекта приоритетной стратегией для организаций становится создание «организационной структуры, способной к саморегуляции».Во-вторых — создание специализированной команды, внедрение системы этического

контроля и формирование инновационной лаборатории.[6]. Это свидетельствует о том, что суть современной обучающейся организации заключается в её гибкости и способности к адаптации, что создаёт институциональную и культурную основу для совместного создания сотрудников (включая их цифровые навыки) и новых технологий.

2.3 Предположения исследований и построение теоретической модели

На основе вышеприведённого обобщения теоретических положений в настоящем исследовании формулируются следующие гипотезы и построена теоретическая модель, показанная на рис. 1.

- Н1: Уровень цифровой грамотности сотрудников оказывает значительное положительное влияние на инновационную эффективность организации. Поскольку сотрудники являются микро-субъектами инноваций, их цифровая грамотность представляет собой базовую компетенцию, необходимую для появления инновационных идей и их реализации с помощью цифровых инструментов.[10]. Сотрудники с высоким уровнем цифровой грамотности эффективнее осваивают передовые знания, анализируют рыночные данные и сотрудничают в междисциплинарных проектах, что напрямую способствует инновациям в продуктах, процессах и сервисах.[5].

- Н2: Уровень цифровой грамотности сотрудников оказывает значительное положительное влияние на культуру обучения в организации. Сотрудники с высоким уровнем цифровой грамотности чаще используют цифровые платформы для обмена знаниями и онлайн-сотрудничества, что постепенно способствует формированию в организации открытой, совместной и экспериментальной атмосферы обучения.- Н3: Культура обучения оказывает значительное положительное влияние на эффективность инноваций в организации. Поддерживая пилотирование, способствуя обмену знаниями и сотрудничеству между подразделениями, такая культура снижает риски и сопротивление в процессе инноваций, объединяя разрозненные индивидуальные идеи в системные результаты организационных инноваций.[6].

- Н4: Культура учёной организации выступает посредником в связи между цифровой грамотностью сотрудников и инновационной эффективностью организации. То есть цифровая грамотность сотрудников не только напрямую способствует инновационной эффективности, но и косвенно повышает общую инновационную способность организации, формируя и укрепляя культуру обучения. Это означает, что без организационной среды, поддерживающей обучение, обмен и экспериментирование, Вклад цифровых навыков отдельного сотрудника в организационные инновации может оказаться ограниченным.

Рисунок 1 : теоретическая модель данного исследования

(цифровая грамотность сотрудников → культура обучения в организации → инновационная эффективность организации)

3 метод исследования

3.1 проектирование исследования

В данном исследовании используется метод поперечного среза с анкетированием с целью проверки причинно-следственных связей между переменными на основе данных большой выборки. Для снижения систематической ошибки анкета заполняется анонимно, а некоторые вопросы формулируются в обратном виде. После сбора данных применяется модель структурных уравнений для проверки гипотез — этот метод эффективен для анализа сложных взаимосвязей между множеством переменных и позволяет одновременно оценивать модель измерения и структурную модель.[5].

3.2 Образцы и сбор данных

Исследование проводилось с использованием специализированной платформы для опросов: электронные анкеты были направлены сотрудникам предприятий из различных отраслей материкового Китая, включая информационные технологии, финансовые услуги, передовое производство, здравоохранение и другие. Для отбора выборки применяли комбинированный подход — удобный отбор и снежный ком. В итоге было собрано 352 анкеты. После исключения анкет с слишком коротким временем заполнения и анкет с явно повторяющимися ответами, в общей сложности осталось 305 действительных анкет. Эффективный выход составил 86,6%.

Согласно описательной статистике выборки, среди респондентов мужчины составляют 52,1 %, женщины — 47,9 %. Основной возраст — 26–35 лет (45,2 %). 78,4 % имеют высшее образование (бакалавриат и выше). Работают в таких сферах, как научно-технические разработки, операционное управление и маркетинг. Большинство компаний — средние и крупные. В выборке хорошо проявляется разнообразие.

3.3 измерение переменной

Все концепции оцениваются с помощью проверенных национальных и зарубежных шкал, адаптированных под китайские условия, с использованием пятибалльной шкалы Лайтера (1 — «полностью не согласен», 5 — «полностью согласен»).

1. Цифровая грамотность сотрудников: на основе «Глобальной рамки цифровой грамотности» ЮНЕСКО и методологической системы оценки, разработанной китайскими исследователями[2][7], Оценка проводится по четырём направлениям: цифровые знания и навыки, цифровое взаимодействие и сотрудничество, создание цифрового контента, цифровая безопасность и ответственность — всего 16 пунктов. Пример: «Я могу уверенно использовать профессиональные программные средства и инструменты анализа данных для выполнения своих основных задач». 2. Культура обучения: используется шкала, адаптированная по теории Сенге и соавторов и соответствующим отечественным исследованиям.[6], Включает четыре аспекта: атмосферу непрерывного обучения, механизмы обмена знаниями, ориентацию на системное мышление и поощрение экспериментального подхода — всего 12 пунктов. Например: «Мой отдел

поощряет сотрудников пробовать новые методы, даже если это может привести к неудаче».3. Организационная инновационная эффективность: на основе шкалы инновационного поведения и эффективности, разработанной Янссеном и китайскими исследователями[3][10], Измеряется по девяти вопросам, охватывающим три направления: инновации в продуктах и услугах, технологических процессах и управлении. Например: «За прошедший год наша команда успешно запустила новый продукт или услугу, пользующийся спросом на рынке».4. Контрольные переменные: в модель включены такие факторы, как размер предприятия (количество сотрудников), отрасль деятельности (включая высокотехнологичные отрасли) и уровень должности респондента, которые могут влиять на инновационную эффективность.

4 Анализ данных и результаты

4.1 тестирование надёжности и валидности

Сначала проводится проверочный факторный анализ модели измерения. Результаты показывают, что комбинированная надёжность всех концепций превышает 0,85, а средний коэффициент извлечения дисперсии (Covariance Extraction, CEX) — более 0,50, что свидетельствует о высокой внутренней согласованности и конвергентной валидности шкалы. Различительная валидность проверяется путём сравнения квадратного корня среднего квадратного отклонения (AVE) по концепциям с их корреляционным коэффициентом. Показатели свидетельствуют о том, что средние значения квадратов среднего квадрата (AVE) превышают коэффициенты корреляции между данным концептом

4.2 структурная модель и проверка гипотез

С помощью программного обеспечения AMOS проводили проверку качества подгонки и анализ путей в модели структурных уравнений. Показатели подгонки следующие: $\chi^2/df = 2,187$, RMSEA = 0,062, CFI = 0,937, TLI = 0,928. Все показатели находятся в допустимых пределах, что свидетельствует о хорошем соответствии теоретической модели данным.

Результаты анализа путей показывают: — коэффициент прямого пути цифровой грамотности сотрудников к инновационной эффективности организации составляет 0,325 ($p < 0,001$), что подтверждает гипотезу H1. — коэффициент пути цифровой грамотности сотрудников к культуре обучения организации — 0,468 ($p < 0,001$). Предположение H2 подтверждается. — Коэффициент связи между культурой обучающейся организации и эффективностью инноваций в организации составляет 0,412 ($p < 0,001$), что подтверждает гипотезу H3.

Чтобы проверить медиаторский эффект культуры обучения (H4), был использован метод Bootstrap (5000 повторных выборок). Результаты показали, что коэффициент косвенного пути (цифровая грамотность → культура обучения → инновационная эффективность) составляет 0,193, а 95%-й доверительный интервал — [0,132, 0,258], который не включает 0. Это указывает на значимость медиаторного эффекта. При этом прямой эффект (0,325) также является статистически значимым, что свидетельствует о

частичной посреднической роли культуры организаций, ориентированных на обучение, в связи между цифровой грамотностью и инновационной эффективностью; гипотеза Н4 подтверждается. Общий

5 Обсуждение и выводы

5.1 исследования и теоретические вклады

Это исследование на основе эмпирического анализа подтверждает, что цифровая грамотность сотрудников является важным предпосылкой для достижения инновационной эффективности в организации, что согласуется с современными выводами по оценке стоимости цифрового человеческого капитала.[5][10].Ещё важнее то, что данное исследование показало ключевую посредническую роль культуры учёной организации в этом процессе трансформации. Исследование выявило, что в общей эффективности цифровой грамотности сотрудников на инновационные результаты около 37.3% (0.193/0.518) достигается за счёт формирования и укрепления культуры обучения в организации. Это глубоко указывает на то, что цифровые навыки отдельных сотрудников могут объединиться в поток инноваций организации. Не может обойтись без организационной среды, которая выступает в роли «катализатора» и «усилителя»: она способствует свободному обмену знаниями, стимулирует совместные эксперименты и поддерживает непрерывное

Это открытие вносит два ключевых вклада в теорию: во-первых, оно органично связывает исследования цифровых способностей на индивидуальном уровне с теориями инноваций и обучения на организационном уровне, проливая «чёрную коробку» между «индивидуальными цифровыми навыками» и «организационными результатами инноваций» и выясняя механизм передачи внутриорганизационного социального капитала (культуры обучения). Во-вторых, Оно отвечает на призыв академических кругов изучить влияние цифровой грамотности в конкретных организационных условиях.[10], Подтверждено, что факторы организационной среды (например, культура обучения) являются важным граничным условием, регулирующим эффективность применения цифровых технологий.

5.2 Уроки для руководства

Результаты данного исследования содержат важные практические рекомендации для руководителей организаций, проходящих цифровую трансформацию.

1. Инвестиции в развитие организаций, ориентированных на обучение, должны превосходить простое повышение квалификации: предприятиям не следует сосредотачивать ресурсы только на отдельных цифровых программах повышения квалификации. Как показывает практика создания «сообщества роста сотрудников» в Вэньчжоу, построение сети «роста» на уровне предприятий и рабочих групп, а также формирование экосистемы обучения с помощью механизмов «баллов и почёта» позволяют значительно

эффективнее раскрывать цифровой потенциал сотрудников.[1].Руководителям следует в первую очередь разрабатывать плоскую и сетевую структуру гибкой организации, преодолевая барьеры между подразделениями и создавая пространство для цифровой трансфункциональной взаимодействия и экспериментов с инновациями.[6].

2. Создание благоприятной культурной среды для цифровых инноваций: организация должна чётко определить, что при оценке цифровых проектов основным критерием является «инновационность», а не просто «повышение эффективности».[6].Необходимо создать механизм устойчивости к ошибкам, поощрять сотрудников к экспериментам с использованием цифровых инструментов и создавать специализированные инновационные лаборатории или виртуальные команды, которые станут безопасной площадкой для реализации рискованных, но перспективных идей. Одновременно следует внедрить систему контроля за цифровой этикой, чтобы инновационная деятельность проходила в рамках контролируемых и ответственных подходов.[6].

3. Использование цифровых инструментов для активизации процесса обучения в организации: можно использовать практику таких компаний, как Senpa, применяя такие цифровые решения, как системы AI-тренировок и виртуальные платформы для симуляции, чтобы заменить традиционные централизованные курсы на персонализированное обучение по запросу в конкретных ситуациях, что значительно повышает эффективность передачи знаний и усвоения навыков.[1].Эти инструменты сами по себе являются важной частью формирования культуры динамичного и реального времени обучения.

5.3 Ограничения и перспективы развития

В данном исследовании имеются определённые ограничения, которые указывают направление для будущих исследований: во-первых, использование поперечных данных затрудняет строгое установление причинно-следственных связей между переменными, поэтому в будущем можно будет применить лонгитюдные исследования или метод прослеживания случаев для дополнительной проверки. Во-вторых, выборка в основном представлена городскими районами и сотрудниками предприятий, поэтому в будущем можно будет расширить исследование на более широкие регионы и группы населения (например, рабочие традиционного промышленного производства, сотрудники сферы общественных услуг и т.д.).для проверки обобщаемости модели[1][10].В заключение, в данном исследовании культура организаций, ориентированных на обучение, рассматривается как целостное понятие, что в будущем позволит детально проанализировать, как её различные аспекты — такие как обмен знаниями, экспериментальный дух и системное мышление — различаются в своём влиянии на инновационный процесс, определяемый цифровой грамотностью, и тем самым сформулировать более точные рекомендации по управлению.

В целом, на фоне масштабной картины цифровой экономики цифровая грамотность сотрудников — это «семья» организационных инноваций, а культура обучения — «плодородная почва», в которой семья прорастает, расцветает и приносит плоды. Только системно сочетая развитие цифровых навыков с построением организаций, ориентированных на обучение, организация сможет выстроить устойчивую основу для инновационного потенциала в условиях нового этапа технологических и промышленных преобразований.

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