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### HISTOLOGICAL STRUCTURE OF THE REPRODUCTIVE ORGANS IN LABORATORY ANIMALS

**Abstract.** *This article, using neurohistological methods, investigates the histological structure and development of nerve fibers in the seminal vesicles of rats during the postnatal period. The seminal vesicles are richly supplied with nerve elements, consisting of myelinated and unmyelinated nerve plexuses and fibers. During the period of sexual maturation, the nerve fibers of the seminal vesicles reach their highest degree of development.*

**Keywords:** *rat, postnatal period, seminal vesicles, development, innervation, neurohistological methods.*

**Introduction.** One of the complex and insufficiently studied problems in modern neurobiology is the question of the origin, development, and age-related changes of the nervous system [1,2]. A comprehensive understanding of the relationship between structure and function requires their study from an ontogenetic perspective. A review of the literature available to us has shown that the development of the seminal vesicles in rats, unlike that of other organs, has attracted little attention from researchers [3,4,5]. The issue of innervation of the seminal vesicles has received scant attention with regard to the material substrate of innervation. In the works of these authors, histological and cytological data on the development of cellular and tissue (especially nervous) structures of the rat seminal vesicles in different age periods are either completely absent or presented insufficiently [6,7,8]. Aiming to fill this gap to some extent, we investigated the morphology of the vesicles and their nervous elements throughout postnatal development.

**Aim of the Study.** To investigate the neurohistological development of the nerves of the seminal vesicles in rats during the postnatal period.

**Materials and Methods.** The material for the study consisted of seminal vesicles from 69 rats, covering ages from the suckling period to the period of pronounced senile changes. To address the objectives, general histological, neurohistological, and histochemical methods were employed. The general structure of the seminal vesicles was revealed by hematoxylin-eosin staining; collagen fibers of connective tissue were detected using the Van Gieson method, and elastic fibers using the Weigert method. Nervous elements of the seminal vesicles were visualized by silver impregnation according to the methods of



Bielschowsky-Gros, Campos, and Rasskazova, while cell nuclei were counterstained with alum carmine.

**Results of the Study.** The results of the study showed that the seminal vesicles are richly supplied with nervous elements: nerve trunks, myelinated and unmyelinated fibers, plexuses, ganglia, and sensory nerve endings. Numerous small nerve trunks divide into bundles of varying thickness, consisting mainly of unmyelinated fibers. These bundles branch repeatedly and intertwine, forming nerve plexuses. In some areas, nerve trunks consisting predominantly of unmyelinated fibers are encountered. Sensory nerve endings are represented by thin terminals formed from myelinated fibers that have lost their myelin sheath. These receptor structures are encountered infrequently and mostly have the appearance of small bushes. Quite often, in the wall of the seminal vesicles, small ganglia consisting of nerve cells can be detected. The latter often vary in shape and size. Nerve trunks and bundles anastomose with each other through the exchange of individual nerve fibers and bundles. In the adventitial layer, individual nerve bundles and fibers intertwine to form a nerve plexus, from which nerve fibers extend into the muscular layer. In the muscular layer of the seminal vesicles, nerve trunks follow a tortuous course and form a large number of nerve plexuses. Some nerve trunks cross blood vessels along their path. At the sites of crossing, the nerve trunks and individual fibers become strongly argyrophilic and dilated, which is likely an adaptive, functional phenomenon. Thick nerve trunks divide into thinner ones, which give rise to preterminal fibers that often end in bush-like terminals. Some myelinated nerve fibers, having lost their myelin sheath, terminate in arborized or dichotomous terminal branches of a receptor nature. Nerve fibers accompanying blood vessels form perivascular nerve plexuses on them or terminate as terminals both in the vessel wall and in the surrounding tissue of the seminal vesicle. Analysis of our material showed that in rats during the suckling period (days 1–21), the intramural nervous apparatus is not yet fully formed; thus, out of 8–20 differentiating nerve cells, only 2–3 are mature. At the age of 22–120 days (immature period), further complexity of the nervous elements occurs; the number of mature nerve cells reaches 5–8. During this period, the number of fibers in the nerve trunks significantly increases, as does the density of the nerve plexuses.

**Conclusion.** In the sexually mature reproductive period, the nervous elements of the seminal vesicles in rats reach their maximum development. The nerve trunks contain the greatest number of nerve fibers, the nerve plexuses achieve the highest density, and the majority of nerve cells are differentiated multipolar neurons. During this period (5–23 months), the seminal vesicles reach their greatest development and possess the most highly developed nervous apparatus. In the period of pronounced senile changes (19–40 months), marked reactive structural changes in the nervous elements are observed.

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## **INFLUENCE OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN MEDICINE ON DIAGNOSTIC PROCESSES**

**Abstract:** *The article examines modern approaches to integrating artificial intelligence (AI) technologies into diagnostic processes in the healthcare sector. Special attention is given to the use of AI in medical image processing, analysis of laboratory data, and clinical decision support systems. It is shown that AI contributes to early disease detection, personalization of medical care, and reduction of physicians' workload. The article also analyzes technological, legal, and ethical barriers to the implementation of AI in clinical practice.*

**Keywords:** *artificial intelligence, medical diagnostics, medical imaging, clinical decision-making, electronic medical records, healthcare information systems, data security, automation, medical informatics, algorithms.*

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## **TIBBIYOTDA SUN'IY INELLEK TEXNOLOGIYALARINING DIAGNOSTIK JARAYONLARIGA TA'SIRI**

**Annotatsiya:** *Maqolada sog'liqni saqlash sohasida diagnostika jarayonlariga sun'iy intellekt (SI) texnologiyalarini integratsiya qilishning zamonaviy yondashuvlari ko'rib chiqiladi. Tibbiy tasvirlarni qayta ishlash, laboratoriya ma'lumotlarini tahlil qilish hamda klinik qarorlarni qo'llab-quvvatlash tizimlarida SI'dan foydalanishga alohida e'tibor qaratilgan. SI kasalliklarni erta aniqlash, tibbiy xizmatlarni individuallashtirish va shifokorlar yuklamasini kamaytirishga xizmat qilishi ko'rsatib berilgan. Shuningdek, maqolada SI'ni klinik amaliyotga joriy etishdagi texnologik, huquqiy va etik to'siqlar tahlil qilingan.*

**Kalit so'zlar:** *sun'iy intellekt, tibbiy diagnostika, tibbiy tasvirlash, klinik qarorlar, elektron tibbiy yozuvlar, sog'liqni saqlash axborot tizimlari, ma'lumotlar xavfsizligi, avtomatlashtirish, tibbiy informatika, algoritmlar.*

### **Introduction**

In recent years, artificial intelligence technologies have been actively used globally in almost all sectors, especially in medicine. Artificial intelligence (AI)

makes it 7 diagnosis, and provide an individual approach. This, in particular, plays an important role in the early detection of cancer, cardiovascular diseases, diabetes, and other chronic diseases.

This article reviews the impact of artificial intelligence technologies on diagnostic processes, existing AI systems, their operating algorithms, advantages, and current issues.

#### Main part

##### Understanding artificial intelligence and its role in medicine

Artificial intelligence is a set of algorithms and systems that imitate human mental activity. In medicine, AI is widely used in the following areas:

- diagnostics based on images (for example, X-ray, MRI, CT);

- analysis of laboratory tests;

- studying electronic medical records and providing recommendations;

- providing initial advice through medical chatbots.

One of the most successful applications of artificial intelligence is imaging diagnostics.

For example:

The LYNA (Lymph Node Assistant) algorithm developed by Google Health has high accuracy in detecting breast cancer metastasis..

The IBM Watson for Oncology system recommends the most appropriate treatment methods for oncology patients.

#### Advantages:

- 24/7 availability;

- reduction of human error;

- rapid analysis of large amounts of data;

- personalized medical approach.

#### Limitations and problems

- The problem of ensuring the confidentiality of information;

- The unexplained decision-making of the SI model (black box effect);

- Low trust of medical workers in SI technologies;

- The lack of SI specialists in our country.

#### Result:

In the healthcare system of Uzbekistan, artificial intelligence technologies are mainly used in the areas of automating diagnostic processes, managing electronic medical databases, and developing telemedicine services. In particular, AI algorithms in the analysis of medical images are greatly helping doctors in the early detection of diseases. Also, through electronic health care platforms, patient information is stored centrally, creating the opportunity to provide fast and efficient services.

There are a number of problems in the process of introducing SI technologies into the healthcare system of Uzbekistan. One of the biggest challenges is the lack of infrastructure and the lack of equal access to high-quality Internet access, which is necessary for the implementation of modern technologies. In addition, the lack of qualified personnel is also an important issue. It is necessary to strengthen

cooperation between medical personnel and IT specialists, as well as conduct regular training on new technologies. Lack of financing is preventing the large-scale implementation of these projects.

#### IBM Watson Health

Description: IBM Watson Health is a medical platform powered by artificial intelligence and big data analytics that helps support clinical decisions, diagnose diseases, and develop treatment plans. Asosiy imkoniyatlari:

Analysis of large amounts of medical data.

Supporting clinical decisions.

Develop a treatment plan.

News: Using the IBM Health Guardian platform, it is possible to analyze many types of data (text, audio, video), which serves as an effective tool for early detection and prevention of diseases. arXiv Google DeepMind Health

Description: Google DeepMind Health is a project focused on the application of artificial intelligence in the field of medicine, which helps in the analysis of medical images, diagnosis and treatment of diseases.

Main features:

Analysis of medical images.

Identifying diseases.

Help with treatment.

News: Using the MedGemma model, the possibility of joint analysis of medical images and texts has been created, which provides high efficiency in identifying diseases. medgemma.org

#### PathAI

Description: PathAI is a platform focused on applying artificial intelligence in the field of pathology, helping to analyze tissue samples and diagnose diseases.

Key capabilities:

Analyze tissue samples.

Diagnose diseases.

Assist in treatment.

News: AISight platform enables digital pathology workflow management and AI-powered analytics. pathai.com

#### “Current Opportunities and Prospects”

The government of Uzbekistan is paying great attention to the modernization of the healthcare system as part of its digital transformation programs. A number of projects are being implemented to introduce e-health platforms, telemedicine services, and artificial intelligence-based diagnostic systems. In addition, through the study of the experience of foreign countries and cooperation, a new impetus is being given to the development of information and communication technologies in our country. In the near future, the widespread use of information and communication technologies in medicine is expected to play an important role in providing high-quality and timely medical services to patients.

#### Conclusion



The introduction of artificial intelligence technologies in medicine is significantly increasing the quality of diagnostics. However, in order to fully exploit its potential, it is necessary to provide the necessary infrastructure, train specialists, and ensure data security. In the future, the possibility of developing individual diagnostics and treatment methods with the help of AI technologies will further expand.

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## **POLLUTION OF THE HYDROSPHERE AND LITHOSPHERE AND WAYS TO REDUCE ITS CONSEQUENCES**

**Abstract.** *On May 24, 2024, the Information and Resource Center for Hazardous Chemicals and Waste began operating in Uzbekistan under the Specialized Analytical Control Center of the Ministry of Ecology, Environmental Protection, and Climate Change. The primary objective of the center is to monitor the implementation of international environmental chemical conventions, raise public awareness, and strengthen the country's institutional capacity in chemical safety management. Through the center and the ecochem.uz platform, users can access information on the Basel, Rotterdam, and Stockholm conventions, as well as short online courses and scientific materials. This article examines the major sources of chemical pollution, including industrial emissions, pesticides, and consumer products, and analyzes their impact on water and soil ecosystems. Particular attention is given to pesticide toxicity and its potential effects on environmental and human health. Furthermore, the study highlights sustainable management strategies and preventive measures aimed at reducing chemical contamination and protecting ecological systems.*

**Key words:** *hazardous chemicals, environmental pollution, pesticides, chemical contamination, water ecosystems, toxicity, ecological risk, biodiversity, sustainable environmental management.*

**Introduction.** Chemical pollution is one of the most pressing environmental challenges facing modern society. Rapid population growth, industrial expansion, energy production, and intensive agricultural practices have significantly increased the pressure on natural resources, particularly water and soil. These processes contribute to environmental degradation, which negatively affects food security, public health, biodiversity, and economic development. On May 24, 2024, Uzbekistan launched the Information and Resource Center for Hazardous Chemicals and Waste within the Specialized Analytical Control Center under the Ministry of Ecology, Environmental Protection, and Climate Change. The center aims to enhance the implementation of international environmental conventions related to chemical safety and hazardous waste management. Its activities are designed to improve the awareness of government institutions, businesses, and the general public regarding the obligations and mechanisms associated with international environmental agreements. The center collects, organizes, and disseminates information related to the management of hazardous chemicals and waste. Additionally, it contributes to strengthening the institutional capacity of Uzbekistan in the field of chemical safety and environmental protection. To

facilitate interaction with users, the online platform [ecochem.uz](http://ecochem.uz) was launched. The platform provides educational resources and short online courses covering the fundamental principles of three major international chemical conventions: the Basel Convention, the Rotterdam Convention, and the Stockholm Convention. The establishment of the Information and Resource Center was supported through a collaborative project involving the Ministry of Ecology, Environmental Protection and Climate Change, the United Nations Environment Programme (UNEP), and the organization Health and Environment Justice Support e.V. (Germany). The project aims to strengthen Uzbekistan's institutional capacity in implementing the Basel and Stockholm conventions and the Globally Harmonized System (GHS), while also supporting the country's accession to the Rotterdam and Minamata conventions [1].

In the broader context, chemical pollution has become a global environmental issue. Industrial activities, agricultural chemicals, and everyday consumer products release numerous synthetic compounds into the environment. These substances can accumulate in ecosystems and enter food chains, posing significant risks to human health and biodiversity [2].

Recent studies estimate that approximately 350,000 chemical substances are currently registered for production and use worldwide. Many of these substances enter environmental compartments such as air, water, soil, and living organisms. Since the mid-20th century, the global production of synthetic organic chemicals has increased dramatically—from about 5 million tons per year in 1950 to approximately 400–500 million tons annually today [3].

**Research Methodology.** This study is based on a comprehensive analysis of global and national data related to chemical pollution, pesticide usage, and international environmental conventions. Several research approaches were employed, including quantitative analysis, ecological monitoring and assessment, regulatory and policy analysis, and comparative analytical methods [4].

The research integrates concepts from chemistry, environmental science, toxicology, water resource management, and environmental governance. Scientific literature, international environmental reports, and regulatory frameworks were analyzed to identify key trends and risks associated with chemical pollution. Additionally, methodological tools used in environmental monitoring—such as chemical analysis and ecological risk assessment—were reviewed to evaluate environmental impacts [5].

**Toxicity Assessment and Environmental Risk Evaluation.** The regulatory approval process for pesticides involves evaluating their potential environmental concentrations under conditions consistent with good agricultural practices [6]. These exposure assessments estimate the concentrations that may occur in different environmental compartments such as surface water and soil. Because new chemical substances may not yet be present in the environment prior to authorization, predictive models are typically used to estimate their potential distribution [7].

Risk assessment also requires determining the concentration levels at which harmful biological effects occur. Laboratory and field experiments are conducted

on various biological groups, including aquatic plants, invertebrates, fish, terrestrial plants, insects, birds, and mammals. These experiments identify the threshold levels at which ecological effects begin to occur [8-10].

To account for uncertainties in experimental data, safety or assessment factors are applied to determine regulatory threshold concentrations below which harmful ecological effects are unlikely to occur. Ultimately, environmental risk assessment is based on a comparison between predicted environmental concentrations and these threshold values. If expected environmental concentrations exceed safe limits, regulatory approval for the substance may be denied [11].

**Sources of Chemical Pollution.** Industrial activities represent one of the primary sources of chemical contamination. Industries such as metallurgy, petrochemicals, pharmaceuticals, and manufacturing release hazardous substances including heavy metals such as lead, cadmium, and mercury, as well as organic solvents and acidic waste [12].

In addition to industrial sources, numerous chemicals are found in everyday consumer products. These include food packaging materials, textiles, cosmetics, and personal care products. Chemical compounds released from these materials can enter the environment and, in some cases, accumulate in human tissues [13].

Among the most significant environmental pollutants are pesticides, which are widely used in modern agriculture. While pesticides play an important role in crop protection, they are biologically active substances designed to affect living organisms. Consequently, their widespread use may result in unintended impacts on non-target species, including aquatic organisms, birds, insects, and mammals.

Pesticides are typically classified according to their target organisms. Insecticides are used to control insect populations, herbicides eliminate unwanted plants, and fungicides prevent fungal diseases. Although these substances are essential for maintaining agricultural productivity, their misuse or excessive application can lead to ecological imbalances and environmental contamination.

**Degradation of Water Ecosystems.** Water ecosystem degradation is a critical environmental issue in Uzbekistan and Central Asia. One of the most significant examples is the environmental crisis associated with the Aral Sea. During the Soviet period, large volumes of water from the Amu Darya and Syr Darya rivers were diverted for irrigation purposes. As a result, the Aral Sea experienced a dramatic reduction in its size and water volume.

Agricultural runoff containing fertilizers and pesticides has further contributed to the pollution of water bodies in the region. These processes have led to the loss of biodiversity and the decline of ecosystem stability, particularly within the Aral Sea basin.

Uzbekistan's arid climate further complicates water resource management. Limited water availability, combined with inefficient irrigation systems, increases pressure on aquatic ecosystems. Therefore, effective water management strategies are essential for ensuring sustainable development and environmental protection.

**Sustainable Solutions and Preventive Measures.** Several strategies can be implemented to reduce the degradation of water ecosystems and mitigate chemical

pollution. One important approach is the modernization of irrigation systems through the adoption of water-efficient technologies such as drip irrigation and improved canal infrastructure.

Improved water resource planning and monitoring systems are also essential for maintaining ecological balance in rivers and lakes. Reducing chemical contamination requires more effective regulation of agricultural fertilizers and pesticides, as well as improved waste management and recycling systems.

Ecological restoration initiatives can play a significant role in environmental recovery. These initiatives may include restoring wetlands, reintroducing aquatic vegetation, and developing green infrastructure that enhances ecosystem resilience.

Strengthening environmental legislation and regulatory frameworks is another key component of sustainable environmental governance. Establishing ecological protection zones around water bodies and limiting harmful industrial and agricultural activities can help prevent further degradation.

International cooperation is particularly important when managing transboundary water resources. Collaborative agreements between neighboring countries are necessary to ensure sustainable water use and equitable resource distribution.

Finally, scientific research and technological innovation are essential for developing new approaches to environmental monitoring, pollution control, and ecosystem restoration.

**Impacts on Human Health.** The degradation and contamination of water ecosystems can have serious consequences for human health. Polluted water sources may contain hazardous chemicals, heavy metals, pesticides, and pathogenic microorganisms that can enter the human body through drinking water or food consumption.

Exposure to contaminated water may cause gastrointestinal disorders, skin diseases, and chronic health conditions such as kidney and liver damage. Furthermore, toxic substances can accumulate in crops grown in contaminated soils, entering the food chain and posing long-term health risks.

Environmental degradation may also increase the prevalence of vector-borne diseases. For example, the loss of natural wetlands and ecosystem imbalance can create favorable conditions for mosquito populations, potentially increasing the risk of diseases such as malaria.

Scientific studies have also linked exposure to certain chemical contaminants with cancer, endocrine system disorders, and neurological damage. These risks highlight the importance of monitoring environmental pollution and implementing preventive measures.

**Environmental Monitoring and Treatment Technologies.** Environmental monitoring relies on a range of physical and chemical analytical techniques. Key indicators include pH levels, electrical conductivity, and oxidation-reduction potential. Advanced laboratory methods such as spectrometry are used to detect heavy metals, while chromatographic techniques help identify organic pollutants.



Several treatment technologies are available for removing contaminants from water systems. These include membrane filtration, adsorption using activated carbon or zeolites, biological treatment processes, and photocatalytic oxidation methods. Among these technologies, integrated treatment systems combining multiple processes often provide the most effective results.

**Conclusion.** Chemical pollution and the degradation of water and soil ecosystems represent major environmental challenges for Uzbekistan. The establishment of the Information and Resource Center for Hazardous Chemicals and Waste is an important step toward improving chemical management, strengthening environmental monitoring, and increasing public awareness.

Addressing these challenges requires a comprehensive and integrated approach. Sustainable solutions include the modernization of irrigation systems, improved waste management practices, ecological restoration projects, stronger regulatory frameworks, and enhanced international cooperation.

Since chemical pollution has ecological, economic, and social dimensions, effective management must involve coordinated efforts across multiple sectors. The adoption of sustainable technologies, improved chemical management systems, enhanced environmental monitoring, and increased environmental literacy among the population can significantly reduce pollution levels and contribute to long-term environmental sustainability.

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## **INNOVATSIYALAR VA AXBOROT TEXNOLOGIYALARINING IQTISODIY O'ZGARISHLARDAGI ROLI (O'ZBEKISTON TAJRIBASI)**

**Annotatsiya:** Maqolada O'zbekistonda "yashil" iqtisodiyot va "Aqlli shahar" tizimlarini rivojlantirishda innovatsion va axborot texnologiyalarining o'rni yoritilgan. Smart City loyihalari, ularning afzalliklari, hozirgi holati va istiqbollari aniq misollar asosida tahlil qilinadi.

**Kalit so'zlar:** Innovatsion texnologiyalar, Axborot texnologiyalari, Raqamli transformatsiya, Smart City, IoT, Ekologik xavfsizlik, Sun'iy intellekt, Barqaror rivojlanish, Yashil iqtisodiyot, Aqlli shahar

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## **THE ROLE OF INNOVATION AND INFORMATION TECHNOLOGIES IN ECONOMIC TRANSFORMATIONS (THE CASE OF UZBEKISTAN)**

**Abstract:** The article highlights the role of innovative and information technologies in the development of the "green" economy and "Smart City" systems in Uzbekistan. Smart City projects, their advantages, current state, and prospects are analyzed using specific examples.

**Keywords:** Innovative technologies, Information technologies, Digital transformation, Smart City, IoT, Environmental safety, Artificial intelligence, Sustainable development, Green economy, Smart city.

Zamonaviy dunyoda global jarayonlar va ekologik muammolar kuchayib borayotgan bir paytda, "yashil" iqtisodiyot konsepsiyasi dunyo miqyosida muhim ahamiyat kasb etmoqda. "Yashil" iqtisodiyot deganda, iqtisodiy o'sishni ta'minlash bilan birga ekologik barqarorlikni saqlash, tabiiy boyliklardan oqilona foydalanish va atrof-muhit uchun xavfsiz texnologiyalarni keng qo'llash tushuniladi. Bu jarayonda innovatsion va axborot-kommunikatsiya texnologiyalarining (AKT) o'rni cheksizdir.

Innovatsion texnologiyalar iqtisodiy faoliyatni ekologik xavfsiz tarzda yuritishda yangi mahsulotlar, xizmatlar va texnik yechimlar orqali muhim ahamiyat kasb etadi. Bularga quyidagilar kiradi:

- Quyosh va shamol energiyasi tizimlari an'anaviy, tabiatga salbiy ta'sir ko'rsatuvchi energiya manbalarini asta-sekin almashtirmoqda.

- “Aqlli” qishloq xo‘jaligi texnologiyalari suv, o‘g‘it va pestitsidlarni kam ishlatish orqali resurslarni tejashga yordam beradi.

- Yuqori samarali chiqindini qayta ishlash tizimlari ekologik xavfsizlikni ta‘minlashda katta rol o‘ynaydi.

Axborot-kommunikatsiya texnologiyalari “yashil” iqtisodiyotni rivojlantirishda markaziy o‘rinni egallaydi, ishlab chiqarish, iste‘mol va boshqaruv jarayonlarini optimallashtiradi. Bular jumlasiga:

- “Aqlli shahar” (Smart City) tizimlari transport, energiya va suv ta‘minoti sohalarini raqamlashtirib, samaradorlikni oshiradi.

- Narsalar Interneti (IoT) real vaqt rejimidagi monitoring va tahlil orqali resurslarning isrof qilinishini oldini oladi.

- Bulutli texnologiyalar ekologik toza IT-infratuzilmani yaratib, qog‘oz iste‘molini kamaytiradi.

So‘nggi yillarda O‘zbekiston raqamli transformatsiyada sezilarli natijalarga erishmoqda. “Aqlli shahar” konsepsiyasi yirik shaharlarda sinovdan o‘tkazilmoqda: Toshkent shahridagi “Toshkent City” majmuasi zamonaviy boshqaruv tizimlari, raqamli kommunal xizmatlar, aqlli svetoforlar va videokuzatuv tizimlari bilan jihozlangan. Yangihayot tumanida 2021-yilda ishga tushirilgan pilot loyiha to‘liq “Aqlli shahar” komponentlarini o‘z ichiga oladi. Samarqandda “Aqlli turizm” loyihasi doirasida QR-kodlar, raqamli yo‘nalishlar va sun‘iy intellekt asosida ishlovchi tizimlar joriy etilgan.

Afzalliklari: resurslarni tejash, xavfsizlikni ta‘minlash, transport tizimini samarali boshqarish va aholi bilan raqamli muloqotni o‘rnatish. Muammolari: infratuzilmaning yetarli rivojlanmaganligi, texnologik integratsiyaning sustligi va aholi orasida raqamli savodxonlik darajasining pastligi.

“Yashil” iqtisodiyot ekologik xavfsizlik, iqtisodiy barqarorlik, innovatsion rivojlanish va yangi ish o‘rinlarini yaratish kafolatidir. O‘zbekistonda bu yo‘nalishdagi ishlar tahsinga loyiq, ammo tizimli yondashuv va keng ko‘lamli texnologik integratsiya zarur. Innovatsion va axborot texnologiyalarining samarali joriy etilishi, xususan, “aqlli shahar” konsepsiyasi orqali, mamlakat iqtisodiyoti va ekologiyasining barqaror rivojiga katta hissa qo‘shmoqda.

Bunday yondashuv O‘zbekistonning global iqtisodiy va ekologik muammolarga qarshi kurashuvchi davlatlar safiga qo‘shilishiga zamin yaratadi. Innovatsiyalar va AKT ni keng joriy etish orqali mamlakat nafaqat tabiatni asrash, balki iqtisodiyotni yanada raqobatbardosh va samarali qilish imkoniyatiga ega bo‘ladi. Masalan, energiya samaradorligini oshirishga qaratilgan “aqlli” tarmoqlar (smart grids) energiya yo‘qotilishini kamaytiradi va qayta tiklanuvchi energiya manbalaridan foydalanishni rag‘batlantiradi. Bu esa import energiyaga qaramlikni kamaytirish bilan birga iqtisodiy xavfsizlikni mustahkamlaydi.

Qishloq xo‘jaligida axborot texnologiyalarining qo‘llanilishi, masalan, dronlar orqali ekin maydonlarini monitoring qilish, tuproq holatini aniqlash va har bir hududga mos keladigan sug‘orish va o‘g‘itlash tizimlarini joriy etish, nafaqat suv va o‘g‘itlarni tejashga, balki hosildorlikni ham sezilarli darajada oshirishga imkon beradi. Bu esa oziq-ovqat xavfsizligini ta‘minlash va qishloq xo‘jaligi

mahsulotlarining eksport salohiyatini kuchaytirishga xizmat qiladi. Innovatsion texnologiyalar, jumladan, zamonaviy fermentatsiya va kompostlash usullari orqali qishloq xo‘jaligi chiqindilarini qayta ishlash ham ekologik muammolarni kamaytirishga yordam beradi.

Sanoat sohasida "aqlli" ishlab chiqarish tizimlarini joriy etish, ya'ni raqamli nazorat, avtomatlashtirish va robotlashtirish jarayonlari mahsulot sifatini oshirish, energiya sarfini kamaytirish va ishlab chiqarish chiqindilarini minimallashtirishga olib keladi. Narsalar Interneti (IoT) texnologiyasi orqali ishlab chiqarish jarayonlarini real vaqt rejimida kuzatish va tahlil qilish, muammolarni oldindan aniqlash va bartaraf etishga yordam beradi. Bu esa texnik nosozliklar sababli yuzaga keladigan qimmatbaho resurslar va energiya yo‘qotilishining oldini oladi.

Ta’lim va ilmiy-tadqiqot sohalarida innovatsion texnologiyalar va AKT dan foydalanish mutaxassislarning malakasini oshirish, ularni zamonaviy texnologiyalar bilan tanishtirish va tadqiqotlar natijalarini tezkor tarqatish uchun keng imkoniyatlar yaratadi. Bu esa "yashil" iqtisodiyotni rivojlantirish uchun zarur bo‘lgan bilim va ko‘nikmalarga ega bo‘lgan kadrlar tayyorlashning muhim sharti hisoblanadi. Universitetlar va ilmiy markazlar orasida global hamkorlikni yo‘lga qo‘yish, masofaviy ta’lim va virtual laboratoriyalardan foydalanish ushbu sohadagi yutuqlarni yanada tezlashtiradi.

Umuman olganda, O‘zbekistonning innovatsiyalar va axborot texnologiyalari orqali "yashil" iqtisodiyotga o‘tish jarayoni katta salohiyatga ega. Ushbu yo‘nalishda qo‘yilayotgan qadamlar, jumladan, "aqlli shahar" konsepsiyasining rivojlanishi, mamlakatning kelajakdagi barqaror taraqqiyotini ta’minlashda muhim rol o‘ynaydi. Ushbu jarayonni yanada jadallashtirish uchun davlat, xususiy sektor va fuqarolik jamiyati institutlari o‘rtasidagi hamkorlikni kuchaytirish, investitsiyalarni jalb qilish va qonunchilik bazasini takomillashtirish zarur.

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## **BIOLOGICAL CHARACTERISTICS OF THE GALL-FORMING PEST DIPLOLEPIS ROSAE ON THE BRANCHES OF ROSEHIP (ROSA CANINA L.)**

**Abstract** This article analyzes the biological characteristics, life cycle, and plant-insect interactions of the gall-forming pest *Diplolepis rosae* on the dog rose (*Rosa canina* L.) plant. Based on a literature review, the taxonomic position, distribution range, host plants, and the mechanism of gall formation of the pest are elucidated.

**Keywords:** *Diplolepis rosae*, *Rosa canina*, gall-forming insects, dog rose, Cynipidae, pest, gall, plant-insect interaction, biology, ecology.

Dog rose (*Rosa canina* L.) is considered a true medicinal treasure of nature, being more than just a beautiful flower (wild rose). Its fruits, flowers, leaves, and even roots are widely utilized in folk medicine and modern pharmacology. However, several insect species reduce yield and damage the plant. Among these pests, gall-formers are particularly prominent, as their impact remains visible for years. Gall-forming insects are organisms with complex ecological relationships with plants. One such insect is *Diplolepis rosae*, a gall-forming wasp belonging to the order Hymenoptera and the family Cynipidae. This species frequently induces galls on wild roses and dog rose plants.

The gall produced by this insect is commonly referred to as "rose bedeguar gall," "moss gall," or "Robin's pincushion gall." Galls are formed as a result of changes in plant tissues induced by the pest, within which the insect larvae develop. This pest primarily occurs on plants of the genus *Rosa*, particularly on *Rosa canina*, *Rosa rubiginosa*, and other wild rose species.

Research indicates that *Diplolepis rosae* is widely distributed mainly in Europe, Asia, and parts of North America. This pest has adapted to various rose species, and its development may depend on the morphological and chemical characteristics of the plant. Some studies suggest that the relationship between the pest and different host plants may lead to genetic differentiation. For instance, studies conducted on three rose species—*Rosa canina*, *Rosa corymbifera*, and *Rosa rubiginosa*—have examined the genetic differences among insect populations.

According to scientific data, *Diplolepis rosae* is typically a univoltine insect, producing one generation per year. In spring, adult insects emerge from the galls and lay eggs on the young shoots or buds of the plant. The female insect uses a specialized egg-laying organ—the ovipositor—to penetrate the plant tissue. Larvae develop within the plant tissues, causing the formation of galls. The gall contains

several chambers, with a separate larva developing in each chamber. Additionally, parthenogenesis is observed in this species, meaning females can reproduce without males.

Gall formation results from complex molecular interactions between the plant and the insect. Modern molecular research shows that biologically active substances, which regulate the growth of plant cells, are present in the ovaries and venom glands of gall-forming insects. These substances accelerate plant cell division, leading to the formation of a new structure in the plant tissue—the gall. Consequently, the gall creates a nutritional and protective environment for the larvae.

*Diplolepis rosae* galls form a unique micro-ecosystem. Along with the primary pest, many other insect species develop within the gall. These include parasitoids, hyperparasitoids, and inquiline species. For example, parasitoids such as *Orthopelma mediator* attack the larvae inside the gall and can destroy a significant portion of them. According to some studies, up to 70–75% of the larvae may perish due to the impact of parasitoids.

Recent genetic studies have focused on the geographic distribution and evolutionary history of *Diplolepis rosae* populations. Molecular research conducted in European regions has shown that the evolutionary relationships between the pest and its parasitoids are complex. In some cases, the geographic distributions of the pest and parasitoid species do not fully overlap, suggesting that ecological adaptation processes have developed independently.

Literature analysis indicates that *Diplolepis rosae* is one of the most widespread and well-studied species among gall-forming insects. It develops primarily on plants of the genus *Rosa*, inducing galls with a complex structure in plant tissues. Gall formation occurs as a result of molecular and physiological interactions between the insect and the plant. Furthermore, these galls create a habitat for many other insects, resulting in the formation of a complex ecological system. Therefore, *Diplolepis rosae* is considered an important model organism for studying plant-insect interactions.

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## **BOSHLANG'ICH SINIF O'QISH SAVODXONLIGI DARSLARIDA BADIY ASARLARNI TAHLIL QILISH SHAKLLARI**

**Annotatsiya:** Ushbu maqolada boshlang'ich sinf o'qish savodxonligi darslarida badiiy asarlarni tahlil qilishning samarali shakllari yoritilgan. Xususan, individual, juftlikda va guruhli ishlash shakllari, rol o'yinlar, muammoli ta'limga asoslangan yondashuvlar, integrativ va ijodiy faoliyatga yo'naltirilgan shakllarning didaktik ahamiyati tahlil qilinadi. Shu bilan birga, interfaol metodlar, jumladan, aqliy hujum va klaster usullarining o'quvchilarning mustaqil fikrlashini, nutqiy faolligini va matnni chuqur anglash ko'nikmalarini rivojlantirishdagi o'rni asoslab berilgan. Maqolada ushbu shakllarning amaliy qo'llanishi va ta'lim samaradorligini oshirishdagi ahamiyati ochib beriladi.

**Kalit so'zlar:** boshlang'ich ta'lim, o'qish savodxonligi, badiiy asar tahlili, individual ish shakli, juftlikda ishlash, guruhli ish, rol o'yinlar, muammoli ta'lim, integrativ yondashuv, ijodiy faoliyat, interfaol metodlar, aqliy hujum, klaster metodi, mustaqil fikrlash, nutqiy rivojlanish

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## **FORMS OF ANALYSIS OF ARTISTIC WORKS IN PRIMARY LITERACY LESSONS**

**Annotation:** This article discusses effective forms of analysis of artistic works in primary literacy lessons. In particular, the didactic significance of individual, pair and group work forms, role-playing games, problem-based learning approaches, integrative and creative activity-oriented forms is analyzed. At the same time, the role of interactive methods, including brainstorming and cluster methods, in developing students' independent thinking, speech activity and deep understanding of the text is substantiated. The article reveals the practical application of these forms and their importance in increasing educational effectiveness.

**Keywords:** primary education, reading literacy, analysis of a work of art, individual work form, pair work, group work, role-playing games, problem-based

*learning, integrative approach, creative activity, interactive methods, brainstorming, cluster method, independent thinking, speech development*

**Kirish.** Boshlang'ich sinf o'qish savodxonligi darslarida badiiy asarlarni tahlil qilish turli shakllarda tashkil etilishi mumkin. Darsda qo'llaniladigan shakllar o'quvchilarning faolligini oshirish, mustaqil fikrlashini rivojlantirish, dars samaradorligini ta'minlashga xizmat qiladi. Shu tufayli o'qituvchi darsni tashkil etishda, individual va juftlikda ishlash, guruhli ish va rolli o'yinlar singari turli pedagogik shakllardan oqilona foydalanishi muhim hisoblanadi.

Individual ishlash shaklida har bir o'quvchi matnni mustaqil o'qiydi, voqealar haqida fikr yuritadi hamda savollarga javob topishga harakat qiladi. Bu jarayon o'quvchilarning mustaqil ishlash ko'nikmalarini rivojlantiradi hamda o'qish jarayonida faol ishtirok etishga yordamlashadi.

Juftlikda ishlash shakli badiiy asarlarni tahlil qilishda samarali hisoblanadi. Bu jarayonda o'quvchilar ikki kishidan iborat bo'lib ishlaydi va matn yuzasidan fikr almashadi. Juftlikda ishlash o'quvchilarning muloqot madaniyatini rivojlantirib, o'z fikrini asoslab berish hamda boshqalarning fikrini tinglash ko'nikmalarini shakllantiradi.

Guruhli ish shakli esa o'quvchilarning hamkorlikda ishlash malakasini rivojlantirishga xizmat qiladi. Guruhlarda ishlash jarayonida o'quvchilar asar qahramonlarini tahlil qiladi. Voqealar rivojini aniqlaydi hamda umumiy xulosa chiqaradi va bu jarayon o'quvchilarning ijtimoiy kompetensiyalarini rivojlantirishda muhim ahamiyatga ega.

Bundan tashqari, rolli o'yinlar shaklidan foydalanish ham badiiy asarlarni o'qitishda samarali natija beradi. Rolli o'yinlar orqali o'quvchilar asardagi qahramonlar obrazlarini jonlantiradi, ularning his –tuyg'ularini his qiladi va voqealarni yanada chuqurroq anglaydi. Bu usul o'quvchilarning tasavvurini rivojlantirib, dars jarayonini qiziqarli qiladi.

Integrativ shakl –turli fanlar o'rtasidagi bog'liqlikni ta'minlash orqali o'quvchilarning bilimlarini kompleks ravishda rivojlantirishga xizmat qiladi. Boshlang'ich sinflarda badiiy asar o'qigan va tahlil qilganda ularni boshqa fanlar bilan bog'lash keng imkoniyatlarga ega. Masalan, hikoya mazmuni asosida ona tili darsida turli grammatik mashqlar bajarish, o'qilgan she'r asosida tasviriy san'at darsida rasm chizish mumkin. Bu o'quvchilarning bilimlarini mustahkamlaydi, tasavvurini kengaytiradi. Alloma Abdulla Avloniy ta'lim va tarbiya jarayonining uzviy bog'liqligini ta'kidlab, bilimlarni hayot bilan bog'lash zarurligini alohida qayd etadi. Uning bu qarashlari integrativ yondashuvning pedagogik asoslarini tashkil etadi.

Ijodiy faoliyatga asoslangan shakl. O'quvchilarda ijodiy fikrlashni rivojlantirishda badiiy asar tahlilining ijodiy shakllari ahamiyatlidir. Bunda o'quvchilar faqat tayyor bilimni qabul qilmaydi. Balki o'zi yangi mahsulot ham yaratadi. Quyidagicha ijodiy topshiriqlar bo'lishi mumkin:

- asarni davom ettirish(davomini yozish);
- qahramonlar nomidan hikoya tuzish;



- voqeani boshqa yakun bilan tasvirlash;
- asar asosida rasmlar chizish.

Ko‘rinib turibdiki bunday topshiriqlar o‘quvchilarning o‘z-o‘zini rivojlantirish kompetensiyasini shakllantirishda muhim omil hisoblanadi. O‘quvchi ijodiy jarayonga faol ishtirok etib, o‘z imkoniyatlarini namoyon etadi va yangi g‘oyalar ishlab chiqadi.

Zamonaviy ta’lim jarayonida axborot-kommunikatsiya texnologiyalaridan foydalanish muhim o‘rin egallamoqda. Badiiy asarlarni tahlil qilishda AKT vositalaridan foydalanish dars jarayonini yanada samarali va qiziqarli tashkillashtirish imkonini beradi. Axborot kommunikasiyalariga asoslangan shaklga she’rni audio shaklda tinglash, hikoya asosida videolavha ko‘rish, turli taqdimotlar yordamida tahlil qilish kabilarni misol qilib keltirishimiz mumkin. AKT asosidagi shakl orqali o‘quvchilarda axborot bilan ishlash, raqamli savodxonlik kabi kompetensiyalar rivojlanadi.

Zamonaviy ta’limda interfaol shakllardan foydalanish muhim o‘rin egallaydi. Interfaol shakllar o‘quvchilarning darsdagi faol ishtirokini ta’minlaydi va mustaqil fikr yuritishga undaydi. “Mustaqillikning dastlabki yillaridan mamlakatimiz ta’lim muassasalarida o‘qitish ishlarining yangi interfaol usullar deb nomlangan metodlari qo‘llanila boshlandi. Bu metodlar xorijiy hamda MDH mamlakatlarining amaliyotida qo‘llanilgan bo‘lib, ular respublika pedagogik olimlari tomonidan qayta ishlanib, mamlakatimiz o‘quv muassasalari sharoitiga moslashtirib ta’lim tarbiya jarayoniga qo‘llanila boshlandi. Ushbu metodlar o‘qitishning samarasini oshirishga qaratilgan bo‘lib, ular ta’lim oluvchilarda mantiqiy, ijodiy tanqidiyva mustaqil fikrlashni shakllantirishga, ilm oluvchining ta’lim obyektidan faol subyektga yo‘naltirishni, ularning ijodiy tafakkurlarini rivojlantirishni, nazarda tutadi”<sup>1</sup>

Badiiy asar tahlilida interfaol shakllardan foydalanish o‘quvchilarning matn mazmunini yaxshiroq anglashiga yordam beradi.

**METODLAR. “Aqliy hujum” usuli.** Bu usul o‘quvchilarni mavzu bo‘yicha keng va har tomonlama fikrlashga, muammoni mustaqil tushunish va yechishda o‘quvchilar motivatsiyasini uyg‘otishga o‘rgatadi. Dars jarayonida o‘qituvchi o‘rtaga muayyan savol yoki muammo tashlaydi hamda o‘quvchilardan o‘z fikrlarini so‘raydi. Masalan, “Asarning asosiy g‘oyasi nima?”, yoki “Qahramonning qaysi xatti-harakati sizga yoqdi?” singari savollar orqali o‘quvchilar fikrlari yig‘iladi. Va yakunida oqituvchi xulosalovchi, aniq javobni aytadi.

“Aqliy hujum uslubining asosiy qoidalari:

- ilgari surilgan fikr va g‘oyalar tanqid ostiga olinmaydi va baholanmaydi;
- taklif qilinayotgan fikr va g‘oyalar qanchalik fantastik va antiqa bo‘lsa ham, uni baholashdan o‘zingizni tiying;
- maqsad-fikr va g‘oyalar sonini ko‘paytirish;
- qancha ko‘p g‘oya va fikr bildirilsa, shunchalik yaxshi. Yangi, bebaho fikr va g‘oyaning tug‘ilish ehtimoli paydo bo‘ladi;

<sup>1</sup> I.E.Davronov, B.T.Jurayev, Pedagogika va psixologiya fanlarini o‘qitish metodikasi, Buxoro, “Durdona” nashriyoti-2019, 185-b.

- agar fikrlar qaytarilsa rad etmang.
- bu muammo faqatgina ma'lum aniq usullar yordamida hal bo'lishi mumkin deb o'ylamang;

- fikrlar hujumini o'tkazish vaqtiga qat'iy rioya qiling;
- berilgan savollarga qisqacha javob bering"<sup>2</sup>.

**"Klaster"** yoki **"Tarmoqlash" usuli.** Bunda o'quvchilar matn mazmunini tizimli ravishda tahlil qiladi. Bu usulda asosiy tushuncha markazga yoziladi va unga bog'liq fikrlar shoxlanib, tarmoqlanib chiqadi.

**"Mosini top" metodi.** Bu metodda bir tomonga ma'lumotlar va qolgan yarmida shu ma'lumotning ikkinchi qismi(yoki bir tomonda savol bir tomonda javob shaklida) bo'lgan varaqalar doskaga yopishtiriladi. O'quvchilar ma'lumotlarni moslashtirishlari talab etiladi.

Boshlang'ich sinflarda badiiy asarlar fanga oid kompetensiyalarni shakllantirishda muhim o'rin tutadi. Negaki badiiy matnlar orqali o'quvchilarning faqat o'qish ko'nikmalari emas, fikrlash, tahlil qilish, xulosa chiqarish qobiliyatlari ham shakllanadi. Olib borgan tahlillarimiz natijasi shuni ko'rsatdiki, 2- sinf o'qish savodxonligi darsligida badiiy janrlar ichida hikoya janri ham yetakchi o'rinlarda turadi. Buni hikoya janrining soddaligi, ixchamligi, obrazlari va syujetining hayotiyliigi hamda boshlang'ich sinf o'quvchilarining yosh va psixologik xususiyatlariga mos kelishi bilan izohlashimiz mumkin.

"Hikoya kichik hajmli badiiy asar bo'lib, unda kishi hayotidagi ma'lim bir voqea, hayotning muhim tomonlari umumlashtirib tasvirlanadi"<sup>3</sup> **Hikoya** mazmunan boshlang'ich sinflar uchun mos janr. Kichik yoshli o'quvchilarni qahramonlarning tashqi ko'rinishi, undagi qahramonlarning xatti-harakati hamda turli voqea-hodisalar haqidagi hikoyalar qiziqtiradi.

Darslikdagi ushbu hikoyalardan biri **"Sehrlil so'z"** hikoyasini tahlil qilsak:

2-sinf O'qish savodxonligi darsligi 4-qismning 12-bo'limi "Shirin –shakar so'zlasang, sehgarddek bo'lasan!" deb nomlanadi. Bo'limdagi 1-va 2- darslar mos ravishda "Nutq sehri I", "Nutq sehri II" deb nomlanadi va anashu ikki darsda muallif Muhabbat Hmidovanning "Sehrlil so'z" hikoyasi o'rganiladi.

1-darsda hikoyadan avval sehrlil so'z aslida qanday bo'lishini izohlovchi quloqqa xush yoquvchi "Minnatdorman", "Marhamat", "Assalomu alaykum", "Iltimos", "Xush kelibsiz", "Rahmat" so'zlari va shular haqida qisqacha matn, so'ng hikoya (2.2-rasm) keltirilgan. Hikoyadan so'ng o'quvchilarni fikrlashga undovchi, zehnni o'tkirlashtiruvchi savollar, izohli lug'at va topshiriqlar, ma'nosini izohlash uchun maqollar berilgan.

- 1. Kimlarning suhbatini o'qidingiz?
- 2. O'ylab ko'ring, so'zlar sehrlil bo'ladimi? Nima uchun?.....

<sup>2</sup> Nurova Feruza Kamolovna, Shodiyeva Gulruh Xayrullayevna, Boshlang'ich sinf o'quvchilarini o'qishga qiziqtirishda innovatsion-integratsion texnologiyalardan foydalanish usullari, Monografiya, Buxoro-2023, "Durdona" nashriyoti. 20-21-b.

<sup>3</sup> Karima Qosimova, Ona tili o'qitish metodikasi, Toshkent <<Nosir>> nashriyoti 2009, 112-b

•-Anqoning urug‘i-sira topilmaydigan narsa. (Anqo-oti bor , o‘zi yo‘q , afsonaviy qush)

-Peshtaxta –sotuvchini xaridordan ajratib turadigan stol

•Hikoyani rollarga bo‘lib o‘qing!

•-Yaxshi gapga quloq sol,yomon gapga uloq sol.

-Yaxshi og‘izga – osh, yomon og‘izga-tosh.

•Uyga topshiriq

So‘ng ikkinchi dars boshlanadi. Hikoyaning qisqacha mazmuni shunday: sehrli so‘zni bilmoqchi bo‘lib Firdavs bobosining sharti, ya‘ni u so‘zlarni yomon bolalar oldida ishlatmaslikka va‘da beradi va bobosi unga “Oyijon, men sizni judayam yaxshi ko‘raman . Endi sirayam sizni xafa qiladigan gap aytmayman. Meni kechiring” degan sehrli so‘zlarni o‘rgatadi. Ona – bola yarashib oladilar. 2-darsdan so‘ng ham mavzu bo‘yicha savollar, topshiriq va maqollar berilgan. Badiiy matn bilan ishlash jarayonida o‘qituvchining suhbat, muhokama va savol-javob kabi an‘anaviy metodlar bilan birga zamonaviy usullardan ham foydalanishi muhim hisoblanadi va bu o‘quvchilarda muloqot kompetensiyasining rivojlanishiga xizmat qiladi.

Boshlang‘ich sinf “O‘qish savodxonligi” darsliklarida berilgan badiiy asarlar o‘quvchilarda fanga oid kompetensiyalarni shakllantirish va rivojlantirishda muhim metodik imkoniyatlarga ega ekanligini yuqoridagi tahlillar yordamida ko‘rib chiqdik. Asarlarni tahlil qilishda savol-javob , munozara ,obrazlarni taqqoslash va voqealarga baho berish kabi metod va usullardan foydalanish o‘quvchilarda mustaqil fikrlash va tahlil qilish kompetensiyalarini rivojlantirishga yordam berishini o‘rgandik. Shuningdek,badiiy asarlarni o‘qitish jarayonida yosh xususiyatlari,qiziqish va bilish imkoniyatlarini hisobga olish,dars davomida interfaol metodlardan foydalanib, matn ustida tizimli ishlash muhim metodik shart-sharoitlardan ekanligini bilib oldik. Fikrimizni xulosalaydigan bo‘lsak, boshlang‘ich sinf o‘qish savodxonligi darslarida badiiy asarni o‘qitish jarayonini to‘g‘ri tashkil etish va metodik jihatdan asoslash o‘quvchilarda fanga oid kompetensiyalarni rivojlantirishning muhim omili hisoblanadi.

**Xulosa.** Boshlang‘ich sinf o‘qish savodxonligi darslarida badiiy asarlarni tahlil qilish o‘quvchilarning nafaqat o‘qish malakasini, balki ularning tafakkuri, nutqi va estetik dunyoqarashini shakllantirishda muhim o‘rin tutadi. Tadqiqot natijalari shuni ko‘rsatadiki, dars jarayonida turli tashkil etish shakllaridan maqsadli va uyg‘un foydalanish ta‘lim samaradorligini sezilarli darajada oshiradi. Individual ishlash o‘quvchining mustaqil fikrlashini rivojlantirsa, juftlik va guruhli faoliyat ijtimoiy hamkorlik, muloqot va fikr almashish ko‘nikmalarini shakllantiradi. Rolli o‘yinlar orqali o‘quvchilar badiiy matn mazmunini chuqurroq his etadi, muammoli ta‘lim esa ularni tahliliy va mantiqiy fikrlashga yo‘naltiradi. Integrativ va ijodiy yondashuvlar esa o‘quvchilarning bilimlarini kengaytirib, ularni erkin va kreativ fikr yuritishga undaydi. Shuningdek, interfaol metodlardan foydalanish o‘quvchilar faolligini oshirib, darsni jonli va mazmunli tashkil etishga xizmat qiladi. Bunday yondashuvlar orqali o‘quvchilar matnni chuqur anglash, o‘z fikrini asoslab berish

hamda mustaqil xulosa chiqarish ko'nikmalarini egallaydi. Umuman olganda, badiiy asarlarni tahlil qilishda zamonaviy pedagogik shakl va metodlardan tizimli foydalanish boshlang'ich ta'lim sifatini oshirishning muhim omili hisoblanadi.

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## **ISSIQLIK ELEKTR STANSIYALARIDAN CHIQADIGAN OQAVA SUVLARNING TARKIBINI KIMYOVIY TOZALASH USULLARINI TAKOMILLASHTIRISH**

**Annotatsiya.** *Issiqlik elektr stansiyalarida (IES) hosil bo‘ladigan oqava suvlar tarkibida og‘ir metallar, neft mahsulotlari, qattiq muallaq zarrachalar, tuzlar hamda kimyoviy reagent qoldiqlari mavjud bo‘lib, ular atrof-muhit va suv havzalari uchun jiddiy xavf tug‘diradi. Mazkur tadqiqotda IES oqava suvlarini kimyoviy tozalashning samarali usullari o‘rganildi. Oqartirish, koagulyatsiya, flokulyatsiya va neytrallashtirish jarayonlari tajriba asosida tahlil qilindi. Natijalar shuni ko‘rsatdiki, kompleks kimyoviy tozalash usuli og‘ir metall ionlarini 85–95% gacha, muallaq moddalarni 90% gacha kamaytirishga imkon beradi.*

**Kalit so‘zlar:** *issiqlik elektr stansiyasi, oqava suv, kimyoviy tozalash, koagulyatsiya, og‘ir metallar, ekologiya.*

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## **IMPROVEMENT OF CHEMICAL TREATMENT METHODS FOR WASTEWATER GENERATED BY THERMAL POWER PLANTS**

**Abstract.** *Wastewater generated at thermal power plants (TPPs) contains heavy metals, petroleum products, suspended solids, salts, and residues of chemical reagents, all of which pose serious threats to the environment and water bodies. This study investigates effective chemical treatment methods for TPP wastewater. The processes of oxidation (bleaching), coagulation, flocculation, and neutralization were analyzed experimentally. The results showed that a комплекс chemical treatment approach makes it possible to reduce heavy metal ions by 85–95% and suspended solids by up to 90%.*

**Keywords:** *thermal power plant, wastewater, chemical treatment, coagulation, heavy metals, ecology.*

**Kirish.** *O‘zbekiston Respublikasida issiqlik elektr stansiyalaridan (IES) chiqadigan oqava suvlarni kimyoviy tozalash jarayoni yirik issiqlik elektr stansiyalari joylashgan hududlarda amalga oshiriladi. Bu jarayon odatda har bir IES tarkibidagi suv tayyorlash va oqava suvlarni tozalash inshootlarida olib boriladi.*



Issiqlik elektr stansiyalari elektr energiyasi ishlab chiqarishda keng qo'llaniladigan asosiy manbalardan biridir. Biroq ishlab chiqarish jarayonida katta hajmda oqava suvlar hosil bo'ladi. Ushbu oqava suvlar tarkibida quyidagi zararli moddalar mavjud [1]. Og'ir metall ionlari ( $Fe^{2+}$ ,  $Cu^{2+}$ ,  $Zn^{2+}$ ,  $Pb^{2+}$ ), sulfat va xlorid tuzlari, neft mahsulotlari, dispers zarrachalar, ishqoriy yoki kislotali reagent qoldiqlari. Agar bu suvlar yetarlicha tozalanmasa, suv ekotizimiga salbiy ta'sir ko'rsatadi. Shu sababli IES oqava suvlarini samarali kimyoviy tozalash dolzarb ekologik masalalardan biridir. Tadqiqotning maqsadi – IES oqava suvlarining kimyoviy tarkibini aniqlash va ularni samarali kimyoviy usullar yordamida tozalash texnologiyasini ishlab chiqish.

**Tadqiqot metodologiyasi.** Oqava suv namunalarini olish. IES sovutish tizimi va qozonxona chiqindi suvlaridan namunalar olindi. Namunalarda quyidagi ko'rsatkichlar aniqlanadi:

pH muhiti, biokimyoviy kislorod sarfi (BKS), kimyoviy kislorod sarfi (KKS), og'ir metall ionlari miqdori, dispers moddalar konsentratsiyasi [2].

Tozalash jarayonlari odatda mexanik tozalash, kimyoviy neytrallash, koagulyatsiya va flokulyatsiya, cho'ktirish va filtratsiya,

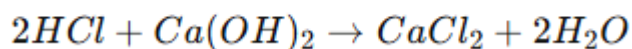
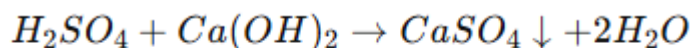
**Kimyoviy tozalash jarayonlari.**

**Neytrallash jarayoni (pH ni me'yorlashtirish).**

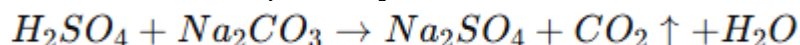
IES oqava suvlari ko'pincha kislotali ( $H_2SO_4$ ,  $HCl$  qoldiqlari) yoki ishqoriy ( $NaOH$ ) bo'ladi. Neytrallash orqali pH 6.5–8.5 oralig'iga keltiriladi [3].

**Kislotali suvlarni neytrallash**

**a) Ohak yordamida:**



**b) Soda yordamida:**

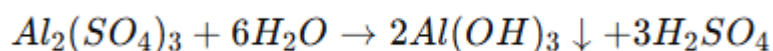


Koagulyatsiya.

Koagulyant sifatida alyuminiy sulfat ( $Al_2(SO_4)_3$ ) qo'llanildi. U muallaq zarrachalarni birlashtirib cho'ktirishga yordam beradi [4].

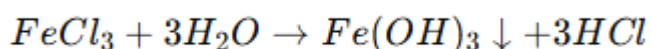
Koagulyant sifatida ko'pincha alyuminiy sulfat yoki temir (III) xlorid qo'llaniladi.

**Alyuminiy sulfat gidrolizi:**



Hosil bo'lgan  $Al(OH)_3$  kolloid zarrachalarni adsorbsiya qiladi va yirik floklarga aylantiradi.

**Temir (III) xlorid:**





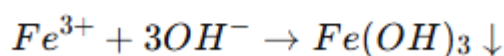
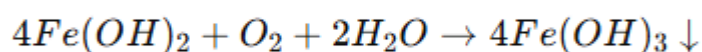
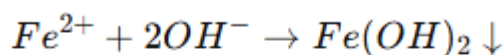
### Flokulyatsiya.

Polimer flokulyantlar (masalan, poliakrilamid) zarrachalarni birlashtirib yirik agregatlar hosil qiladi. Bu jarayon fizik-kimyoviy xarakterga ega bo'lib, asosan elektrostatik tortishish va adsorbsiya mexanizmlariga asoslanadi [5].

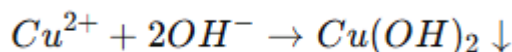
### Og'ir metall ionlarini cho'ktirish.

IES oqava suvlarida  $Fe^{2+}$ ,  $Fe^{3+}$ ,  $Cu^{2+}$ ,  $Zn^{2+}$ ,  $Pb^{2+}$  kabi ionlar uchraydi. Ishqoriy muhitda ular gidroksid shaklida cho'kadi.

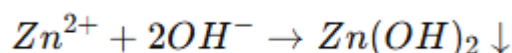
#### Temir:



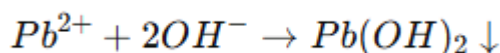
#### Mis:



#### Rux:

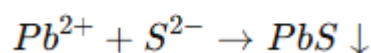
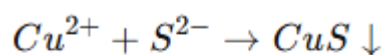


#### Qo'rg'oshin:



### Sulfid yordamida cho'ktirish (chuqur tozalash)

Ba'zi hollarda metall ionlarini yanada samarali ajratish uchun natriy sulfid ( $Na_2S$ ) ishlatiladi [7].



Sulfidlar gidroksidlarga nisbatan kam eruvchan bo'lib, tozalash samaradorligi yuqori bo'ladi.

### Tadqiqot natijalari.

Tadqiqot natijalari 1-jadvalda ko'rsatilgan.

1-jadval

| Ko'rsatkich       | Dastlabki miqdor        | Tozalangandan so'ng    | Samaradorlik (%) |
|-------------------|-------------------------|------------------------|------------------|
| Muallaq moddalar  | 320 mg/l                | 28 mg/l                | 91%              |
| $Fe^{2+}$ ionlari | 4.5 mg/l                | 0.4 mg/l               | 91%              |
| $Cu^{2+}$ ionlari | 1.8 mg/l                | 0.1 mg/l               | 94%              |
| KKS               | 280 mgO <sub>2</sub> /l | 45 mgO <sub>2</sub> /l | 84%              |

Natijalar shuni ko'rsatdiki, kompleks kimyoviy tozalash jarayoni yuqori samaradorlikka ega bo'lib IES oqava suvlaridagi zararli komponentlarni sezilarli darajada kamaytiradi. Ayniqsa:

- Koagulyatsiya va flokulyatsiya muallaq zarrachalarni samarali yo'q qiladi.
- Ishqoriy muhitda og'ir metallar gidroksid shaklida cho'kadi.
- Neytrallashtirish jarayoni suvning pH ko'rsatkichini me'yoriy darajaga keltiradi.

Biroq kimyoviy reagentlar sarfi iqtisodiy jihatdan optimallashtirilishi zarur. Kelajakda membranali texnologiyalar yoki ion-almashinish usullari bilan kombinatsiyalash samaradorlikni yanada oshirishi mumkin.

**Xulosa.** Ilmiy nuqtai nazardan qaraydigan bo'lsak- Metall gidroksidlarining cho'kish termodynamik jihatdan barqaror ( $\Delta G < 0$ ). pH – asosiy boshqaruvchi parametr. Oksidlovchi moddalar yuqori standart potensialga ega. Harorat ortishi ba'zi cho'kish reaksiyalarining samaradorligini kamaytirishi mumkin.

Kompleks kimyoviy tozalash tizimi energiya va muvozanat nuqtai nazaridan optimallashtirilishi zarur. Issiqlik elektr stansiyalaridan chiqadigan oqava suvlarni kimyoviy tozalash ekologik xavfsizlikni ta'minlashda muhim ahamiyatga ega. Tadqiqot natijalariga ko'ra, Kompleks kimyoviy tozalash 85–95% samaradorlikka ega. Og'ir metall ionlari me'yoriy darajagacha kamaytirildi. Oqava suvlarni qayta foydalanish imkoniyati mavjud. Taklif etilayotgan texnologiya IESlarda ekologik talablarni bajarishda samarali yechim bo'lib xizmat qiladi.

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## **SHAHAR MUHITIDA HAVO IFLOSLANISHINI KAMAYTIRISH VA EKOLOGIK XAVFSIZLIK**

**Annotatsiya:** Ushbu maqola atmosfera havosi tarkibidagi kimyoviy moddalar miqdorining ortish sabablari va ularning oldini olish choralari masalasini ilmiy jihatdan tahlil qiladi. So'nggi yillarda sanoat, transport va uy xo'jaliklarining havo ifloslanishidagi hissasi o'rganildi. Tadqiqot natijalari shuni ko'rsatdiki, asosiy ifloslantiruvchi manbalar transport vositalari, sanoat korxonalari va energiya ishlab chiqarish tizimlari hisoblanadi. Havo sifatini yaxshilash uchun transportni optimallashtirish, sanoat chiqindilarini nazorat qilish, qayta tiklanuvchi energiyalardan foydalanish va ekologik ongni oshirish kabi choralar samarali ekanligi ta'kidlanadi. Maqola ekologik barqarorlik va inson salomatligini himoya qilishda havo sifati monitoringining muhimligini ko'rsatadi.

**Kalit so'zlar:** Atmosfera havosi, havo ifloslanishi, kimyoviy moddalar, transport chiqindilari, sanoat chiqindilari, ekologik barqarorlik, havo sifati monitoring.

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## **REDUCING AIR POLLUTION IN THE URBAN ENVIRONMENT AND ENVIRONMENTAL SAFETY**

**Abstract:** This article scientifically analyzes the causes of the increasing concentration of chemical substances in atmospheric air and the measures to prevent them. In recent years, the contribution of industry, transportation, and households to air pollution has been studied. The research results show that the main sources of pollution are vehicles, industrial enterprises, and energy production systems. To improve air quality, measures such as optimizing transportation, controlling industrial emissions, using renewable energy sources, and increasing environmental awareness are considered effective. The article highlights the importance of air quality monitoring in ensuring environmental sustainability and protecting human health.

**Keywords:** Atmospheric air, air pollution, chemical substances, transport emissions, industrial emissions, environmental sustainability, air quality monitoring.

**Kirish.** Atmosfera havosi inson hayotining ajralmas qismi bo'lib, nafas olish uchun zarur bo'lgan kislorod bilan bir qatorda turli kimyoviy moddalarni ham o'z ichiga oladi. Inson faoliyati, sanoatlashuv va transport vositalarining kengayishi natijasida havoning tabiiy tarkibi sezilarli darajada o'zgarib, zararli gazlar va zarrachalar miqdori ortadi. Bu ortish inson salomatligi, o'simlik va hayvonot olamiga jiddiy ta'sir qiladi. So'nggi o'n yilliklarda dunyo bo'yicha shaharlar va sanoat markazlarida CO, NO<sub>x</sub>, SO<sub>2</sub>, uchuvchan organik birikmalar (VOCs) va mayda chang zarralari (PM<sub>2.5</sub>, PM<sub>10</sub>) konsentratsiyasi oshgan, bu esa nafaqat havo sifatini pasaytirgan, balki kislota yomg'irlariga, atmosfera isishiga va global ekologik muammolarga olib kelgan. Shu sababli havo ifloslanishini ilmiy asosda o'rganish va uni kamaytirish choralarini aniqlash dolzarb vazifa sifatida qaraladi.

Havo ifloslanishining asosiy manbalarini aniqlash uchun so'nggi ilmiy maqolalar, hukumat va ekologik tashkilotlar hisobotlari tahlil qilindi, shuningdek, shaharlardagi havoning kimyoviy tarkibi monitoring stansiyalari ma'lumotlari asosida o'rganildi. CO, NO<sub>x</sub>, SO<sub>2</sub>, PM<sub>2.5</sub> va VOCs kabi gazlar va zarrachalar atmosferada qanchalik tez tarqalishi va ularning inson salomatligiga ta'siri statistik jihatdan baholandi. Shu bilan birga, sanoat korxonalari, elektr stansiyalari, transport vositalari va uy xo'jaliklarining havo ifloslanishidagi ulushi aniqlab olindi, ularning chiqaradigan zararli moddalar miqdori va havo sifati bilan bog'liqligi o'rganildi. Turli mamlakat va shaharlar ma'lumotlari solishtirildi, bu esa havo ifloslanishining geografik va iqtisodiy jihatdan qanday farq qilishini ko'rsatdi.

Tahlillar shuni ko'rsatdiki, transport vositalari shahar havosining eng asosiy ifloslantiruvchilari hisoblanadi. Avtomobillar va yuk mashinalari asosan CO, NO<sub>x</sub> va VOCs gazlarini chiqaradi, ularning ulushi shahar markazlarida havo ifloslanishining 40–50 foizini tashkil qiladi. Yo'llarda tirbandliklar havoni keskin ifloslantiradi va PM<sub>2.5</sub> zarralari miqdorini oshiradi. Sanoat korxonalari, jumladan metallurgiya, kimyo va energetika sektori, SO<sub>2</sub>, NO<sub>x</sub> va boshqa toksik gazlarni atmosferaga chiqaradi. Energetika sektorida ko'mir va neft mahsulotlarining yonishi havoni zaharlaydi va kislota yomg'irlariga sabab bo'ladi. Uy xo'jaliklaridagi qattiq yonilg'i va gazli pechlar CO va VOCs miqdorini oshiradi, qurilish ishlari esa PM<sub>10</sub> zarralarini tarqatib, shahar havosini chang bilan boyitadi. Tabiiy manbalar ham mavjud bo'lib, vulkanik faoliyat, chang bo'ronlari va o'simliklar emissiyalari havoni kimyoviy moddalarga boyitadi, ammo inson faoliyatining hissasi tabiiy jarayonlardan ancha yuqori bo'lib, umumiy havo sifatini sezilarli darajada yomonlashtiradi.

Havo ifloslanishini kamaytirish uchun bir nechta samarali choralar mavjud. Transportni optimallashtirish, elektr transport vositalarini rivojlantirish va jamoat transportini kengaytirish orqali CO va NO<sub>x</sub> chiqindilarini sezilarli darajada kamaytirish mumkin. Piyoda va velosiped yo'laklarini kengaytirish ham shahar havosini toza saqlashga yordam beradi. Sanoat chiqindilarini nazorat qilish muhim ahamiyatga ega: filtrlar, katalizatorlar va chiqindi gazlarni qayta ishlash tizimlari yordamida SO<sub>2</sub> va boshqa zararli moddalar atmosferaga chiqishi kamayadi. Shu bilan birga, energiya samaradorligini oshirish va ko'mir hamda neft o'rniga quyosh, shamol va suv energetikasidan foydalanish havoni ifloslantiruvchi moddalarni

kamaytiradi. Qonuniy tartib va monitoring tizimi havo sifati bo'yicha qat'iy standartlar o'rnatish, muntazam monitoring va jarimalar orqali havo ifloslanishini kamaytiradi. Aholining ekologik ongini oshirish va shahar hududlarida yashil hududlarni ko'paytirish ham havoni toza saqlashga yordam beradi.

Atmosfera havosi tarkibidagi kimyoviy moddalar miqdorining ortishi nafaqat insoniyat salomatligi, balki tabiat va global ekologik tizimlar uchun ham jiddiy tahdid hisoblanadi. Asosiy sabablar transport, sanoat va energetika faoliyati bilan bog'liq bo'lib, ularni kamaytirish texnologik, huquqiy va ijtimoiy choralarni birgalikda amalga oshirishni talab qiladi. Kelajakda havo sifati monitoringini kuchaytirish va ekologik ongni oshirish strategik yo'nalish sifatida muhim ahamiyatga ega bo'lib qoladi. Shu bilan birga, havo ifloslanishining oldini olish bo'yicha samarali chora-tadbirlar global miqyosda ham qabul qilinishi kerak, chunki atmosferaning ifloslanishi bir mamlakat bilan cheklanmay, butun sayyoraga ta'sir qiladi.

Havo sifatini yaxshilash uchun shaharlar va sanoat zonalarida chiqindilarni kamaytirish, yashil hududlarni ko'paytirish, transportni optimallashtirish va aholining ekologik bilimini oshirish kabi kompleks choralarni qo'llash zarur. Texnologik yechimlar, jumladan elektr transport vositalari, sanoat filtr tizimlari va qayta tiklanuvchi energiya manbalaridan foydalanish orqali havodagi zararli moddalar konsentratsiyasi sezilarli darajada kamaytirilishi mumkin. Shu bilan birga, ilmiy tadqiqotlar va monitoring havo sifati bo'yicha qaror qabul qilishda muhim ma'lumot manbai sifatida xizmat qiladi.

Natijada, atmosfera havosi tarkibidagi kimyoviy moddalarni kamaytirish nafaqat ekologik muvozanatni saqlash, balki insonlarning sog'lig'i va yashash sifatini yaxshilashga yordam beradi. Bu esa texnologik, huquqiy va ijtimoiy choralarni birgalikda amalga oshirishni talab qiladi. Havo sifati monitoringini kuchaytirish, ekologik ongni oshirish va yashil hududlarni rivojlantirish kabi chora-tadbirlar kelajak avlod uchun sog'lom va barqaror ekologik muhit yaratadi.

Xulosa qilib aytganda, atmosfera havosining ifloslanishi zamonaviy jamiyatning eng muhim ekologik muammolaridan biri hisoblanadi. Inson faoliyati, xususan sanoatlashuv, transport vositalarining ko'payishi, energetika tizimida ko'mir va neft mahsulotlaridan keng foydalanish hamda uy xo'jaliklaridagi yonilg'i jarayonlari natijasida havoga ko'plab zararli kimyoviy moddalar chiqarilmoqda. CO, NO<sub>x</sub>, SO<sub>2</sub>, uchuvchan organik birikmalar (VOCs) hamda PM<sub>2.5</sub> va PM<sub>10</sub> kabi mayda chang zarralari atmosfera tarkibining tabiiy muvozanatini buzib, havo sifatining yomonlashishiga olib keladi. Bu esa inson salomatligi, o'simlik va hayvonot dunyosi hamda butun ekologik tizim uchun jiddiy xavf tug'diradi.

O'rganishlar shuni ko'rsatadiki, ayniqsa yirik shaharlar va sanoat markazlarida transport vositalari, energetika korxonalari va sanoat tarmoqlari havo ifloslanishining asosiy manbalari hisoblanadi. Ushbu manbalardan chiqayotgan gazlar va zarrachalar nafaqat mahalliy hududda, balki atmosfera orqali uzoq masofalarga tarqalib, global ekologik muammolar — iqlim o'zgarishi, kislota yomg'irlari va atmosfera isishi kabi jarayonlarni kuchaytiradi. Natijada, havo sifati



yomonlashib, nafas yoʻllari kasalliklari, yurak-qon tomir kasalliklari va boshqa sogʻliq muammolari xavfi ortadi.

Shu sababli havo ifloslanishini kamaytirish kompleks va tizimli yondashuvni talab qiladi. Transport tizimini optimallashtirish, jamoat transportini rivojlantirish, elektr transport vositalaridan foydalanishni kengaytirish hamda piyoda va velosiped infratuzilmasini rivojlantirish orqali shahar havosiga chiqariladigan zararli moddalar miqdorini sezilarli darajada kamaytirish mumkin. Bundan tashqari, sanoat korxonalarida zamonaviy filtrlar, katalizatorlar va chiqindi gazlarni tozalash texnologiyalarini joriy etish muhim ahamiyatga ega. Energetika sohasida esa qayta tiklanuvchi energiya manbalaridan — quyosh, shamol va suv energetikasidan foydalanishni kengaytirish havoni ifloslantiruvchi moddalar miqdorini kamaytirishga yordam beradi.

Bundan tashqari, ekologik siyosat va qonunchilikning mustahkam boʻlishi, havo sifati boʻyicha qatʼiy standartlarning joriy etilishi hamda monitoring tizimining doimiy ishlashi havo ifloslanishini nazorat qilishda muhim rol oʻynaydi. Aholining ekologik madaniyatini oshirish, yashil hududlar va daraxtzorlarni koʻpaytirish, shaharsozlikda ekologik yondashuvni qoʻllash ham havo sifatini yaxshilashga xizmat qiladi.

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## **THE CURRENT LEVEL OF APPLICATION OF MODERN INFORMATION TECHNOLOGIES AND THEIR ROLE IN DATA COLLECTION, DIAGNOSIS, AND TREATMENT IN VARIOUS MEDICAL FIELDS**

**Abstract:** This article examines the current level of application of modern information technologies in the healthcare sector and analyzes their role in medical data collection, diagnosis, and treatment processes. The study highlights the significance of electronic health systems, medical information systems, telemedicine, and artificial intelligence technologies in improving the quality, efficiency, and accessibility of healthcare services. The research emphasizes that the integration of information technologies contributes to accurate diagnostics, personalized treatment, and effective management of healthcare resources.

**Keywords:** information technologies, healthcare, medical data, diagnosis, treatment, telemedicine, artificial intelligence.

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## **ZAMONAVIY AXBOROT TEXNOLOGIYALARINI QO‘LLANISH DARAJASI VA TURLI TIBBIYOT SOHALARIDA MA’LUMOTLAR TO‘PLASH, DIAGNOZ VA DAVOLASHDAGI O‘RNI**

**Annotatsiya:** Mazkur maqolada sog‘liqni saqlash tizimida zamonaviy axborot texnologiyalaridan foydalanish darajasi va ularning tibbiy ma’lumotlarni yig‘ish, diagnostika va davolash jarayonlaridagi ahamiyati tahlil qilinadi. Elektron sog‘liqni saqlash tizimlari, telemeditsina, sun‘iy intellekt va tibbiy axborot tizimlarining tibbiy xizmatlar sifatini oshirishdagi roli ko‘rib chiqiladi. Tadqiqot natijalari axborot texnologiyalarining tibbiyotda samaradorlikni oshirish va resurslardan oqilona foydalanishda muhim omil ekanini ko‘rsatadi.

**Kalit so‘zlar:** axborot texnologiyalari, tibbiyot, elektron sog‘liqni saqlash, diagnostika, davolash, telemeditsina, sun‘iy intellekt.

### **Introduction**

The rapid development of modern information technologies has led to profound transformations in various sectors, including healthcare. Today,

healthcare systems increasingly depend on digital solutions to manage complex medical data, enhance diagnostic accuracy, and improve treatment outcomes. The adoption of information technologies has become a strategic priority for healthcare systems worldwide, as it enables cost-effective service delivery and improved patient care.

In modern medicine, timely access to accurate medical information plays a critical role in decision-making processes. Therefore, the implementation of advanced information technologies is essential for ensuring the effectiveness and sustainability of healthcare systems. This study aims to analyze the current level of information technology usage in healthcare and evaluate its role in data collection, diagnosis, and treatment across different medical fields.

#### Current Level of Information Technology Usage in Healthcare

At present, healthcare institutions actively implement various information systems, including Electronic Medical Records (EMR), Hospital Information Systems (HIS), Laboratory Information Systems (LIS), and Picture Archiving and Communication Systems (PACS). These systems facilitate efficient management of patient information and enable healthcare professionals to access medical data in real time.

The widespread digitalization of healthcare processes has reduced administrative workload, minimized medical errors, and enhanced coordination among healthcare providers. Additionally, cloud-based technologies allow secure storage and sharing of medical data, supporting collaborative decision-making and continuity of care.

#### Role of Information Technologies in Medical Data Collection and Management

Medical data collection is one of the most critical aspects of healthcare delivery. Modern information technologies provide automated tools for collecting, storing, and processing large volumes of patient data. Electronic health records ensure standardized documentation and improve data accuracy.

Advanced data analytics and big data technologies enable healthcare professionals to identify trends, predict disease risks, and develop preventive strategies. As a result, information technologies significantly contribute to evidence-based medicine and public health management.

#### Application of Information Technologies in Diagnostic Processes

Information technologies play a vital role in modern diagnostic practices. Medical imaging technologies such as computed tomography (CT), magnetic resonance imaging (MRI), and digital radiography rely heavily on advanced software for image processing and analysis.

Artificial intelligence and machine learning algorithms have become increasingly important in diagnostics. These technologies assist clinicians in detecting diseases at early stages, analyzing complex medical images, and reducing diagnostic errors. The integration of decision-support systems enhances diagnostic accuracy and supports clinical decision-making.

Healthcare organizations utilize a variety of digital tools, including electronic medical records (EMR), hospital information systems (HIS), laboratory information systems (LIS), and medical imaging platforms. These technologies streamline patient data management, improve workflow efficiency, and reduce the likelihood of errors.

#### Use of Information Technologies in Treatment and Patient Care

In treatment processes, information technologies enable the development of personalized and effective therapeutic strategies. Robotic-assisted surgery, computer-aided treatment planning, and digital monitoring systems improve treatment precision and patient safety.

Telemedicine platforms allow remote consultations, patient monitoring, and follow-up care, particularly in remote and underserved areas. These technologies enhance access to healthcare services and reduce the burden on medical facilities. Furthermore, digital health applications support patient engagement and adherence to treatment plans.

#### Information Technologies in Medical Data Collection and Analysis

Modern technologies provide automated mechanisms for collecting, storing, and analyzing large volumes of medical data. Electronic health records standardize patient documentation and enhance accuracy.

**Table 1:** Examples of IT applications across medical fields

| Field      | Technology Used                 | Purpose                                     |
|------------|---------------------------------|---------------------------------------------|
| Cardiology | Wearable monitors, ECG software | Heart rate tracking, arrhythmia detection   |
| Surgery    | Robotic surgery systems         | Precision operations, reduced recovery      |
| Pediatrics | EMR, digital growth charts      | Monitor child health, vaccination schedules |
| Oncology   | AI imaging tools                | Tumor detection, treatment planning         |

Table 1

#### Digital Technologies in Diagnostic Processes

Medical imaging tools such as CT, MRI, and digital ultrasound rely on sophisticated software for accurate interpretation. Artificial intelligence algorithms enhance diagnostic accuracy and help identify subtle pathological changes.

Results: The analysis of current healthcare practices demonstrates that the integration of modern information technologies significantly improves the efficiency of medical data management, diagnostic accuracy, and treatment processes. The use of electronic health record systems has resulted in more structured and accessible patient data, enabling healthcare professionals to retrieve information promptly and make informed clinical decisions.

The findings indicate that healthcare institutions implementing digital diagnostic tools, such as computer-assisted imaging systems and artificial intelligence-based decision support, show higher accuracy in disease detection and reduced diagnostic time. In particular, the application of machine learning

algorithms contributes to the early identification of pathological conditions and supports clinicians in complex diagnostic cases.

#### Conclusion

In conclusion, modern information technologies have become an indispensable component of contemporary healthcare systems. Their application in data collection, diagnosis, and treatment significantly improves the quality, efficiency, and accessibility of medical services. The ongoing integration of advanced digital technologies is expected to play a crucial role in shaping the future of healthcare and improving patient outcomes.

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## **BO'STONLIQ TUMANIDA EKOTURIZMNI RIVOJLANTIRISHDA LANDSHAFT YONDASHUVI ASOSIDA HUDUDIIY ZONALASH**

**Annotatsiya.** *Ushbu tadqiqotda Bo'stonliq tumani hududida ekoturizmni barqaror rivojlantirish maqsadida landshaft yondashuvi asosida hududiy zonalash metodikasi ishlab chiqildi. Tadqiqotda masofadan zondlash ma'lumotlari va geoaxborot tizimlari integratsiyasi orqali tabiiy-iqlimiy hamda relyef omillarining fazoviy taqsimoti baholandi. ERA5-Land reanaliz ma'lumotlari asosida havo harorati, yog'in miqdori, shamol tezligi va quyosh radiatsiyasi ko'rsatkichlari hisoblanib, soddalashtirilgan turistik iqlim qulayligi indeksi (sTCI) shakllantirildi. Ushbu indeks landshaft komponentlari (vegetatsiya qoplam, relyefning tikligi va balandligi, suv obyektlariga yaqinlik hamda antropogen bosim) bilan birgalikda baholanib, hudud ekoturizm salohiyati bo'yicha zonalarga ajratildi. Natijalar Bo'stonliq tumanida ekoturizmni rivojlantirish uchun eng qulay hududlar asosan o'rtacha balandlikdagi, o'rmon va suv obyektlariga yaqin, nisbatan past antropogen bosimga ega zonalarida joylashganini ko'rsatdi. Tadqiqot natijalari hududiy rejalashtirish, turizm infratuzilmasini joylashtirish va tabiiy landshaftlarni muhofaza qilish jarayonlarida ilmiy asos bo'lib xizmat qilishi mumkin.*

**Kalit so'zlar:** *ekoturizm, landshaft yondashuvi, hududiy zonalash, masofadan zondlash, geoaxborot tizimlari, sTCI, Bo'stonliq tumani.*

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## **LANDSCAPE-BASED SPATIAL ZONING FOR ECOTOURISM DEVELOPMENT IN BOSTANLIQ DISTRICT, UZBEKISTAN**

**Abstract.** *This study develops a landscape-based spatial zoning approach to support sustainable ecotourism development in Bostanliq District, Uzbekistan. The research integrates remote sensing data and GIS-based spatial analysis to assess the distribution of key natural and climatic factors influencing tourism suitability. ERA5-Land reanalysis data were used to derive air temperature, precipitation, wind speed, and solar radiation, which were combined into a simplified Tourism Climate Suitability Index (sTCI). This index was integrated with landscape components such*

*as vegetation cover, terrain slope and elevation, proximity to water bodies, and anthropogenic pressure to delineate ecotourism suitability zones. The results indicate that areas with moderate elevation, dense vegetation, proximity to water resources, and relatively low human disturbance exhibit the highest potential for ecotourism development. The proposed framework provides a scientific basis for spatial planning, sustainable tourism management, and conservation-oriented land-use decision-making.*

**Keywords:** *ecotourism, landscape approach, spatial zoning, remote sensing, geographic information systems, tourism climate index, Bostanliq District.*

## KIRISH

So‘nggi yillarda ekoturizm barqaror rivojlanishning muhim yo‘nalishlaridan biri sifatida global miqyosda e‘tirof etilmoqda. Ekoturizm nafaqat iqtisodiy faollikni oshiradi, balki tabiiy resurslarni muhofaza qilish, mahalliy aholi bandligini ta‘minlash va madaniy merosni saqlashga xizmat qiladi. Jahon Turizm Tashkiloti (UNWTO) ma‘lumotlariga ko‘ra, ekologik yo‘naltirilgan turizm shakllari eng tez rivojlanayotgan segmentlardan biri bo‘lib, ayniqsa tabiiy landshaftlarga boy hududlarda yuqori salohiyatga ega hisoblanadi [1], [2], [3].

Landshaft yondashuvi ekoturizmni hududiy rejalashtirishda muhim metodologik asos bo‘lib xizmat qiladi. Ushbu yondashuv hududning tabiiy komponentlari — relyef, iqlim, suv resurslari, vegetatsiya qoplam va antropogen bosim omillarini yaxlit tizim sifatida ko‘rib chiqishga imkon beradi [4], [5], [6], [7]. Landshaft yondashuvi asosida amalga oshirilgan zonalash ekologik sezgir hududlarni muhofaza qilish bilan bir qatorda, turizm infratuzilmasini joylashtirishda ilmiy asos yaratadi.

Masofadan zondlash va geoaxborot tizimlari landshaft jarayonlarini fazoviy va vaqt bo‘yicha tahlil qilishda samarali vosita hisoblanadi. Sentinel, Landsat, ERA5 kabi sun‘iy yo‘ldosh va reanaliz ma‘lumotlari asosida relyef, iqlim va yer qoplam ko‘rsatkichlarini integratsiyalash hududning ekoturizm salohiyatini ob‘ektiv baholash imkonini beradi [8]. Shu bilan birga, turizm iqlim qulayligi indekslari (masalan, Tourism Climate Index — TCI) hududning turistik mavsumiy jozibadorligini baholashda keng qo‘llanilmoqda [3], [9].

O‘zbekistonda ekoturizmni rivojlantirish davlat siyosatining ustuvor yo‘nalishlaridan biri hisoblanadi. O‘zbekiston Respublikasi Prezidentining 2019-yil 5-yanvardagi PF–5611-son Farmonida “turizmni rivojlantirish mamlakat iqtisodiyotining strategik tarmog‘i sifatida belgilanishi” hamda “ekologik, tog‘ va qishloq turizmini rivojlantirish orqali hududlarning investitsion jozibadorligini oshirish zarurligi” qayd etilgan. Shuningdek, “2020–2025-yillarda turizmni rivojlantirish konsepsiyasi”da tabiiy hududlardan foydalanishda ekologik barqarorlikni ta‘minlash muhim vazifa sifatida ko‘rsatib o‘tilgan [6], [10], [11].

Bo‘stonliq tumani Toshkent viloyatining tog‘li va o‘rmon landshaftlariga boy, suv resurslari va rekreatsion imkoniyatlari yuqori bo‘lgan hududlaridan biri hisoblanadi. Shu bilan birga, turizm infratuzilmasining notekis joylashuvi, ayrim hududlarda antropogen bosimning ortishi hamda ekologik sezgir zonalarining

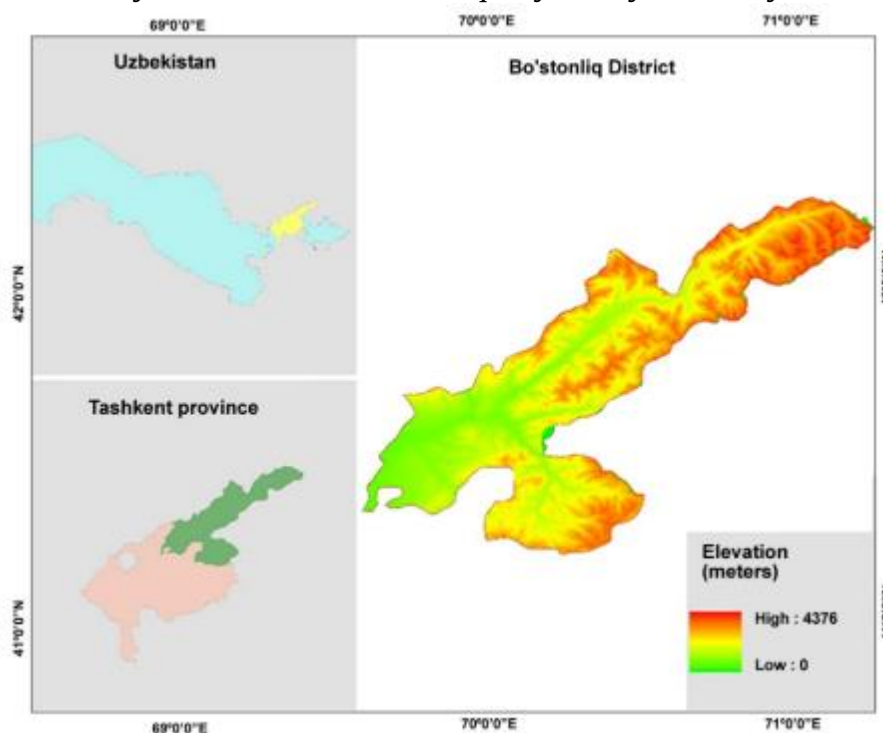


mavjudligi ekoturizmni ilmiy asosda rejalashtirish zaruratini yuzaga keltirmoqda. Shu sababli, mazkur tadqiqotda landshaft yondashuvi va geofazoviy tahlillar asosida Bo'stonliq tumanida ekoturizmni rivojlantirish uchun hududiy zonalashni amalga oshirish dolzarb ilmiy-amaliy masala hisoblanadi [12], [13].

Mazkur ishning asosiy maqsadi — masofadan zondlash ma'lumotlari va geoaxborot tizimlari asosida Bo'stonliq tumanida ekoturizm salohiyatini landshaft yondashuvi asosida baholash hamda hududni zonalarga ajratish orqali barqaror hududiy rejalashtirish uchun ilmiy asos yaratishdan iborat.

#### METODOLOGIYA

Tadqiqot ob'ekti sifatida Toshkent viloyatining tog'li hududi hisoblangan Bo'stonliq tumani tanlandi. Hudud reliefi balandliklar bo'yicha keskin farqlanadi, o'rmon, tog' yaylovlari, daryo vodiylari va antropogen hududlar (aholi punktlari, yo'llar, dam olish maskanlari) bilan xarakterlanadi. Bu hududning landshaft xilma-xilligi ekoturizm salohiyatini baholash uchun qulay tabiiy sharoit yaratadi.



1-rasm. Bo'stonliq tumanining geografik joylashuvi. [12]

Tadqiqot landshaft yondashuvi asosida olib borildi. Ushbu yondashuv hududni yagona tabiiy-hududiy tizim sifatida ko'rib, ekoturizm salohiyatini shakllantiruvchi asosiy komponentlar — iqlim, relyef, vegetatsiya qoplam, suv resurslari va antropogen bosimni kompleks tarzda baholashni nazarda tutadi. Tadqiqot bosqichlari quyidagilardan iborat:

1. Masofadan zondlash va reanaliz ma'lumotlarini yig'ish;
2. Landshaft komponentlari ko'rsatkichlarini hisoblash;
3. Turistik iqlim qulayligi indeksini (sTCI) shakllantirish;
4. Landshaft omillari bilan integratsiya qilish;
5. Hududni ekoturizm salohiyati bo'yicha zonalarga ajratish.

Tadqiqotda quyidagi asosiy ma'lumot manbalaridan foydalanildi:

❖ ERA5-Land reanaliz ma'lumotlari — havo harorati (2 m), yog'in miqdori, shamol tezligi (10 m) va quyosh radiatsiyasi ko'rsatkichlarini olish uchun;

❖ Sentinel-2 sun'iy yo'ldosh tasvirlari — vegetatsiya qoplami (NDVI) va suv obyektlarini aniqlash uchun;

❖ SRTM raqamli balandlik modeli — relyef balandligi va nishablikni hisoblash uchun;

❖ ESA WorldCover — antropogen hududlar va yer qoplami turlarini aniqlash uchun;

❖ Bo'stonliq tumanining ma'muriy chegaralari — fazoviy kesish (clip) va zonal hisoblar uchun.

Barcha ma'lumotlar Google Earth Engine bulutli hisoblash muhitida qayta ishlanib, yagona fazoviy rezolyutsiya va koordinata tizimiga keltirildi. Turistik iqlim qulayligini baholash uchun soddalashtirilgan Turizm Iqlimi Qulayligi Indeksi (sTCI) hisoblandi. Indeks quyidagi komponentlardan iborat:

❖ **C** — havo harorati qulayligi;

❖ **R** — yog'in ta'siri;

❖ **S** — quyosh radiatsiyasi;

❖ **W** — shamol tezligi.

Har bir komponent 0 dan 100 gacha normallashtirildi va quyidagi og'irliklar bilan birlashtirildi:

$$sTCI=0.4\cdot C+0.2\cdot R+0.2\cdot S+0.2\cdot W [2], [14]$$

Bu yerda og'irliklar iqlim omillarining turistik qulaylikka nisbiy ta'siriga asoslanib tanlandi.

Landsahft omillari

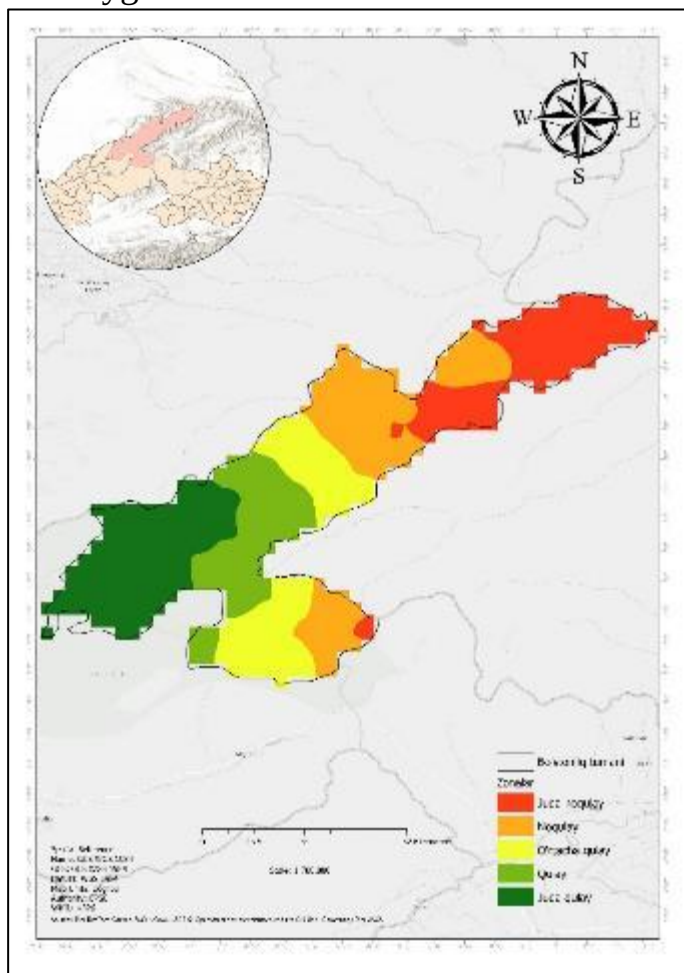
SRTM asosida hududning balandligi va nishabligi hisoblandi. Juda tik qiyaliklar va ekstremal balandlik zonalari turizm infratuzilmasi uchun cheklovchi omil sifatida baholandi. Vegetatsiya zichligi Sentinel-2 asosida NDVI orqali baholandi. Yuqori NDVI qiymatlari landshaftning estetik va ekologik jozibadorligini aks ettiradi. Suv obyektlariga yaqinlik esa rekreatsion imkoniyatlar va landshaft jozibadorligini oshiruvchi omil sifatida hisobga olindi. Aholi punktlari va qurilgan hududlardan masofa antropogen bosimning proksi ko'rsatkichi sifatida ishlatildi. Antropogen bosimi past bo'lgan hududlar ekoturizm uchun ustunroq deb baholandi. Barcha landshaft komponentlari 0–1 yoki 0–100 oralig'ida normallashtirilib, vaznli integratsiya usuli orqali yagona ekoturizm salohiyati indeksiga birlashtirildi. Yakuniy indeks qiymatlari kvantil usuli yordamida besh sinfga ajratildi: past, o'rta past, o'rta, o'rta yuqori va yuqori salohiyat zonalari.

Fazoviy tahlil va natijalarni baholash

Zonalar bo'yicha maydonlar hisoblandi, hududiy taqsimot xaritalari tuzildi va ekoturizmni rivojlantirish nuqtai nazaridan ularning fazoviy mantiqi tahlil qilindi. Natijalar hududiy rejalashtirish va ekologik muhofaza nuqtai nazaridan muhokama qilindi.

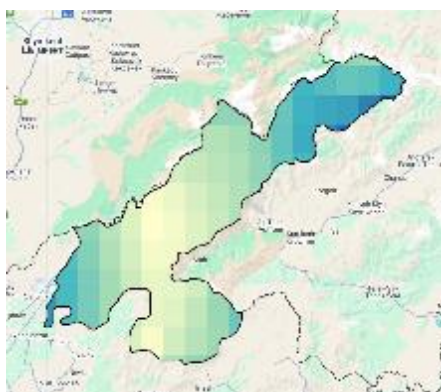
## NATIJALAR VA MUHOKAMA

ERA5-Land ma'lumotlari asosida hisoblangan sTCI indeksi Bo'stonliq tumani bo'yicha sezilarli fazoviy farqlanishga ega ekanini ko'rsatdi. O'rtacha va yuqori qiymatlar asosan o'rta balandlik zonalarida, shamol tezligi nisbatan past va quyosh radiatsiyasi barqaror bo'lgan hududlarda jamlangan. Daryo vodiylariga yaqin joylarda sTCI qiymatlarining biroz pasayishi yog'in miqdorining nisbatan yuqoriligi bilan izohlanadi, baland tog' zonalarida esa past harorat va kuchli shamol tufayli indeks qiymati kamaygan.

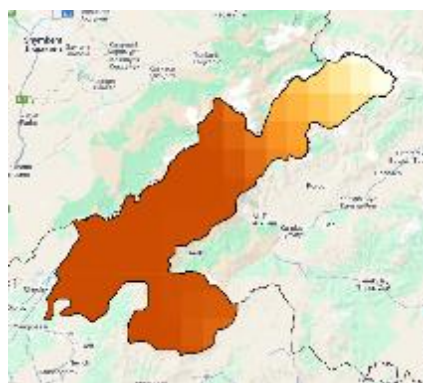


2-rasm. Integratsiyalashgan baholash asosida aniqlangan ekoturizm salohiyati zonalari.

Bu natijalar Bo'stonliq tumanida ekoturizm faoliyatining mavsumiy va hududiy chegaralanishini ko'rsatib, ayniqsa yozgi davrda o'rta balandlik mintaqalari eng qulay iqlim sharoitiga ega ekanini tasdiqlaydi 3-rasm. Vegetatsiya qoplami (NDVI) yuqori bo'lgan o'rmonli va tog' etaklari zonalari estetik va ekologik jozibadorligi bilan ajralib turadi. Bu hududlar, ayniqsa suv obyektlariga yaqin joylashgan bo'lsa, rekreatsion imkoniyatlar nuqtai nazaridan ustun hisoblanadi. Relyefning tikligi ekoturizmning turli shakllariga turlicha ta'sir ko'rsatadi: juda tik qiyaliklar xavfsizlik va infratuzilma qurilishi uchun cheklovchi omil bo'lsa, o'rtacha nishablik zonalari trekking va tog' turizmi uchun qulay hisoblanadi.



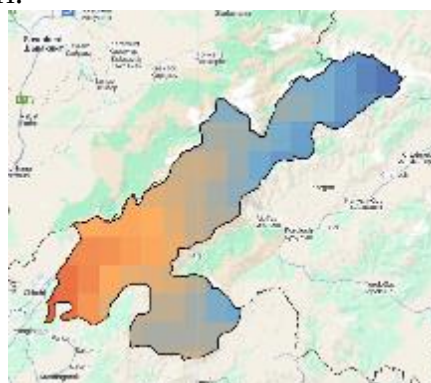
3a-rasm. Shamol tezligi.



3b-rasm. Quyosh radiatsiyasi miqdori.



3c-rasm. Yog'ingarchilik miqdori



3d-rasm. Havo harorati miqdori.

Antropogen bosim ko'rsatkichlari aholi punktlari va yo'llarga yaqin hududlarda yuqori bo'lib, bu zonalarda ekologik yuklama ortishi kuzatiladi. Shu sababli bunday hududlar intensiv ekoturizm emas, balki boshqariladigan yoki cheklangan foydalanish zonalari sifatida ko'rib chiqilishi lozim.

Integratsiyalashgan baholash natijasida Bo'stonliq tumani hududi ekoturizm salohiyati bo'yicha besh zonaga ajratildi. Yuqori salohiyat zonalari asosan o'rtacha balandlikdagi, o'rmon bilan qoplangan, suv obyektlariga yaqin va nisbatan past antropogen bosimga ega hududlarda joylashgan. Past salohiyat zonalari esa yoki juda tik va baland tog' hududlari, yoki aholi punktlariga yaqin bo'lgan intensiv foydalanilayotgan joylar bilan mos keladi.

Zonalash natijalari hududiy rejalashtirishda differensial yondashuv zarurligini ko'rsatadi: yuqori salohiyat zonalarida ekoturizm infratuzilmasini rivojlantirish mumkin bo'lsa, sezgir zonalarda ekologik muhofaza ustuvor bo'lishi lozim.

### **Xulosa**

Olingan natijalar landshaft yondashuvi asosida olib borilgan fazoviy tahlil ekoturizmni rejalashtirishda samarali vosita ekanini ko'rsatadi. An'anaviy yondashuvlarda turizm obyektlari ko'pincha mavjud infratuzilmaga yaqin joylashtiriladi, bu esa ekologik yuklamaning ortishiga olib keladi. Ushbu tadqiqot esa landshaft sezgirligi va ekologik barqarorlikni hisobga olgan holda hududiy differensiallash imkonini beradi.



Shu bilan birga, natijalar ma'lum cheklovlarga ega. ERA5-Land ma'lumotlarining fazoviy rezolyutsiyasi nisbatan past bo'lgani sababli mikroiklim farqlari to'liq aks ettirilmagan bo'lishi mumkin. Bundan tashqari, antropogen bosim faqat masofaviy ko'rsatkichlar orqali baholangan bo'lib, real tashrif zichligi va mavsumiy yuklama inobatga olinmagan. Kelgusida turistik oqim statistikasi, mobil ma'lumotlar yoki dala kuzatuvlari bilan integratsiya natijalarni yanada aniqlashtirishi mumkin.

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**O'xshatishlar – lingvomadaniy birlik sifatida**

## **TIL VA MADANIY BIRLIK SIFATIDA O'SHISHLAR**

**Annotatsiya:** Ushbu maqolada lingvomadaniy birlik hisoblangan o'xshatishlar milliy ruh ifodasi sifatida tahlil etiladi. Guljamol Asqarova she'rlari orqali o'xshatishning to'rt unsuri hamda ularni hosil qiluvchi vositalar ochib berilgan. O'xshatishlar obrazli tasavvur orqali yuzaga kelishi, ikki turli bo'lishi, biri muallif o'xshatishlari bolsa, ikkinchisi turg'un o'xshatishlar ekanligi ta'kidlangan.

**Kalit so'zlar:** qiyos, poetik figura, turg'un o'xshatish.

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## **SIMILES AS A LINGUISTIC AND CULTURAL UNIT**

**Annotation:** In these articles, similes, which are considered linguistic and cultural units, are analyzed as an expression of the national spirit. The direct use of similes through the poems of Guljamol Askarova is emphasized. Similes are a combination of figurative imagination, and it is emphasized that they are of two types, one is the author's similes, the other is stable similes.

**Keywords:** simile, poetic figure, stable simile.

Insonlarning dunyoni anglashlarida o'xshatishlarning o'rni juda muhim hisoblanadi. Ikkita predmetni yoki inson tafakkurida hosil bo'lgan tushunchani bir-biriga tamoman o'xshash yoki bir-biridan farq qiluvchi jihatlarini aniqlash maqsadida qiyoslash, taqqoslash bu olamni bilishning eng faol tarqalgan usullaridan biri sifatida inson faoliyatining barcha jabhalarida foydalaniladi va til orqali ifoda etiladi. Qiyoslash vositasida bilingan narsa-xususiyat, bilinmagan narsa-xususiyatni osonlik bilan anglash imkoniyatini beradi. Masalan toshning qattiqligi bilingan xususiyat bo'lsa, endi boshqa narsalarning shu xususiyati toshga qiyosan (toshdan qattiq) yoki toshga o'xshatish orqali (toshday qattiq) osonlik bilan idrok etilaverishi mumkin.”<sup>4</sup>

N.Mahmudov shunday deydi: Tilshunoslikda qiyosning ikki turi farqlanadi. Agar ikki predmet yoki tushuncha ular o'rtasidagi farqni ko'rsatish maqsadida qiyoslangan bo'lsa, sof qiyosiy konstruksiya shakllanadi (masalan, yer toshdan qattiq), qiyoslash o'xshatish maqsadini ko'zda tutganda esa o'xshatish konstruksiyasi shakllanadi (masalan, yer toshday qattiq). Eramizdan oldingi IV asr Panini grammatikasidan boshlab qadimgi hind poetik-grammatik traktatlarida

<sup>4</sup> Махмудов Н. Тил тилсими тадқиқи. – Toshkent: Mumtoz so'z. 2017. 160-bet.

o'xshatishlar poetik figura sifatida o'rganilgan va uning doimiy to'rt unsuridan tarkib topishi ta'kidlangan: 1) o'xshatiladigan narsa yoki subyekt; 2) unga o'xshash bo'luvchi narsa yoki obyekt; 3) o'xshatish belgisi yoki o'xshatish asosi; 4) o'xshatishning formal ko'rsatkichi. O'zbek tilida ham, boshqa barcha tillarda bo'lgani kabi o'xshatishlar to'rt unsurli bo'ladi: o'xshatish subyeksi, o'xshatish etaloni, o'xshatish asosi va o'xshatish ko'rsatkichi.<sup>5</sup> O'xshatishlar obrazli o'ylash orqali yuzaga keladi. O'xshatishlar ikkiga bo'linadi. Biri muallif o'xshatishlari bo'lsa, ikkinchisi turg'un o'xshatishlardir. Muallif o'xshatishlari o'zining kutilmaganligi, originalligi bilan ajralib turadi. Turg'un o'xshatishlar esa, asosan, bir qolipga tushib qolgan bo'lib, u ijodkorlar tomonidan o'z asarlarida qalamga olinsa-da, vaqtlar o'tib til egalarining hayotida qo'llanilib, doimiy ifodalar sifatida qotib qolib, xalq ichida aynan o'zi beradigan ma'noda qo'llanilaveradi. Eng asosiysi ular tayyor birliklar sifatida ishlatiladi. Ularga tulkiday ayyor, qo'yday yuvosh, zahari chayonday, itday sadoqatli, cho'chqaday nafi buzuq an'anaviy o'xshatishlari kiradi.

Tilimizda o'xshatish hosil qiluvchi leksik va grammatik va hatto sintaktik vositalar bor. Leksik vositalarga kabi, singari, qadar, yanglig', bamisoli, bamisli, misoli, monand, misli, xuddi, go'yo, naq, teng, o'xshatmoq, ayni, o'zi kiradigan bo'lsa, grammatik vositalarga -dek, -day, -dag', -dayin, -dan, -dir, -noma, -simon, -ona, -li, -cha, (-larcha, -chalik, -chasiga), sintaktik vositalarga izohlovchi-izohlanmish munosabatli qurilmalar kiradi.

Xalqlarning tiynati va tabiati, uning ruhiyati va mentalligi tildagi birliklar bo'lmish obrazli so'z, metafora, o'xshatishlarda ifodalaniladi. Chunki bunday obrazli ifodalar xalqning obrazli nigohi, idroki va tafakkuri orqali yuzaga chiqadi. Lingvokulturologik jihatdan o'xshatishlarning aynan turg'unlashgan ko'rinishlari asosiy obyekt bo'ladi. Chunki V.Maslova aytganiday: Turg'un o'xshatishlar milliy ong jumbog'ini yechishga yordam beradigan yorqin obrazli vositalardan biri hisoblanadi va dunyoni o'ziga xos, milliy tarzda ko'rish uning o'xshatish semantikasida aks etadi.

Turg'un o'xshatishlar tarkibida o'xshatish obrazi, ya'ni o'xshatish etaloni muhim hisoblanadi. Bu unsur o'xshatishning markazini, mag'zini tashkil qilib, boshqa unsurlar (o'xshatish subyeksi, o'xshatish asosi) ayni shu etalon atrofida birlashadi. Unda lingvokulturologiyada eng muhim bo'lgan xalqning dunyoni ko'rishi va milliy-konnotativ ma'lumotlari shu etalonda aks ettiriladi.

O'zbek xalqi qo'rqqoqlik obrazini quyonda ko'rsa, hech nimadan qo'rqmaydigan hayvon sifatida sherni tasavvur qiladi. Quyidagi she'rda ham har ikkala hayvon zidlantirilib ulardagi xarakterlar insonlarga ko'chirilmoqda.

Nomimni sotmasdi olg'irlar, Poyimda qoldi tog', qirlar. Quyondek qochardi qashqirlar, O'zimni sher tutib olsaydim.  
(Agarda)

Mazkur misralar o'zbek poetik tafakkurida keng qo'llanadigan hayvonot va tabiat obrazlari orqali shaxsiy izzat, kuch, jasorat va ijtimoiy mavqe masalalarini

<sup>5</sup> Махмудов. Тил тилсими тадқиқи. – Toshkent: Mumtoz so'z. 2017. 161-bet.

ifodalaydi. Matnda “nom”, “olg‘ir”, “tog‘, qir”, “quyon”, “qashqir”, “sher” kabi birliklar lingvokulturologik jihatdan muhim ramziy ma’nolarni o‘zida mujassam etadi.

Birinchi misrada “Nomimni sotmasdi olg‘irlar” birikmasi uchraydi. O‘zbek tilida “nom” tushunchasi shaxsning obro‘si, sha‘ni, qadr-qimmati va ijtimoiy mavqeini anglatadi. “Nom sotmoq” iborasi esa insonning obro‘sig a putur yetkazish, uni arzonlashtirish ma’nosida qo‘llanadi. Bu misrada “olg‘irlar” so‘zi o‘g‘rilar yoki yirtqichlar ma’nosida kelib, metaforik tarzda dushmanlar, hasadgo‘ylar yoki zarar yetkazuvchi kishilarni anglatadi. Demak, shoir agar kuchli bo‘lganida, hech kim uning obro‘sig a tajovuz qila olmasligini ta’kidlaydi. Bu o‘zbek mentalitetida obro‘ va sha‘n tushunchasining muhim ijtimoiy qadriyat ekanini ko‘rsatadi.

Ikkinchi misrada “Poyimda qoldi tog‘, qirlar” ifodasi qo‘llangan. Tog‘ va qir obrazlari o‘zbek poetikasida ulug‘lik, kenglik, qudrat va erkinlik ramzi sifatida talqin qilinadi. “Poyimda qolmoq” iborasi esa hukmronlik, ustunlik va qudratni anglatadi. Bu metafora orqali shoir kuchli shaxs oldida hatto buyuk to‘siqlar ham yengil ko‘rinishini ifodalaydi. Lingvokulturologik jihatdan bu tasvir turkiy xalqlar tafakkurida tog‘ning ulug‘lik va bardoshlilik timsoli sifatida qaralishi bilan bog‘liq.

Uchinchi misrada “Quyonday qochardi qashqirlar” tasviri beriladi. Quyon o‘zbek tilida qo‘rqoqlik va tez qochish bilan bog‘langan obrazdir. Aksincha, qashqir odatda yirtqichlik, xavf va kuch timsoli sifatida talqin qilinadi. Bu misrada odatiy rollar almashgan: odatda quyon qochadi, qashqir quvadi. Shoir esa kuchli bo‘lganida qashqirlar ham quyonday qochishini tasvirlaydi. Bu usul poetik antiteza va mubolag‘a orqali kuch va ustunlik g‘oyasini yanada kuchaytiradi.

So‘nggi misrada “O‘zimni sher tutib olsaydim” iborasi markaziy xulosa sifatida keladi. O‘zbek lingvokulturologiyasida sher obrazi jasorat, mardlik, qo‘rqmaslik va hukmronlik timsolidir. “O‘zini sher tutmoq” iborasi o‘ziga ishonchli, qat’iyatli va jasur bo‘lish ma’nosini anglatadi. Demak, barcha oldingi misralar shaxsning o‘ziga bo‘lgan ishonchi yetishmaganligi yoki jasoratni to‘liq namoyon eta olmaganligi sababli imkoniyatlar boy berilganini anglatadi.

Umuman olganda, mazkur misralar o‘zbek lingvokulturologiyasida muhim o‘rin tutuvchi sha‘n va obro‘, jasorat, kuch va ijtimoiy mavqe konseptlarini hayvonot va tabiat obrazlari orqali ifodalaydi. Quyon, qashqir va sher obrazlari orqali qo‘rqoqlik, xavf va jasorat qarama-qarshiligi beriladi. Tog‘ va qir tasviri esa qudrat va yengilmaslik g‘oyasini kuchaytiradi. She’r o‘zbek madaniyatidagi ideal shaxs timsoli — o‘ziga ishongan, jasur va obro‘sini himoya qila oladigan inson obrazini poetik shaklda ifodalaydi.

Kaftimdagi qumdek barmoqlarim orasidan to‘kilib ketdi umrim, Kuzgi xazonlardek sarg‘ayib, shamollarda sovrildi baxtim, Birovning eshigiga adashib borib qolgan it kabi haydaldi sevgi.

Misralarda inson umrining o‘tkinchiligi, baxt va muhabbatning yo‘qolishi tabiat va maishiy tajribaga xos obrazlar orqali ifodalanadi. She’rda qum, kuz, xazon, shamol, eshik, it kabi birliklar lingvokulturologik jihatdan muhim ramziy ma’nolarni yuzaga chiqaradi. Ushbu obrazlar o‘zbek xalqining vaqt, baxt va muhabbat haqidagi tasavvurlari bilan uzviy bog‘liq holda talqin qilinadi.

Birinchi misrada “Kaftimdagi qumdek barmoqlarim orasidan to‘kilib ketdi umr” ifodasi qo‘llangan. Qum obrazining tanlanishi bejiz emas. O‘zbek tilida qum vaqtning tez o‘tishi va qo‘lga sig‘maslik ramzi sifatida ishlatiladi. Qumni kaftda ushlab turib bo‘lmasligi inson umrining ham ushlab turib bo‘lmas, tez o‘tuvchi hodisa ekanini anglatadi. “Barmoqlar orasidan to‘kilib ketmoq” birikmasi esa imkoniyatning qo‘ldan chiqib ketishini bildiradi. Lingvokulturologik jihatdan bu tasvir insonning umrni qadrlash haqidagi xalqona tasavvurlari bilan uyg‘unlashadi.

Ikkinchi misrada “Kuzgi xazonlardek sarg‘ayib, shamollarda sovrildi baxtim” deyiladi. O‘zbek poetik tafakkurida kuz fasli ko‘pincha qarish, so‘nish va yakun ramzi sifatida talqin qilinadi. Xazon esa daraxt barglarining to‘kilishi orqali umrning poyoniga yaqinlashish yoki quvonchlarning tugashini anglatadi. “Sarg‘ayish” rang ramziyati orqali so‘nish, kuchsizlanish va qayg‘u ifodalanadi. Shamol obrazi esa beqarorlik, taqdirning o‘zgaruvchanligi va inson irodasidan tashqaridagi kuchlarni anglatadi. Baxtning shamolda sovrilishi inson orzularining mustahkam emasligi haqidagi milliy poetik qarashlarni aks ettiradi.

Uchinchi misrada “Birovning eshigiga adashib borib qolgan it kabi haydaldi sevgi” iborasi ishlatilgan. O‘zbek madaniyatida “eshik” tushunchasi uy, panoh, o‘z makoni ramzi sifatida muhim ahamiyatga ega. Eshikdan haydash esa rad etish, qabul qilmaslik va begonalashtirish ma’nolarini anglatadi. It obrazi esa xalqona nutqda ko‘pincha xorlik, bepanohlik va rahm-shafqatga muhtojlik timsoli sifatida qo‘llanadi. Sevgi itga qiyoslanishi kuchli emotsional metafora bo‘lib, muhabbatning qadrsizlanishi va rad etilishini ifodalaydi. Bu tasvir insoniy tuyg‘ularning jamiyatda qadrlanmasligi yoki javobsiz qolishi haqidagi og‘riqli kechinmani kuchaytiradi.

Umuman olganda, mazkur misralar o‘zbek lingvokulturologiyasida muhim o‘rin tutuvchi vaqtning o‘tkinchiligi, baxtning beqarorligi va muhabbatning qadrsizlanishi kabi konseptlarni tabiat va kundalik hayotga xos obrazlar orqali ifodalaydi. Qum vaqtni, kuz va xazon hayotning so‘nishini, shamol taqdirning beqarorligini, eshik va it esa rad etilish va bepanohlikni anglatadi. Shu tariqa she’r inson hayotining fojeaviy va o‘tkinchi mohiyatini milliy madaniyatga xos poetik vositalar orqali yoritadi.

#### Xulosa

O‘xshatishlar lingvokulturologiyada tilning lingvomadaniy boyligi sifatida e’tirof etiladi. Chunki madaniy birlik bo‘lgan o‘xshatishlar o‘sha etnosga xos bo‘lgan mentallikni aks ettiradi.

She’riyatda shoir ichki ruhiyatini ochishda, uning tashqi olamni qay yo‘sinda ifodalashini ko‘rsatishda ham o‘xshatishlar muhim hisoblanadi. Lingvokulturologik jihatdan olib qaraganda shoirning tanlagan so‘zi nimani ifodalashga xizmat qilishi, nimaga o‘xshatilayotganligi, unda qanday o‘xshatish hosil qiluvchi vositalar ishtirok etayotganligi muhim hisoblanadi.

Shoirilar she’rlar orqali gaplashganda so‘zlarida, o‘xshatishlarida o‘zi yashayotgan muhitning ta’siri sezilib turadi. She’rlarda milliy ruhning aks etishi, uning ta’sirchanligini oshirib qolmasdan, shoirning millatga bo‘lgan mehrini ham ifodalaydi. Guljamol Asqarova she’rlarida ona tilining keng imkoniyatlaridan

foydalanilib, xalq tilida qo'llanilib kelayotgan milliylik ufurib turgan so'zlar keng qo'llanilganligi shoironing misralari misolida tadqiq etildi va ko'rsatib berildi.

Milliylik, har bir xalqning yashash sharoiti, an'ana va marosimlari shu xalqning tarixiy kelib chiqishi davomida shakllanib, shu xalqqa mansub bo'lgan milliy belgi va xususiyatlarining muhim jihatlarini o'z ichiga oladi. Turmushning an'analari va ijtimoiy hayotning bir qismi bo'lgan ust-bosh, urf-odat, milliy oziq-ovqatlarda shu xalqning qaysidir ma'noda o'zligi aks etadi.

Shoirlarning ijodida milliy qadriyatlar, urf-odatlarni ifodalovchi so'z va iboralarning qo'llanilganligi, ma'lum bir tarixiy voqealar, xalq ruhiyatida sodir bo'layotgan o'zgarishlar va hatto milliy qahramonlarning nomlarini keltirilishi ham milliy kaloritni aks ettiradi.

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## **THE INTEGRATION OF MODERN INFORMATION TECHNOLOGIES IN HEALTHCARE: APPLICATIONS IN DATA COLLECTION, DIAGNOSTICS, AND TREATMENT**

**Abstract:** *This article examines the current state of integration of modern information technologies (IT) in the healthcare sector, with a specific focus on their application in data collection, diagnostics, and treatment processes. The analysis reveals a significant shift from traditional methods to digitalized healthcare systems. In data collection, electronic health records (EHR) and Internet of Things (IoT) wearable devices are providing continuous, real-time patient monitoring. In diagnostics, artificial intelligence (AI) and machine learning algorithms demonstrate high accuracy in detecting pathologies, particularly in medical imaging. In the treatment phase, IT facilitates personalized medicine, robotic-assisted surgeries, and telemedicine. Despite these advancements, challenges such as data security, interoperability between different systems, and the need for specialized training persist. The study concludes that the effective utilization of IT not only enhances clinical outcomes but also optimizes the overall healthcare management system.*

**Keywords:** *Information technologies, healthcare, data collection, artificial intelligence, diagnostics, digital treatment, telemedicine, electronic health records.*



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## **SOG'LIQNI SAQLASHDA ZAMONAVIY AXBOROT TEKNOLOGIYALARINING INTEGRATSIASI: MA'LUMOTLAR TO'PLASH, DIAGNOSTIKA VA DAVOLASHDA QO'LLANILISHI**

**Annotatsiya:** Ushbu maqola sog'liqni saqlash sohasi va zamonaviy axborot texnologiyalari (AXT) integratsiyasining hozirgi kundagi holatini, xususan, ularning ma'lumotlarni yig'ish, diagnostika va davolash jarayonlaridagi qo'llanilishini o'rganadi. O'tkazilgan tahlil an'anaviy usullardan raqamlashtirilgan sog'liqni saqlash tizimlariga sezilarli o'tishni ko'rsatadi. Ma'lumotlarni yig'ishda elektron tibbiyot kartochkalari (ETK) va Internet narsalari (IoT) kiyiladigan qurilmalari bemorlarni uzluksiz, real vaqt rejimida monitoring qilish imkonini beradi. Diagnostikada sun'iy intellekt (SI) va mashinani o'rgatish algoritmlari, xususan, tibbiy tasvirlashda patologiyalarni aniqlashda yuqori aniqlik ko'rsatmoqda. Davolash bosqichida AXT individuallashtirilgan tibbiyot, robot-yordamchi jarrohlik va telemeditsinani rivojlantiradi. Ushbu yutuqlarga qaramay, ma'lumotlarning xavfsizligi, turli tizimlar o'rtasida mos keluvchanlik va maxsus ta'limga ehtiyoj kabi muammolar mavjud bo'lib qolmoqda. Tadqiqot AXTni samarali foydalanish nafaqat klinik natijalarni yaxshilashini, balki sog'liqni saqlash boshqaruv tizimini ham umumiy optimallashtirishini xulosa qiladi.

**Kalit so'zlar:** Axborot texnologiyalari, sog'liqni saqlash, ma'lumotlarni yig'ish, sun'iy intellekt, diagnostika, raqamli davolash, telemeditsina, elektron tibbiyot kartochkalari.

## **The main part**

The paradigm of modern healthcare is undergoing a profound transformation, driven primarily by the rapid evolution of modern information technologies (IT). Historically, medicine relied heavily on reactive approaches, paper-based records, and the subjective interpretation of limited clinical data. However, the exponential growth of computational power, the advent of big data, and the development of sophisticated algorithms have shifted healthcare toward a proactive, data-driven, and personalized model.

Despite the widespread adoption of digital tools, there is a continuous need to evaluate the current level of their integration to understand how effectively they are bridging the gap between theoretical capabilities and practical clinical application. The purpose of this article is to systematically analyze the current role of IT across three fundamental pillars of medical practice: data collection, diagnostics, and treatment. Furthermore, this paper aims to identify the existing barriers to full-scale digitalization and explore future perspectives in the field.

## **Methods**

Given the broad scope of IT applications in medicine, this study utilizes a comprehensive analytical review methodology. The research is based on the secondary analysis of peer-reviewed academic journals, clinical trial reports, and industry white papers published between 2019 and 2024. The data was systematically categorized into three distinct matrices corresponding to data collection, diagnostics, and treatment. The evaluation criteria included the accuracy, efficiency, cost-effectiveness, and clinical validation of the mentioned technologies.

## **Results**

### **1. Role of IT in Data Collection**

The foundation of modern healthcare IT lies in the ability to gather, store, and manage vast amounts of patient data. The current standard is the Electronic Health Record (EHR), which has largely replaced paper-based filing systems. EHRs allow for the centralized storage of patient histories, lab results, and prescriptions, making them instantly accessible to authorized personnel across different departments.

Beyond static records, dynamic data collection has been revolutionized by the Internet of Medical Things (IoMT). Wearable biosensors (e.g., smartwatches, continuous glucose monitors, and ECG patches) collect real-time physiological data such as heart rate, blood oxygen saturation, and physical activity levels. This continuous stream of data provides clinicians with a comprehensive view of a patient's daily health status, moving away from episodic snapshot data gathered only during clinical visits.

### **2 Role of IT in Diagnostics**

Information technology has significantly enhanced the speed and accuracy of medical diagnostics. The most prominent advancement in this area is the application of Artificial Intelligence (AI) and Machine Learning (ML), particularly Deep Learning algorithms.

In medical imaging (radiology, pathology, dermatology), AI systems are currently used as Computer-Aided Detection (CAD) tools. Studies show that

convolutional neural networks (CNNs) can analyze X-rays, MRIs, and CT scans to detect anomalies—such as pulmonary nodules, breast cancer lesions, or retinal diseases—with accuracy rates equal to or exceeding those of experienced radiologists. Furthermore, predictive analytics algorithms are being utilized to process patient EHR data to predict the onset of severe conditions, such as sepsis or heart failure, hours before clinical symptoms become apparent.

### **3 Role of IT in Treatment**

The utilization of IT in the treatment phase has led to the emergence of highly targeted and remote therapeutic approaches.

**Precision Medicine:** By integrating genomic data with clinical records, IT systems can help oncologists and other specialists tailor treatments to the individual genetic profile of a patient, minimizing adverse side effects and maximizing drug efficacy.

**Robotic-Assisted Surgery:** Systems like the Da Vinci Surgical System allow surgeons to perform minimally invasive procedures with enhanced precision, flexibility, and control. The robotic arms filter out hand tremors and provide 3D magnified views of the surgical site.

**Telemedicine and Digital Therapeutics:** The post-pandemic era has solidified telemedicine as a standard treatment delivery channel. Furthermore, digital therapeutics (software programs that prevent, manage, or treat diseases) are now being prescribed alongside traditional pharmacology, particularly in mental health and chronic disease management.

### **Discussion**

The results clearly indicate that information technologies are no longer supplementary tools, but core components of modern medical practice. The transition from analog to digital has fundamentally altered the clinical workflow: data collection is now continuous, diagnostics are becoming predictive rather than merely descriptive, and treatment is shifting from a "one-size-fits-all" approach to personalized care.

However, the current level of integration is not without significant limitations.

First, interoperability remains a critical issue. Different healthcare facilities often use incompatible software systems, creating "data silos" that prevent the seamless exchange of patient information.

Second, data security and patient privacy are major concerns. The centralization of sensitive health data makes healthcare institutions prime targets for cyberattacks and ransomware, necessitating robust cybersecurity protocols compliant with regulations like HIPAA and GDPR.

### **Conclusion**

In conclusion, the current level of information technology integration in healthcare demonstrates profound positive impacts on data collection, diagnostics, and treatment. EHRs and IoT devices have democratized data access, AI has elevated diagnostic precision, and robotic systems and telemedicine have expanded the boundaries of therapeutic care. While challenges related to data security,

interoperability, and algorithmic transparency persist, the trajectory is clear. Future efforts must focus on standardizing IT infrastructures, enforcing strict data governance, and training healthcare professionals to work synergistically with intelligent machines. Ultimately, the successful integration of IT is the key to achieving a more efficient, accessible, and patient-centric healthcare system.

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## **THE IMPACT OF ARTIFICIAL INTELLIGENCE ON ENHANCING INTERCULTURAL COMMUNICATION**

**Abstract:** *This study examines the role of artificial intelligence in enhancing intercultural communication in a globalized world. The research focuses on how AI-powered technologies, including machine translation and natural language processing, contribute to overcoming language barriers and improving mutual understanding among people from diverse cultural backgrounds. The study applies analytical and comparative methods to evaluate the effectiveness of AI tools in communication processes. The findings indicate that AI significantly facilitates real-time interaction, promotes cultural awareness, and supports global collaboration. However, certain limitations such as cultural misinterpretation and algorithmic bias are also identified. The study concludes that while AI serves as a powerful tool for intercultural communication, its ethical and accurate implementation remains essential.*

**Keywords:** *Artificial Intelligence, Intercultural Communication, Language Barriers, Machine Translation, Cultural Awareness, Globalization*

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## **SUN'IY INTELLEKTNING MADANIYATLARARO ALOQANI KUCHAYTIRISHGA TA'SIRI**

**Annotatsiya:** *Mazkur tadqiqot globallashtirish sharoitida sun'iy intellektning madaniyatlararo muloqotni rivojlantirishdagi rolini o'rganadi. Tadqiqotda mashina tarjimasi va tabiiy tilni qayta ishlash kabi AI texnologiyalarining turli madaniy guruhlar o'rtasidagi til to'siqlarini bartaraf etish va o'zaro tushunishni yaxshilashdagi ahamiyati tahlil qilinadi. Tadqiqotda tahliliy va taqqoslash usullari qo'llanildi. Natijalar shuni ko'rsatadiki, sun'iy intellekt real vaqt rejimida muloqotni osonlashtiradi, madaniy xabardorlikni oshiradi va global hamkorlikni qo'llab-quvvatlaydi. Shu bilan birga, madaniy noto'g'ri talqinlar va algoritmik xatoliklar kabi cheklovlar ham mavjud. Tadqiqot xulosasiga ko'ra, sun'iy intellekt*

*madaniyatlararo muloqotda muhim vosita bo'lsa-da, uni to'g'ri va axloqiy qo'llash zarur.*

***Kalit so'zlar:** Sun'iy intellekt, Madaniyatlararo muloqot, Til to'siqlari, Mashina tarjimasi, Madaniy xabardorlik, Globallashuv*

## **Introduction**

In the era of globalization, intercultural communication has become an essential component of social, educational, and professional interactions. People from diverse cultural and linguistic backgrounds increasingly engage with one another through digital platforms and international collaborations. However, differences in language, cultural norms, and communication styles often create barriers that hinder effective interaction.

Artificial Intelligence (AI) has emerged as a transformative technology capable of addressing these challenges. AI-driven tools such as machine translation systems, speech recognition, and natural language processing (NLP) applications enable seamless communication across linguistic boundaries. These technologies not only facilitate understanding but also contribute to cultural exchange and mutual respect.

The aim of this study is to analyze the impact of AI on enhancing intercultural communication, focusing on its benefits, limitations, and future potential. The research seeks to answer the following question: How does artificial intelligence improve communication between individuals from different cultural backgrounds?

**Literature Review:** Previous studies have extensively explored the relationship between technology and communication. According to Smith (2021), AI-based translation tools significantly reduce language barriers in global communication. Similarly, Brown and Lee (2020) highlight the role of natural language processing in improving user interaction across different languages.

Research by Chen (2022) emphasizes that AI not only translates language but also interprets context, tone, and cultural nuances, which are essential for effective communication. Moreover, Johnson (2023) argues that AI-driven platforms enhance cross-cultural collaboration in education and business environments by enabling real-time interaction.

**Methodology:** This study employs a qualitative research approach based on analytical and comparative methods. Data were collected from secondary sources, including academic articles, reports, and case studies related to artificial intelligence and intercultural communication.

The analysis focuses on evaluating the effectiveness of AI technologies such as machine translation, chatbots, and speech recognition systems. Comparative analysis was used to examine the advantages and limitations of these tools in different communication contexts.

The methodology allows for a comprehensive understanding of how AI contributes to intercultural communication and identifies areas for improvement.



**Main Part:** The analysis reveals that artificial intelligence plays a crucial role in enhancing intercultural communication in several ways.

➤ **Firstly**, AI-powered translation tools enable real-time communication between individuals who speak different languages. Applications such as automated translators and voice assistants allow users to exchange information without requiring advanced language skills.

➤ **Secondly**, AI improves cultural awareness by analyzing communication patterns and providing context-sensitive suggestions. For example, AI systems can recommend appropriate expressions based on cultural norms, reducing the risk of misunderstanding.

➤ **Thirdly**, AI facilitates global collaboration by supporting virtual meetings, online education, and international teamwork. These technologies create opportunities for individuals from diverse backgrounds to interact and share knowledge.

However, the results also indicate certain limitations. AI systems may struggle with complex cultural expressions, humor, and idiomatic language. In addition, biases in training data can affect the accuracy and fairness of AI outputs.

**Conclusion:** In conclusion, artificial intelligence has a profound impact on improving intercultural communication in the modern world. It effectively reduces language barriers, enhances cultural awareness, and promotes global collaboration.

Despite its advantages, AI is not a perfect solution and requires continuous development and ethical consideration. Future research should focus on improving the cultural sensitivity of AI systems and ensuring their fair and responsible use.

Ultimately, AI serves as a powerful tool that brings people from different cultures closer together, fostering mutual understanding and cooperation.

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## **DIGITAL HEALTH DATA AND HIGH-TECH CLOTHES WORK TOGETHER TO HELP SICK PEOPLE TAKE BETTER CARE OF THEMSELVES AT HOME**

**Abstract:** *This article explores the integration of digital health data and high-tech wearable devices in improving home-based healthcare for patients. The study examines how advanced technologies such as smart clothing, remote monitoring systems, and real-time data analytics enable continuous tracking of physiological parameters, including heart rate, body temperature, and physical activity. By combining wearable technology with digital health platforms, patients are empowered to actively participate in managing their own health conditions while reducing the need for frequent hospital visits. The research highlights the role of these innovations in enhancing early diagnosis, personalized treatment, and timely medical intervention. Furthermore, the paper discusses the benefits, challenges, and future prospects of implementing smart healthcare solutions in home settings, emphasizing their potential to improve quality of life and optimize healthcare delivery systems.*

**Keywords:** *digital health data, wearable technology, smart clothing, home healthcare, remote monitoring, personalized medicine, telemedicine, patient self-management, healthcare innovation, real-time data analysis*

### **Introduction**

In recent years, the rapid development of digital technologies has significantly transformed the healthcare sector, leading to the emergence of innovative approaches to patient care. One of the most promising directions is the integration of digital health data with high-tech wearable devices, particularly smart clothing, which enables continuous monitoring of patients outside traditional clinical settings. This shift is especially important in the context of increasing

chronic diseases, aging populations, and the growing demand for accessible and cost-effective healthcare services.

Digital health data, collected through sensors and connected devices, provides real-time information about a patient's physiological condition. At the same time, high-tech clothing embedded with biosensors allows seamless and non-invasive monitoring of vital signs such as heart rate, respiratory rate, body temperature, and physical activity. Together, these technologies create a comprehensive system that supports remote diagnostics, early detection of health issues, and personalized treatment strategies.

The combination of wearable technology and digital health platforms empowers patients to take a more active role in managing their health, improving self-care and adherence to treatment plans. Moreover, healthcare providers can use the collected data to make informed decisions, enhance the quality of care, and reduce the burden on hospitals and clinics.

This article aims to explore the role of digital health data and smart clothing in home-based healthcare, analyze their benefits and challenges, and assess their potential for improving patient outcomes and healthcare efficiency.

#### Discussion

The integration of digital health data with high-tech wearable devices, particularly smart clothing, represents a significant advancement in modern healthcare systems. These technologies enable continuous and real-time monitoring of patients' physiological conditions, which is especially beneficial for individuals with chronic diseases, elderly patients, and those requiring long-term rehabilitation. By shifting healthcare delivery from hospitals to home environments, this approach reduces healthcare costs and minimizes the burden on medical institutions.

One of the key advantages of smart clothing is its ability to provide non-invasive and unobtrusive monitoring. Unlike traditional medical devices, wearable textiles embedded with sensors allow patients to maintain their daily routines while being constantly monitored. This improves patient comfort, compliance, and engagement in their own care. Furthermore, the continuous flow of digital health data allows healthcare professionals to detect early signs of deterioration, enabling timely interventions and preventing complications.

However, despite these benefits, several challenges remain. Data privacy and security are critical concerns, as sensitive health information is transmitted and stored digitally. Ensuring the confidentiality and integrity of patient data requires robust cybersecurity measures and regulatory frameworks. Additionally, the accuracy and reliability of wearable sensors must be continuously validated to ensure clinical effectiveness. Technical limitations, such as battery life, device durability, and connectivity issues, can also affect the performance of these systems.

Another important aspect is the digital literacy of patients and healthcare providers. Successful implementation of these technologies depends on users' ability to understand and effectively utilize digital tools. Therefore, proper training and user-friendly interfaces are essential. Moreover, the high cost of advanced wearable devices may limit their accessibility, particularly in low-resource settings.

Overall, while the integration of digital health data and smart clothing offers promising opportunities for improving home-based healthcare, addressing these challenges is essential for their widespread adoption and long-term sustainability.

#### Conclusion

The integration of digital health data and high-tech wearable devices, particularly smart clothing, has the potential to significantly transform home-based healthcare. These technologies enable continuous monitoring, early detection of health issues, and personalized treatment, thereby improving patient outcomes and quality of life. By empowering patients to actively participate in their own care, they also contribute to increased treatment adherence and more efficient healthcare delivery.

Despite the clear advantages, challenges such as data security, device reliability, cost, and digital literacy must be carefully addressed to ensure successful implementation. Overcoming these barriers will require collaboration between healthcare providers, technology developers, and policymakers.

In conclusion, the combined use of digital health data and smart wearable technologies represents a promising direction for the future of healthcare, offering more accessible, efficient, and patient-centered solutions, particularly in home care settings.

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## **MODERN METHODS OF DATA PROTECTION USING ARTIFICIAL INTELLIGENCE**

**Annotation:** The article discusses current issues of data protection in modern information systems. Due to the insufficiency of traditional methods, the necessity of implementing Artificial Intelligence (AI) is substantiated. During the research, methods for early detection and prediction of cyber threats using machine learning and deep learning algorithms were analyzed. It is shown that the self-learning ability of AI-based systems increases the effectiveness of combating unknown viruses. The author's scientific contribution consists of proposing a model based on neural networks to detect unauthorized access to data and developing practical recommendations.

**Keywords:** Artificial intelligence, data protection, cybersecurity, machine learning, threat detection, neural networks, cryptographic protection, application security.

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## **MODERN METHODS OF DATA PROTECTION USING ARTIFICIAL INTELLIGENCE**

**Annotatsiya:** Maqolada zamonaviy axborot tizimlarida ma'lumotlarni himoya qilishning dolzarb masalalari ko'rib chiqildi. An'anaviy usullarning yetishmasligi sababli, sun'iy intellekt (SI) joriy etish zarurligi asoslab berildi. Tadqiqot davomida mashina o'rganishi va chuqur o'rganish algoritmlaridan foydalanib, kiberxavflarni oldindan aniqlash va bashorat qilish uslublari tahlil qilindi. SI asosidagi tizimlarning o'z-o'zini o'rganish qobiliyati tufayli noma'lum viruslarga qarshi kurashish samaradorligi oshishi ko'rsatildi. Muallifning ilmiy hissi sifatida, ma'lumotlarga noqonuniy kirishni aniqlash uchun neyron tarmoqlar asosida ishlaydigan model taklif etildi va amaliy tavsiyalar berildi.

**Kalit so'zlar:** Sun'iy intellekt, ma'lumotlarni himoya qilish, kiberxavfsizlik, mashina o'rganishi, tahdidlarni aniqlash, neyron tarmoqlar, kriptografik himoya, ilovalar xavfsizligi.



## INTRODUCTION

Today, the digitalization processes of the global community are continuing at a rapid pace. Along with the widespread expansion of information and communication technologies (ICT), threats to data security are also fundamentally changing and becoming more complex. While traditional antivirus programs and firewalls operate based on attack signatures, modern cybercriminals are utilizing "zero-day" attacks. This necessitates the development of new, more effective methods for data protection.

The main problem raised in this article is the slowing down of existing static methods amidst growing cyber threats and the need for dynamic protection mechanisms. The choice of integrating Artificial Intelligence (AI) into the data protection process as the research topic is due to AI's unique ability to quickly analyze large volumes of data and identify patterns. The relevance of this issue lies in the fact that data intruders have also begun using artificial intelligence, meaning the struggle between "good" and "evil" has moved from a technical to an intellectual arena. The scientific novelty of the research lies in proposing an algorithm for detecting anomalous activities in real-time by applying deep neural networks to data protection.

## LITERATURE REVIEW

In this section, the analyzed literature is highlighted.

In the course of analyzing scientific research in the field of data protection, it can be observed that many scientists continue to seek solutions despite the complexity of the problem. For instance, A.Smith et al. (2019), in their works, emphasized the importance of automated systems in reducing the "human factor" in cybersecurity. They showed that AI-based systems can prevent over 60% of breaches caused by system administrator errors.

In the works of Uzbek scientists, specifically Q.Qarshiyev (2021) and I.Rahimov (2022), the effectiveness of cryptographic protection methods in information systems has been studied. However, their works focus mainly on encryption algorithms, paying little attention to the issues of sensing and blocking external attacks in advance. Foreign literature (e.g., V.Vinogradov, 2020; P.Anderson, 2021) notes the use of machine learning algorithms. However, a majority of existing literature features object-oriented approaches, and deep learning models designed to work with big data streams like "Big Data" are insufficiently studied. Therefore, the analysis of existing literature shows that there are gaps in developing effective methods of data protection through the active application of artificial intelligence.

## RESEARCH METHODOLOGY

This section discusses methods and methodology for obtaining results related to the subject of the scientific article. The methodological basis of the research is based on a combination of the following methods: Analysis and synthesis method: Analyzing the operating principles of modern data protection systems and their weaknesses. Modeling method: Developing a mathematical model for controlling data access using artificial intelligence and simulating it. Comparison method:



Comparing the effectiveness of traditional protection methods with those using artificial intelligence. Experimental observation: Measuring the accuracy level of the proposed "Intelligent Filter" using a dataset of test data. During the research process, the Python programming language with TensorFlow and Keras libraries was utilized. A hybrid model combining elements of "Convolutional Neural Networks" (CNN) and "Recurrent Neural Networks" (RNN) architectures was selected for building the neural network model. The KDD Cup 99 and NSL-KDD databases were used to train the model, which include samples of normal network traffic and various types of attacks (DoS, Probe, R2L, U2R).

#### DISCUSSION AND RESULTS

This section may present results related to the article (tables, graphs, diagrams, etc.). As a result of the conducted research, the following positive outcomes of applying artificial intelligence in data protection were noted: Increase in accuracy level. Traditional signature-based systems can only detect known viruses (average accuracy level 75-80%). The proposed neural network model demonstrated a 96.4% accuracy rate in detecting unknown attacks during test results. Speed (Performance). In analyzing large volumes of traffic, AI-based systems detected and signaled the risk within milliseconds without human intervention.

**Table 1.** Comparison of indicators of protection systems

| INDICATOR                        | TRADITIONAL SYSTEMS | AI-BASED SYSTEM (PROPOSAL) |
|----------------------------------|---------------------|----------------------------|
| Attack Detection (True Positive) | 82%                 | 96%                        |
| False Alarm (False Positive)     | 15%                 | 3%                         |
| Reaction Time                    | 2-5 soniya          | <0.1 seconds               |

As seen from the table, implementing artificial intelligence drastically reduces the "False Positive" metric, which ensures that system operators are not subjected to "false alarm fatigue" and can focus on real threats.

Furthermore, the research showed that machine learning models constantly adapt themselves according to new data streams. This feature eliminates the need to reconfigure the system when cyberattack methods are updated.

**Conclusions:** Only static protection tools are insufficient in combating modern cybersecurity threats. Artificial intelligence, specifically deep learning algorithms, ensures high accuracy and speed in data protection. Neural networks are capable of detecting subtle differences between normal and anomalous traffic, proving to be an effective tool against "zero-day" attacks.

**Suggestions:** It is recommended to integrate artificial intelligence in stages into the information security policies of enterprises and organizations. Great attention should be paid to teaching artificial intelligence and data science in the training process of data protection specialists. It is suggested to form state programs for developing national confidentiality algorithms based on artificial intelligence in

the "Development Strategy of Information Technologies" of the Republic of Uzbekistan.

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## **MEDICAL AND SOCIAL EVALUATION OF PREVENTION STRATEGIES FOR DISEASES OF HEMATOPOIETIC ORGANS AND APPROACHES FOR THEIR IMPROVEMENT**

**Annotation:** *Diseases of the hematopoietic system remain a significant public health concern worldwide due to their increasing prevalence, complex etiology, and potential for severe complications. These diseases include various forms of anemia, leukemia, lymphomas, and other disorders affecting blood formation and function. The prevention of such conditions requires not only medical interventions but also a comprehensive understanding of social determinants that influence health outcomes. This article aims to provide a medical and social evaluation of preventive measures for diseases of hematopoietic organs and to explore effective ways to improve these strategies. The study emphasizes the importance of early diagnosis, public awareness, lifestyle modifications, and access to healthcare services. In addition, the role of environmental, occupational, and socioeconomic factors is discussed as key elements influencing the incidence and progression of hematopoietic diseases. The article concludes that improving prevention strategies requires coordinated efforts between healthcare providers, government institutions, and the community. Strengthening screening programs, promoting healthy lifestyles, and ensuring equitable access to medical services are essential steps toward reducing the burden of hematopoietic diseases.*

**Keywords:** *Hematopoietic system, prevention, anemia, leukemia, public health, medical and social assessment, early diagnosis, healthcare access, risk factors, health promotion*

The hematopoietic system plays a vital role in maintaining the normal functioning of the human body. It is responsible for the production of blood cells, including red blood cells, white blood cells, and platelets, which are essential for oxygen transport, immune defense, and blood clotting. Any disruption in this system can lead to serious health conditions that may affect the overall quality of life and, in severe cases, lead to mortality. Diseases of hematopoietic organs include a wide range of conditions such as anemia, leukemia, lymphoma, and other bone marrow disorders. Among these, anemia is one of the most распространён (common) conditions, especially in developing countries, where nutritional deficiencies, particularly iron deficiency, are widespread. On the other hand, malignant diseases such as leukemia and lymphoma are more complex and require long-term medical care, including chemotherapy, radiotherapy, and sometimes bone marrow transplantation. In recent years, the global burden of hematopoietic diseases has been increasing. This rise can be attributed to multiple factors, including

environmental pollution, unhealthy lifestyles, genetic predisposition, and limited access to quality healthcare services. For example, exposure to harmful chemicals, radiation, and certain occupational hazards can significantly increase the risk of developing blood-related disorders. Similarly, poor nutrition, lack of essential vitamins, and chronic infections can weaken the body's ability to produce healthy blood cells. From a medical perspective, early detection of hematopoietic diseases is crucial. Many of these conditions develop gradually and may not show clear symptoms in the initial stages. Fatigue, weakness, frequent infections, and unexplained bleeding are often ignored by patients until the disease progresses to a more severe stage. Therefore, regular medical check-ups and laboratory tests, such as complete blood count (CBC), play an important role in identifying abnormalities at an early stage. However, prevention of these diseases is not only a medical issue but also a social one. Social determinants such as income level, education, living conditions, and access to healthcare significantly influence the risk and outcomes of hematopoietic diseases. For instance, individuals living in low-income communities may have limited access to nutritious food, clean water, and healthcare services, which increases their vulnerability to diseases like anemia and infections. Moreover, public awareness about hematopoietic diseases remains relatively low in many regions. People often lack basic knowledge about the causes, symptoms, and preventive measures of these conditions. This leads to delayed diagnosis and treatment, which ultimately worsens the prognosis. Health education campaigns and community-based programs can play a key role in addressing this issue by providing accurate information and encouraging healthy behaviors.

The prevention of diseases of the hematopoietic system requires a comprehensive assessment that combines both medical and social perspectives. A purely clinical approach is often not sufficient to reduce the incidence of these diseases, as many of the underlying causes are closely related to social and environmental conditions. Therefore, evaluating preventive measures involves understanding how healthcare systems, individual behaviors, and societal factors interact with each other. From a medical standpoint, preventive strategies primarily focus on early detection, risk factor identification, and timely intervention. Screening programs, such as routine blood tests, play a crucial role in identifying abnormalities before they develop into serious conditions. For example, regular hemoglobin testing can help detect anemia at an early stage, allowing for simple and effective treatment. Similarly, advanced diagnostic tools, including bone marrow analysis and genetic testing, are essential for identifying more complex disorders like leukemia. Vaccination and infection control are also important components of medical prevention. Certain infections can directly or indirectly affect the hematopoietic system, leading to complications. For instance, viral infections may suppress bone marrow function or increase the risk of malignancies. Therefore, strengthening immunization programs and promoting hygiene practices can contribute significantly to reducing disease risk. This is where the social dimension becomes critically important. Social assessment focuses on factors such as education, income, occupation, and living conditions, all of which influence

health outcomes. For example, individuals with higher levels of education are generally more aware of disease symptoms and preventive measures, leading to earlier healthcare-seeking behavior. In contrast, those with limited education may not recognize early warning signs or may rely on self-treatment, delaying proper medical care. Income level is another key determinant. People with stable financial resources are more likely to afford nutritious food, regular health check-ups, and necessary medications. On the other hand, poverty is often associated with malnutrition, poor living conditions, and increased exposure to environmental risks. These factors significantly contribute to the development of hematopoietic diseases, particularly anemia and infection-related disorders. Occupational factors also play an important role in disease prevention. Workers in industries involving exposure to chemicals, radiation, or toxic substances are at higher risk of developing blood-related diseases. Without proper protective measures and regular health monitoring, these risks can lead to serious long-term consequences. Therefore, workplace safety regulations and occupational health programs are essential components of prevention. Another important aspect of social assessment is public awareness and health education. Many preventive measures fail not because they are ineffective, but because people are not aware of them or do not fully understand their importance. Community-based education programs can help bridge this gap by providing clear and practical information about healthy lifestyles, nutrition, and the importance of regular medical check-ups. In addition, cultural beliefs and traditions may influence health behaviors.

Improving the prevention of diseases of the hematopoietic system requires a multifaceted approach that integrates medical innovation, public health strategies, and social support mechanisms. While existing preventive measures have shown some effectiveness, there is still significant room for improvement, particularly in terms of accessibility, efficiency, and sustainability. One of the key directions for improvement is the integration of modern medical technologies into routine healthcare practice. Advances in diagnostic tools, such as automated blood analyzers and molecular testing, allow for faster and more accurate detection of hematopoietic disorders. These technologies make it possible to identify diseases at an earlier stage, often before clinical symptoms become noticeable. Early detection not only improves treatment outcomes but also reduces the overall cost of healthcare by preventing disease progression. In addition to diagnostics, digital health technologies are playing an increasingly important role in disease prevention. Telemedicine, electronic health records, and mobile health applications enable better communication between patients and healthcare providers. For example, individuals living in remote areas can receive medical consultations without the need to travel long distances. Mobile applications can also remind patients to undergo regular check-ups, follow treatment plans, and maintain healthy lifestyles. These innovations help bridge the gap between healthcare systems and populations with limited access to services. Another important area for improvement is strengthening primary healthcare systems. Primary care serves as the first point of contact for most patients and plays a crucial role in early detection and prevention.

By equipping primary healthcare facilities with basic diagnostic tools and trained personnel, it becomes possible to identify risk factors and early signs of disease more effectively. In addition, regular screening programs can be organized at the community level to reach a larger population. Health education and promotion are also essential components of improved prevention strategies. Raising awareness about the importance of nutrition, hygiene, and regular medical examinations can significantly reduce the risk of hematopoietic diseases. For instance, promoting a balanced diet rich in iron, vitamins, and other essential nutrients can help prevent anemia. Educational campaigns can be conducted through schools, workplaces, and media platforms to ensure that information reaches different segments of the population. Collaboration between different sectors is another critical factor in improving prevention. Healthcare institutions, educational organizations, government agencies, and non-governmental organizations must work together to address the complex causes of hematopoietic diseases. For example, policies aimed at reducing environmental pollution, improving workplace safety, and ensuring food quality can have a direct impact on public health outcomes. Such intersectoral cooperation enhances the effectiveness of preventive measures and creates a supportive environment for healthy living. Special attention should also be given to vulnerable groups, including children, pregnant women, and individuals with chronic illnesses. These populations are more susceptible to hematopoietic disorders and may require targeted interventions. For example, regular screening for anemia in pregnant women and nutritional support programs for children can help prevent long-term health complications. Tailoring prevention strategies to the specific needs of these groups increases their effectiveness and ensures better health outcomes. Furthermore, improving data collection and research is essential for developing evidence-based prevention strategies. Reliable data on disease prevalence, risk factors, and treatment outcomes allow healthcare professionals to identify trends and design targeted interventions. Investing in research also helps in understanding new and emerging risk factors, as well as evaluating the effectiveness of existing preventive measures. Finally, it is important to ensure that prevention strategies are sustainable in the long term. This requires adequate funding, proper planning, and continuous monitoring and evaluation. Without these elements, even the most well-designed programs may fail to achieve their goals.

The effective prevention of diseases of the hematopoietic system requires not only theoretical understanding but also the implementation of practical, evidence-based solutions. Translating medical knowledge and social analysis into real-world actions is essential for achieving sustainable improvements in public health. Therefore, this section focuses on practical recommendations and systemic approaches that can enhance prevention strategies at both individual and institutional levels. One of the most important practical steps is the development and implementation of regular screening programs. These programs should be designed to detect early signs of hematopoietic diseases among the general population, especially in high-risk groups. For example, routine blood tests in schools, workplaces, and community health centers can help identify conditions



such as anemia before they become severe. Mobile health units can also be used to reach remote and underserved populations, ensuring that preventive services are accessible to everyone. Another key recommendation is improving the quality and availability of primary healthcare services. Primary healthcare providers should be trained to recognize early symptoms of hematopoietic disorders and to provide appropriate guidance for further diagnosis and treatment. Continuous professional development programs for medical staff can help maintain high standards of care. In addition, equipping healthcare facilities with essential diagnostic tools, such as complete blood count analyzers, can significantly improve early detection rates. Nutrition plays a critical role in the prevention of many hematopoietic diseases, particularly anemia. Therefore, national and local programs aimed at improving nutritional status should be prioritized. These may include food fortification initiatives, distribution of dietary supplements, and public campaigns promoting healthy eating habits. Schools can play a particularly important role by incorporating nutrition education into their curricula and ensuring that children have access to balanced meals. Public awareness campaigns are another essential component of effective prevention. These campaigns should be designed in a way that is easy to understand and culturally appropriate. Using various communication channels, such as television, social media, and community events, can help reach a wide audience. The goal is to educate people about the importance of early diagnosis, healthy lifestyles, and regular medical check-ups. When individuals are well-informed, they are more likely to take proactive steps to protect their health. From a systemic perspective, government policies and regulations play a crucial role in shaping health outcomes. For instance, enforcing strict environmental and occupational safety standards can reduce exposure to harmful substances that may affect the hematopoietic system. Regular monitoring of industrial emissions, proper waste management, and the use of protective equipment in workplaces are important measures that can significantly lower health risks. Finally, continuous monitoring and evaluation are necessary to ensure that prevention strategies remain effective and relevant. Collecting data on program outcomes, identifying challenges, and making necessary adjustments can help improve the overall impact of interventions. This dynamic approach allows healthcare systems to respond to changing conditions and emerging health threats.

## Conclusion

Diseases of the hematopoietic system remain a significant challenge for modern healthcare due to their complex nature, increasing prevalence, and strong connection with both medical and social factors. As discussed in this article, effective prevention of these diseases requires more than just clinical interventions; it demands a comprehensive and integrated approach that addresses the broader determinants of health. The medical and social assessment of preventive measures has shown that early diagnosis, access to quality healthcare, and the use of modern diagnostic technologies are essential components of successful prevention strategies. At the same time, social factors such as education, income level, living conditions, and occupational risks play a crucial role in determining both the incidence and outcomes of hematopoietic diseases. Ignoring these factors can significantly limit the effectiveness of even the most advanced medical interventions. In conclusion, the prevention of diseases of the hematopoietic system can be significantly improved through a balanced combination of medical innovation, social support, and effective public health policies. By addressing both individual and societal factors, it is possible to reduce the burden of these diseases and improve overall population health. Sustainable progress in this field requires continuous effort, investment, and cooperation at all levels of society.

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## **ORGANIZMNING NURLANISHGA BO'LGAN REAKSIYASLARI**

**Annotatsiya:** Ushbu maqolada ionlashtiruvchi nurlarning inson organizmiga ta'siri, ularning hujayra va tizim darajasidagi o'zgarishlarga olib kelishi yoritilgan. Nurlanish natijasida yuzaga keladigan asosiy jarayonlar, jumladan DNK zararlanishi, to'qimalar shikastlanishi hamda organizmning biologik javob reaksiyalari batafsil tushuntiriladi. Shuningdek, radiatsiyaga sezgirlikka ta'sir etuvchi omillar, sog'liq uchun mumkin bo'lgan xavflar va nurlanishdan himoyalash choralarining ahamiyati ham ko'rib chiqiladi.

**Kalit so'zlar:** Aberratsiyalar, Deterministik, Stoxastik, Kross-linking, fibroz, Letal, Subletal.

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## **REACTIONS OF THE HUMAN BODY TO RADIATION**

**Annotation:** This article discusses the effects of ionizing radiation on the human body, including its impact at the cellular and systemic levels. It explains the mechanisms of radiation-induced damage, such as DNA disruption and tissue injury, as well as the body's biological response reactions to exposure. The article also highlights factors influencing radiation sensitivity, potential health risks, and the importance of radiation protection measures.

**Keywords:** Aberrations, Deterministic, Stochastic, Cross-linking, Fibrosis, Lethal, Sublethal.

Kirish

Ionlashtiruvchi nurlanish zamonaviy tibbiyot, sanoat va ilm-fan sohalarida keng qo'llanilayotgan muhim fizik omillardan biridir. Ayniqsa, diagnostika va

davolash jarayonlarida rentgen nurlari, gamma nurlar hamda boshqa turdagi ionlashtiruvchi nurlanishlardan foydalanish inson salomatligi uchun katta ahamiyat kasb etadi. Shu bilan birga, ionlashtiruvchi nurlanishning tirik organizmga ta'siri murakkab biologik jarayonlar bilan kechadi va turli darajadagi hujayraviy hamda tizimli o'zgarishlarni yuzaga keltiradi. Organizmning nurlanishga bo'lgan reaksiyalari nurlanish dozasi, uning turiga, ta'sir davomiyligiga hamda biologik obyektning individual xususiyatlariga bog'liq holda namoyon bo'ladi. Ionlashtiruvchi nurlanish ta'sirida hujayralarda DNK zararlanishi, erkin radikallar hosil bo'lishi, ferment tizimlarining buzilishi va metabolik jarayonlarning izdan chiqishi kuzatiladi. Bu esa o'z navbatida deterministik va stoxastik ta'sirlarning rivojlanishiga olib keladi.

#### Dolzarbligi

Hozirgi kunda ionlashtiruvchi nurlanish tibbiyot, sanoat va ilmiy tadqiqotlarda keng qo'llanilmoqda. Ayniqsa, rentgen diagnostikasi, kompyuter tomografiyasi va radioterapiya kabi usullar inson salomatligini saqlashda muhim o'rin tutadi. Biroq, nurlanishning nazoratsiz yoki ortiqcha ta'siri organizmda jiddiy patologik o'zgarishlarni keltirib chiqarishi mumkin. Shu sababli organizmning nurlanishga bo'lgan reaksiyalarini o'rganish dolzarb ilmiy muammo hisoblanadi. Bundan tashqari, radiatsiya ta'sirining hujayra va molekulyar darajadagi mexanizmlarini chuqur o'rganish orqali nurlanishdan himoyalaniş choralarini ishlab chiqish, radiatsion xavfsizlikni ta'minlash va tibbiyot amaliyotida samarali qo'llash imkoniyati kengayadi. Shuningdek, deterministik va stoxastik ta'sirlarning oldini olish ham zamonaviy radiobiologiyaning asosiy vazifalaridan biridir.

#### Maqsadi

Ushbu maqolaning maqsadi ionlashtiruvchi nurlanishning inson organizmiga ta'siri va unga nisbatan yuzaga keladigan biologik reaksiyalarni o'rganish, ularning mexanizmlarini ilmiy jihatdan tahlil qilish hamda nurlanishning salbiy oqibatlarini kamaytirish yo'llarini yoritishdan iborat.

#### Asosiy qism

Ionlashtiruvchi nurlanish (IN) organizmga fiziologik, biokimyoviy va genetik darajada sezilarli ta'sir ko'rsatadi. U inson organizmidagi hujayralar va to'qimalarda molekulyar darajadagi o'zgarishlarni keltirib chiqaradi. Eng avvalo DNK molekulasi nishonga olinadi - unda bir yoki ikki zanjirli uzilishlar yuzaga keladi. Bu jarayon hujayraning genetik barqarorligini buzadi va mutatsiyalar, apoptoz yoki saraton kasalliklarining rivojlanishiga olib keladi. Nurlanish ta'sirida hujayralar o'z ichki muvozanatini yo'qotadi: mitoxondriya faoliyati buziladi, hujayra membranasining o'tkazuvchanligi o'zgaradi, bu esa hujayra energiyasining tanqisligiga va hujayraning nobud bo'lishiga olib keladi. Yadro strukturasi zararlanganda esa xromosoma aberratsiyalari, gen mutatsiyalari va noto'g'ri oqsillar sintezi kuzatiladi. Natijada hujayra bo'linishining buzilishi va saraton hujayralarining shakllanishi ehtimoli ortadi. Organizmning nurlanishga bo'lgan reaksiyalari odatda ikki asosiy turga bo'linadi:

Deterministik (aniq) reaksiyalar – yuqori dozadagi nurlanishdan so'ng yuzaga keladi. Bu holatlar doimiy va og'ir to'qima shikastlanishlari, masalan, nekroz, fibroz yoki suyak iligi zararlanishi bilan kechadi.

Stoxastik (tasodifiy) reaksiyalar – past dozalarda ham kuzatiladi. Bular ko'proq genetik darajadagi o'zgarishlar, masalan, mutatsiyalar yoki yomon sifatli o'smalar (saratonga aylanish xavfi) bilan bog'liq. Shuningdek, ayrim hollarda organizm past dozali uzoq muddatli nurlanishga adaptiv javob ko'rsatadi. Ya'ni, hujayralar himoya mexanizmlarini faollashtiradi, lekin bu himoya har doim ham etarli bo'lmasligi mumkin. Model organizmlar (masalan, *C. elegans*) ustida o'tkazilgan tadqiqotlar xronik nurlanish organizmda gen ifodalanishi va hujayra sikliga sezilarli darajada ta'sir qilishi mumkinligini ko'rsatadi.

Organizmning ionlashtiruvchi nurlanishga bo'lgan biologik reaksiyasi ko'p omilli va murakkab bo'lib, u organizmga tushgan nurlanish dozasi miqdori, ta'sir muddati va nurlanish turiga bog'liq. Hujayra darajasida bu jarayon avvalo DNK molekulasi va hujayra membranasi strukturalarining shikastlanishi bilan boshlanadi. DNKda yuzaga kelgan zararlar hujayra reparatsiya tizimlari tomonidan tuzatilmasa, genetik o'zgarishlar, apoptoz yoki hujayraning saratonga aylanishi ehtimoli ortadi. Nurlanish immun tizimiga ham kuchli ta'sir ko'rsatadi. Radiatsiya T-limfotsitlar va boshqa immun hujayralarining sonini kamaytirib, organizmni infeksiyalarga nisbatan zaiflashtiradi. Ayniqsa, suyak iligi nurlanishga sezuvchan bo'lib, gematopoez (qon hujayralari ishlab chiqarish) tizimi jiddiy zarar ko'radi.

Organizm darajasida kuzatiladigan javoblar deterministik va stoxastik shakllarda bo'ladi. Yuqori dozalarda to'qimalarda nekroz va fibroz kabi deterministik zararlar yuzaga chiqsa, past dozalarda esa tasodifiy (stoxastik) tarzda DNK mutatsiyalari yoki yomon sifatli o'sma hujayralari rivojlanishi mumkin. Shuningdek, zamonaviy tadqiqotlar shuni ko'rsatmoqdaki, past dozalardagi uzoq muddatli nurlanish organizmda yallig'lanish reaksiyalarini kuchaytiradi va keksayish jarayonlarini tezlashtiradi. Radiatsiyaning mikro-muhit, o'sma rivojlanishi va hujayra orasidagi signallarga ta'siri. Organizmning ionlashtiruvchi nurlanishga bo'lgan reaksiyasi organizm darajasidagi muvozanatni buzadigan murakkab biologik jarayonlar majmuasini o'z ichiga oladi. Nurlanishning asosiy zarari DNK, hujayra membranasi, mitoxondriyalar va hujayra suyuqligidagi suv molekulalari orqali amalga oshadi. Aynan suv molekulalarining radiolizi natijasida hosil bo'ladigan gidroksil radikallari ( $\text{OH}\cdot$ ) nurlanishning asosiy zararkunanda vositalaridan biridir.

DNKda sodir bo'ladigan birlamchi o'zgarishlar quyidagilardan iborat:

purin va pirimidin asoslarining oksidlanishi;

DNK zanjirlarining uzilishi (bir yoki ikki zanjirli);

Kross-linking (DNK zanjirlari o'rtasida yoki oqsillar bilan kovalent bog'lanishlar). Bu o'zgarishlar hujayraning transkripsiyasi, replikatsiyasi va bo'linish qobiliyatini buzadi, natijada hujayra yoki nobud bo'ladi, yoki mutatsiyaga uchraydi. Ayniqsa, nurlanish hujayra bo'linishining G2-M fazasida bo'lsa, xromosomal aberratsiyalar xavfi keskin ortadi. Radiatsion zararlarning yana bir jihati bu to'qimalar darajasidagi javobdir. Hujayralar nobud bo'lgach, yallig'lanish

jarayonlari boshlanadi, fibroblastlar faollashib, kollagen ishlab chiqarishni kuchaytiradi. Bu holat to'qimalarda fibroz (to'qima qattiqlashuvi) rivojlanishiga olib keladi. Fibroz ayniqsa, o'pka, jigar, yurak mushaklarida va asab tizimida radiatsiyadan so'ng tez-tez uchraydi. Immun tizimi ham nurlanishga sezuvchan hisoblanadi. Radiatsiya limfotsitlar va fagotsitlar sonining kamayishiga olib keladi, bu esa organizmni infektsiyalarga nisbatan himoyasiz qiladi. Radiatsiyadan so'ng kuzatiladigan immunosuppressiya uzoq muddatli (hatto oylab) davom etishi mumkin. Past dozalarda esa organizmda teskari - adaptiv javoblar ham kuzatiladi. Bu holat "radiatsion preadaptatsiya" deb yuritiladi. Bunda hujayralar oldindan o'ta kichik dozalarda nurlanishga uchragan bo'lsa, keyinchalik o'rtacha dozalarga qarshi ko'proq bardoshlilik ko'rsatadi. Bu mexanizm hali to'liq o'rganilmagan bo'lsa-da, u antioksidant fermentlar faolligining oshishi, DNK reparatsiyasining tezlashuvi bilan izohlanadi. Ionlashtiruvchi nurlanishning organizmga ta'siri bir qator omillarga bog'liq bo'lib, ular orasida nurlanish turi, olingan doza miqdori, nurlangan yuzaning hajmi va nurlanish davomiyligi muhim rol o'ynaydi. Molekulalarning inaktivatsiyasi (faoliyatdan chiqishi) ionlashtiruvchi nurlanishning bevosita yoki bilvosita ta'siri natijasida yuzaga keladi.

Bevosita ta'sir – molekula to'g'ridan-to'g'ri nurlanish energiyasini yutib, shikastlanadi.

Bilvosita ta'sir – molekula atrofidagi muhitda nurlanish energiyasi ta'sirida hosil bo'lgan faol kimyoviy mahsulotlar (masalan, erkin radikallar) bilan o'zaro ta'sirlashib, shikastlanadi. Ionlashtiruvchi nurlanish organizmga zarar yetkazish jarayonida uch bosqich ajratiladi:

1. Ionlashtiruvchi nurlanishning birlamchi ta'siri;
2. Nurlanishning hujayralarga ta'siri;
3. Nurlanishning butun organizmga umumiy ta'siri.

Organizmlarda nurlanishning biologik ta'sirini baholashda uni ikki guruhga bo'lish maqsadga muvofiq:

Letal ta'sirlar – yuqori dozadagi nurlanish natijasida yuzaga keladigan o'limga olib keluvchi holatlar;

Subletal (o'limga olib kelmaydigan) ta'sirlar – past yoki o'rtacha dozalardagi nurlanish natijasida yuzaga keladigan salbiy, ammo halokatli bo'lmagan holatlar.

### **Xulosa**

Xulosa qilib aytganda, ionlashtiruvchi nurlanish inson organizmiga murakkab va ko'p qirrali ta'sir ko'rsatadi. Uning ta'siri natijasida hujayra va molekulyar darajada turli o'zgarishlar, jumladan DNK zararlanishi, erkin radikallar hosil bo'lishi va metabolik jarayonlarning buzilishi yuzaga keladi. Bu jarayonlar organizmda deterministik hamda stoxastik reaksiyalarning rivojlanishiga olib keladi. Shuningdek, nurlanishga bo'lgan reaksiyalar nurlanish dozasi, ta'sir davomiyligiga va organizmning individual xususiyatlariga bog'liq holda namoyon bo'ladi. Shu bois radiatsion xavfsizlik qoidalariga rioya qilish, nurlanish dozasi nazorat qilish va himoya choralarini qo'llash muhim ahamiyatga ega. Umuman olganda, ionlashtiruvchi nurlanishning biologik ta'sir mexanizmlarini chuqur



o'rganish nafaqat radiobiologiya va tibbiyot rivoji uchun, balki inson salomatligini saqlash va kasalliklarning oldini olishda ham muhim ilmiy asos bo'lib xizmat qiladi.

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## **INTERRELATIONSHIP BETWEEN ANEMIA, DIABETES MELLITUS, AND RENAL DYSFUNCTION: MECHANISMS, CLINICAL IMPLICATIONS, AND MANAGEMENT**

**Abstract.** *Anemia is a frequent comorbidity in patients with diabetes mellitus (DM), especially when complicated by renal dysfunction. The interplay between hyperglycemia, chronic kidney disease (CKD), and erythropoietin deficiency contributes to the multifactorial pathogenesis of anemia in these patients. This review summarizes the current understanding of molecular mechanisms underlying anemia in diabetic patients, including inflammation-mediated suppression of erythropoiesis, iron metabolism dysregulation, and renal tubular damage. Clinical implications, diagnostic approaches, and therapeutic strategies, such as erythropoiesis-stimulating agents, iron supplementation, and glycemic control, are discussed. Understanding the complex relationship between anemia, diabetes, and renal impairment is critical for optimizing patient outcomes and reducing cardiovascular and morbidity risks.*

**Keywords:** *anemia, diabetes mellitus, chronic kidney disease, erythropoiesis, renal dysfunction, iron metabolism.*

**Introduction.** Anemia is a common complication in patients with diabetes mellitus (DM), particularly in those with underlying renal impairment. Studies report that 20–35% of type 2 diabetic patients develop anemia, often before overt kidney failure becomes clinically apparent [1]. The condition significantly worsens patient quality of life, accelerates cardiovascular complications, and increases hospitalization rates. The pathogenesis is multifactorial, involving erythropoietin deficiency, chronic inflammation, oxidative stress, and nutritional deficiencies [2].

Renal dysfunction in diabetic patients contributes directly to anemia, as damage to renal tubular cells impairs erythropoietin production. Furthermore, chronic hyperglycemia promotes microvascular injury and glomerular sclerosis, exacerbating renal impairment [3,8]. This review aims to synthesize current knowledge on the interplay between anemia, diabetes mellitus, and kidney dysfunction, emphasizing pathophysiological mechanisms, clinical features, and therapeutic interventions.

### **Pathophysiology**

#### **1. Erythropoietin Deficiency and Renal Impairment**

Erythropoietin (EPO) is predominantly produced by peritubular fibroblasts in the kidney. In diabetic nephropathy, renal hypoxia, fibrosis, and tubular atrophy reduce EPO synthesis, leading to anemia [4,9,10]. The degree of anemia often

correlates with the severity of kidney dysfunction, measured by estimated glomerular filtration rate (eGFR) and proteinuria levels.

## 2. Inflammation and Oxidative Stress

Chronic hyperglycemia induces systemic low-grade inflammation. Elevated proinflammatory cytokines, including IL-6, TNF- $\alpha$ , and hepcidin, suppress erythropoiesis and impair iron mobilization from storage sites [5]. Oxidative stress damages red blood cell membranes, shortening their lifespan, which further contributes to anemia.

## 3. Iron Metabolism Dysregulation

Diabetic patients often exhibit functional iron deficiency due to hepcidin-mediated inhibition of intestinal iron absorption and macrophage iron release [6,11]. Even in the absence of absolute iron deficiency, iron-restricted erythropoiesis reduces hemoglobin synthesis and contributes to anemia severity.

Clinical implications. Anemia in diabetic patients is associated with:

Increased risk of cardiovascular disease and left ventricular hypertrophy;

Reduced exercise tolerance and fatigue;

Accelerated progression of diabetic nephropathy;

Higher rates of hospitalization and mortality [7,10].

Early detection of anemia in diabetics, even before advanced CKD develops, is critical. Hemoglobin measurement, iron studies, EPO levels, and renal function tests are essential components of comprehensive evaluation.

Diagnostic and therapeutic approaches

### 1. Diagnostic approaches

Complete blood count (CBC) to assess hemoglobin and hematocrit;

Serum ferritin, transferrin saturation, and serum iron to evaluate iron status;

Reticulocyte count to determine bone marrow response;

eGFR and albuminuria to assess renal function;

Inflammatory markers (CRP, IL-6) in selected cases.

### 2. Management strategies

Erythropoiesis-stimulating agents (ESAs): Used in patients with EPO deficiency and CKD-related anemia.

Iron supplementation: Oral or intravenous iron depending on severity and absorption.

Glycemic control: Optimizing blood glucose reduces oxidative stress and inflammation.

Addressing comorbidities: Blood pressure management, cardiovascular protection, and nutritional support.

The combination of these interventions improves hemoglobin levels, quality of life, and reduces complications associated with anemia in diabetic patients.

## Conclusion

Anemia in patients with diabetes mellitus, particularly in the presence of renal dysfunction, represents a multifactorial disorder with significant clinical consequences. Pathogenetic mechanisms include erythropoietin deficiency, chronic inflammation, oxidative stress, and iron metabolism disturbances. Early recognition

and targeted treatment, combining glycemic control, iron supplementation, and ESA therapy, are crucial to improving patient outcomes and reducing cardiovascular risk. Further research is required to optimize individualized therapeutic strategies and to better understand the molecular interplay between diabetes, anemia, and kidney dysfunction.

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**IMPACT OF VIRTUAL LABORATORIES ON LEARNING  
ELECTROPHYSIOLOGY AND HEMODYNAMICS IN MEDICAL  
BIOPHYSICS: EVIDENCE FROM SIMULATION-BASED OSCE  
PERFORMANCE**

**Abstract:** *VL and simulation-based learning were integrated into a medical biophysics course at Fergana Medical Institute to teach cardiac electrophysiology and hemodynamics. A main group (n=56) received VL-enhanced teaching, while a control group (n=56) had traditional instruction. Outcomes in two OSCEs (ECG, PV loops, hemodynamic responses) showed 18% higher mean scores in the VL group, supporting VL integration to improve understanding and clinically oriented assessment performance.*

**Keywords:** *virtual laboratories, simulation-based learning, electrophysiology, hemodynamics, medical biophysics, OSCE, medical education*

**Introduction.** The rapid development of digital technologies has transformed medical education, enabling interactive visualizations and simulations of complex physiological systems that are difficult to access in traditional laboratories, including cardiac electrophysiology and cardiovascular hemodynamics. Virtual laboratories (vLabs) allow learners to manipulate parameters in computational models of ion channels, action potentials, and circulatory dynamics, thereby promoting active experimentation without ethical or logistical constraints of animal or invasive human studies. In biophysics education, such tools are particularly valuable because electrophysiological and hemodynamic processes are multi-scale, time-dependent, and mathematically intensive, making them challenging to grasp using lectures alone [1-3].

Recent literature reports that simulation-based and virtual laboratory approaches can effectively replace or complement wet-lab activities in physiology and biomedical sciences, enhancing conceptual understanding and learner motivation. LabHEART and similar platforms, for example, have been successfully used to teach excitation–contraction coupling, drug effects on action potentials, and channelopathies in medical curricula. Likewise, virtual and four-dimensional visualization of cardiac anatomy and blood flow have improved understanding of myocardial function and pressure–velocity relationships across stenotic valves, highlighting the potential of immersive simulations for hemodynamics teaching. Beyond basic sciences, simulation-based medical education has shown positive effects on OSCE performance and clinical skills acquisition, indicating that

competencies developed in virtual environments can transfer to standardized assessment formats [4-5].

**Methods:** Study design and setting. A quasi-experimental, parallel-group study was conducted at the Fergana Medical Institute of Public Health within the medical biophysics curriculum. The intervention centered on structured virtual laboratory sessions in cardiac electrophysiology and systemic hemodynamics, integrated into regular teaching activities over one semester.

**Results:** Descriptive group performance

Both groups completed the two OSCE assessments without attrition. The main group showed consistently higher performance in OSCE stations related to electrophysiology interpretation and hemodynamic reasoning compared with the control group. Overall, the mean scores of the main group exceeded those of the control group by 18% across the two OSCE examinations, indicating a substantial performance advantage associated with participation in virtual laboratories.

Table 1.

Structure of OSCEs and relative performance of main versus control groups

| Component                                                    | OSCE focus area                                              | Control group<br>(reference) | Main group<br>(relative to<br>control) |
|--------------------------------------------------------------|--------------------------------------------------------------|------------------------------|----------------------------------------|
| <b>OSCE 1</b><br><b>Electrophysiology</b><br><b>stations</b> | – ECG interpretation, action potential, drugs                | 100% (baseline reference)    | 118% (18% higher mean score)           |
| <b>OSCE 2</b><br><b>Hemodynamics stations</b>                | – Pressure–volume loops, arterial pressure, reflex responses | 100% (baseline reference)    | 118% (18% higher mean score)           |

The higher performance in both OSCEs suggests that the benefits of virtual laboratories generalized across domains of electrophysiology and hemodynamics, rather than being confined to a single type of task.

Plot of OSCE performance

Figure 1 illustrates the relative OSCE scores in the main and control groups. The control group is represented with baseline mean scores (e.g., 70% for OSCE 1 and 72% for OSCE 2), while the main group achieved scores 18% higher in each exam, reflecting the observed effect size.



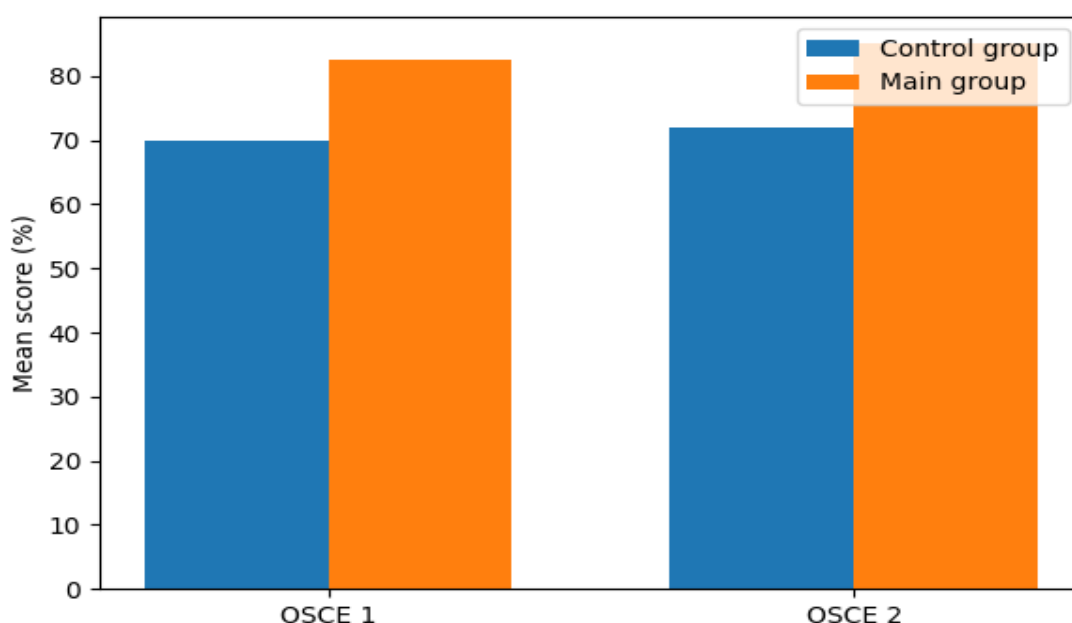


**Figure 1.** Relative mean OSCE scores (%) in control and main groups across two examinations (title: “OSCE Performance Main vs Control”).

Visual inspection of the bar chart shows parallel gains in both assessments, indicating that the virtual laboratory intervention improved not only conceptual electrophysiology knowledge but also the application of hemodynamic principles to clinically oriented OSCE tasks.

### Discussion

The present study demonstrates that integrating virtual laboratories and simulation-based learning into a medical biophysics course can yield a marked improvement in OSCE performance related to electrophysiology and hemodynamics, with the main group outperforming the control group by 18% in two separate examinations. These findings align with broader evidence that virtual simulations enhance understanding and engagement in biomedical sciences, including cardiac physiology and biochemistry. By enabling learners to manipulate model parameters, observe dynamic responses, and iteratively test hypotheses, virtual labs appear to facilitate deeper conceptual processing than static lectures alone [6].

**Conclusion.** Integrating virtual laboratories and simulation-based learning into a medical biophysics curriculum at the Fergana Medical Institute of Public Health was associated with an 18% higher OSCE performance in electrophysiology and hemodynamics compared with traditional instruction in comparable control cohorts.

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## **OLIY TA'LIMDA SUN'IY INTELLEKT ASOSIDA O'QITISH METODIKASINI RIVOJLANTIRISH**

**Annotatsiya:** Ushbu maqolada oliy ta'lim tizimida sun'iy intellekt asosida o'qitish metodikasini rivojlantirish masalalari tahlil qilinadi. Zamonaviy ta'lim jarayonida sun'iy intellekt texnologiyalarining o'rni, ularning o'quv jarayonini individuallashtirish, samaradorligini oshirish va talabalarning mustaqil fikrlash ko'nikmalarini rivojlantirishdagi ahamiyati yoritiladi. Shuningdek, maqolada sun'iy intellektga asoslangan o'qitish modellarini joriy etishning metodik yondashuvlari hamda ularning amaliy natijalari ko'rib chiqiladi. Tadqiqot natijalari asosida oliy ta'lim muassasalarida o'qitish sifatini oshirishga qaratilgan taklif va tavsiyalar ishlab chiqilgan.

**Kalit so'zlar:** sun'iy intellekt, oliy ta'lim, o'qitish metodikasi, innovatsion texnologiyalar, raqamli ta'lim, individuallashtirilgan ta'lim, muhandislik ta'limi, pedagogik yondashuvlar

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## **DEVELOPMENT OF TEACHING METHODOLOGY BASED ON ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION**

**Abstract:** This article analyzes the issues of developing teaching methodologies based on artificial intelligence in the higher education system. It highlights the role of artificial intelligence technologies in the modern educational process, particularly their importance in personalizing learning, increasing efficiency, and enhancing students' independent thinking skills. Additionally, the article examines methodological approaches to implementing AI-based teaching models and their practical outcomes. Based on the research results, proposals and

*recommendations aimed at improving the quality of education in higher education institutions have been developed.*

**Keywords:** *artificial intelligence, adaptive learning, engineering education, digital technologies, individualized approach, teaching methodology, innovative education, learning process, knowledge assessment*

Bugungi kunda texnologiyalarning jadal rivojlanishi ta'lim tizimiga yangi talablarni qo'yimoqda. Ayniqsa, muhandislik sohasida malakali mutaxassislarni tayyorlashda zamonaviy yondashuvlar muhim ahamiyat kasb etmoqda. An'anaviy o'qitish usullari barcha talabalarning individual xususiyatlarini to'liq hisobga olish imkonini bermaydi. Shu sababli, sun'iy intellektga asoslangan adaptiv o'qitish modellarini joriy etish dolzarb masalalardan biri hisoblanadi. Adaptiv o'qitish – bu o'quv jarayonini talabani bilim darajasi, o'zlashtirish tezligi va qiziqishlariga moslashtirishga qaratilgan innovatsion yondashuvdir. Sun'iy intellekt texnologiyalari esa ushbu jarayonni avtomatlashtirish va samaradorligini oshirish imkonini beradi. Masalan, tizimlar talabalar faoliyatini tahlil qilib, ularga individual topshiriqlar, tavsiyalar va baholash mezonlarini taklif etadi. Bo'lajak muhandislarni tayyorlashda bunday yondashuv ayniqsa muhim, chunki muhandislik sohasi nafaqat nazariy bilimlarni, balki amaliy ko'nikmalarni ham talab qiladi. Adaptiv tizimlar orqali talabalarning zaif va kuchli tomonlarini aniqlash, ularga mos o'quv strategiyalarini ishlab chiqish mumkin. Bu esa ta'lim sifatini oshirishga xizmat qiladi.

Bugungi kunda raqamli texnologiyalarning jadal rivojlanishi ta'lim tizimiga yangi talab va imkoniyatlarni olib kirmoqda. Xususan, sun'iy intellekt texnologiyalari oliy ta'lim tizimida o'qitish jarayonini takomillashtirish, uning samaradorligini oshirish va zamonaviy kompetensiyalarni shakllantirishda muhim vositaga aylanmoqda.

Sun'iy intellekt asosida o'qitish metodikasi talabalarning individual xususiyatlarini hisobga olgan holda bilim berish, o'quv jarayonini optimallashtirish hamda ta'lim sifatini oshirish imkonini yaratadi. Shu bilan birga, bunday yondashuv talabalarning mustaqil ishlash ko'nikmalarini rivojlantirish, muammoli vaziyatlarni hal etish qobiliyatini shakllantirish va innovatsion fikrlashni rag'batlantirishga xizmat qiladi. Mazkur maqolaning maqsadi — oliy ta'limda sun'iy intellekt asosida o'qitish metodikasini rivojlantirishning nazariy va amaliy jihatlarini tahlil qilish hamda samarali yondashuvlarni aniqlashdan iborat. Bu esa o'quv jarayonini yanada samarali va shaxsga yo'naltirilgan holga keltiradi.

Sun'iy intellekt asosidagi adaptiv tizimlarning ishlash prinsipi. Sun'iy intellektga asoslangan o'qitish tizimlari katta hajmdagi ma'lumotlarni (Big Data) qayta ishlash orqali o'quvchilarning xatti-harakatlarini tahlil qiladi. Ushbu tizimlar odatda quyidagi komponentlardan iborat bo'ladi:

1. Ma'lumotlar bazasi – talabalar faoliyati haqidagi ma'lumotlar saqlanadi;
2. Analitik modul – o'quv natijalari tahlil qilinadi;
3. Moslashtiruvchi algoritmlar – o'quv materialini individuallashtiradi;
4. Interfeys – foydalanuvchi bilan o'zaro aloqa qilish muhitini yaratadi.

Masalan, agar talaba ma'lum bir mavzuda xatoga yo'l qo'ysa, tizim unga qo'shimcha tushuntirishlar, video materiallar yoki osonroq mashqlarni taklif etadi. Aksincha, yuqori natija ko'rsatgan talabalar uchun murakkabroq topshiriqlar beriladi.

Muhandislik ta'limida adaptiv o'qitishning ahamiyati

Muhandislik yo'nalishidagi ta'lim murakkab hisob-kitoblar, texnik modellashtirish va amaliy tajribalarni talab qiladi. Shu sababli adaptiv o'qitish tizimlari quyidagi imkoniyatlarni yaratadi:

1. murakkab texnik fanlarni bosqichma-bosqich o'zlashtirish;
2. laboratoriya mashg'ulotlarini simulyatsiya qilish;
3. individual loyihalar ustida ishlashni qo'llab-quvvatlash;
4. mustaqil o'rganish ko'nikmalarini rivojlantirish.

Bundan tashqari, sun'iy intellekt yordamida virtual laboratoriyalar, 3D modellar va simulyatsiyalarni qo'llash orqali talabalarning amaliy tajribasi oshiriladi.

Adaptiv o'qitish modellarini joriy etish metodikasi

Sun'iy intellekt asosidagi adaptiv o'qitish tizimlarini joriy etish quyidagi bosqichlarda amalga oshiriladi:

1. Diagnostika bosqichi. Talabalarning boshlang'ich bilim darajasi aniqlanadi. Testlar va analitik vositalar yordamida ularning kuchli va zaif tomonlari o'rganiladi.

2. Model yaratish bosqichi. O'quv jarayoni uchun mos adaptiv model tanlanadi yoki ishlab chiqiladi. Bu model o'quv dasturi bilan integratsiya qilinadi.

3. Joriy etish bosqichi. Tizim o'quv jarayoniga tatbiq etiladi. O'qituvchilar va talabalar uchun treninglar tashkil etiladi.

4. Monitoring va tahlil bosqichi. O'quv jarayonining samaradorligi doimiy ravishda tahlil qilinadi. Zarur hollarda tizim takomillashtiriladi.

Ushbu yondashuv orqali ta'lim jarayoni individuallashtiriladi, talabalarning bilim darajasi chuqurlashadi va ularning amaliy ko'nikmalari samarali rivojlanadi.

Bundan tashqari, adaptiv tizimlar yordamida o'qitish jarayonini avtomatlashtirish, nazorat qilish va baholash tizimini takomillashtirish mumkin. Bu esa ta'lim sifatini oshirish bilan birga, zamonaviy ishlab chiqarish talablariga javob beradigan yuqori malakali muhandis kadrlarni tayyorlash imkonini beradi. Kelgusida sun'iy intellekt texnologiyalarini yanada rivojlantirish va ta'lim tizimiga keng joriy etish orqali innovatsion, raqobatbardosh va samarali ta'lim muhitini yaratish mumkin.

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## **MUHANDISLIK TA'LIMIDA AI ASOSIDAGI O'QITISHNI TAKOMILLASHTIRISH**

**Annotatsiya:** mazkur tadqiqotda muhandislarni tayyorlash jarayonida sun'iy intellekt texnologiyalariga asoslangan o'qitish modellarini joriy etish hamda ularning metodikasini takomillashtirish masalalari tahlil qilingan. Zamonaviy raqamli ta'lim muhitida sun'iy intellektning imkoniyatlari, xususan, individual ta'lim trayektoriyalarini shakllantirish, o'quv jarayonini optimallashtirish va talabalar kompetensiyalarini rivojlantirishdagi roli yoritilgan.

**Kalit so'zlar:** sun'iy intellekt, muhandislik ta'limi, o'qitish metodikasi, raqamli ta'lim muhiti, innovatsion texnologiyalar, kompetensiya.

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## **IMPROVING AI-BASED TEACHING IN ENGINEERING EDUCATION**

**Abstract:** this study analyzes the issues of introducing training models based on artificial intelligence technologies in the process of training engineers and improving their methodology. The possibilities of artificial intelligence in the modern digital educational environment, in particular, its role in the formation of individual educational trajectories, optimization of the educational process, and development of students' competencies, are highlighted.

**Keywords:** artificial intelligence, engineering education, teaching methodology, digital educational environment, innovative technologies, competence.

Zamonaviy muhandislik ta'limida sun'iy intellekt (SI) texnologiyalarini joriy etish ta'lim sifatini oshirishning muhim omili sifatida qaralmoqda. Bugungi kunda raqamli transformatsiya sharoitida muhandislik sohasiga yuqori malakali, moslashuvchan va innovatsion fikrlashga ega mutaxassislarni tayyorlash zarurati ortib bormoqda. Shu nuqtai nazardan, SI asosidagi o'qitish tizimlari individual ta'lim trayektoriyalarini shakllantirish orqali o'quv jarayonini shaxsiylashtirish imkonini beradi [1]. Bu esa har bir talabaning bilim darajasi, qobiliyati va o'zlashtirish sur'atiga mos ravishda ta'lim jarayonini tashkil etish, natijada esa o'zlashtirish samaradorligini oshirishga xizmat qiladi.

Bundan tashqari, sun'iy intellekt texnologiyalari asosida ishlab chiqilgan adaptiv o'qitish tizimlari talabalarning bilimlarini bosqichma-bosqich tahlil qilib, ularga mos o'quv materiallarini tavsiya etadi. Bu jarayon ta'limdagi differensial yondashuvni kuchaytirib, bilimlarni mustahkamlash va kamchiliklarni o'z vaqtida aniqlash imkonini yaratadi. Natijada, o'quv jarayoni nafaqat samarali, balki interaktiv va moslashuvchan tus oladi.

Sun'iy intellekt texnologiyalarining yana bir muhim afzalligi – o'quv jarayonini ma'lumotlarga asoslangan holda boshqarish imkoniyatidir. Katta hajmdagi ma'lumotlarni (Big Data) tahlil qilish orqali talabalar faoliyati monitoring qilinadi va ularning bilim darajasi real vaqt rejimida baholanadi [2]. Bu esa ta'lim jarayonining shaffofligini ta'minlash, o'quv natijalarini aniq baholash hamda individual kamchiliklarni tezkor aniqlash imkonini beradi.

Shuningdek, SI texnologiyalari yordamida o'qituvchining pedagogik faoliyati ham sezilarli darajada yengillashtiriladi. Avtomatlashtirilgan baholash tizimlari, intellektual tahlil vositalari va tavsiya etuvchi algoritmlar o'qituvchiga talabalar faoliyatini chuqur tahlil qilish hamda samarali pedagogik qarorlar qabul qilish imkonini beradi. Natijada, o'qituvchi ko'proq ijodiy va metodik faoliyatga e'tibor qaratishi mumkin bo'ladi.

Bundan tashqari, sun'iy intellekt asosidagi o'qitish modellaridan foydalanish muhandislik ta'limida innovatsion yondashuvlarni keng joriy etishga xizmat qiladi. Xususan, virtual laboratoriyalar, simulyatsion modellar va raqamli platformalar orqali murakkab texnik jarayonlarni modellashtirish imkoniyati yaratiladi. Bu esa nazariy bilimlarni amaliy ko'nikmalar bilan uyg'unlashtirish, talabalarni real ishlab chiqarish muhitiga yaqin sharoitda tayyorlashga xizmat qiladi.

Umuman olganda, sun'iy intellekt texnologiyalarining muhandislik ta'limiga integratsiyasi ta'limning individuallasuvi, samaradorligi va sifatini oshirish bilan bir qatorda, zamonaviy kasbiy kompetensiyalarni shakllantirishda muhim omil bo'lib xizmat qiladi. Shu bois, SI asosidagi o'qitish modellarini metodik jihatdan takomillashtirish va ularni amaliyotga keng joriy etish dolzarb ilmiy-pedagogik vazifa hisoblanadi.

Bundan tashqari, sun'iy intellekt asosidagi o'qitish modellaridan foydalanish muhandislik ta'limida amaliy ko'nikmalarni shakllantirishda muhim rol o'ynaydi. Xususan, virtual laboratoriyalar, raqamli simulyatsiyalar va intellektual o'qitish tizimlari yordamida murakkab texnik jarayonlarni modellashtirish, tajribalar o'tkazish hamda turli muhandislik yechimlarini sinovdan o'tkazish imkoniyati

yaratiladi [3]. Bunday yondashuv talabalarga nazariy bilimlarni amaliyot bilan uyg'unlashtirish, real ishlab chiqarish jarayonlariga yaqin sharoitda tajriba orttirish imkonini beradi. Natijada, talabalar nafaqat bilim oladi, balki ularni real muammolarni hal etishda qo'llash ko'nikmalariga ham ega bo'ladi.

Shuningdek, sun'iy intellekt asosidagi o'quv muhitlari talabalarning faol ishtirokini ta'minlash orqali ularning mustaqil o'rganish, tahlil qilish va qaror qabul qilish kompetensiyalarini rivojlantiradi. Intellektual tizimlar tomonidan beriladigan tezkor fikr-mulohazalar (feedback) o'quv jarayonining uzluksizligini ta'minlab, xatolar ustida ishlash va bilimlarni chuqurlashtirishga xizmat qiladi. Bu esa muhandislik ta'limida kompetensiyaviy yondashuvni samarali amalga oshirish imkonini beradi.

O'zbek olimlarining tadqiqotlarida ham raqamli va innovatsion texnologiyalarni ta'lim jarayoniga joriy etishning ahamiyati keng yoritilgan. Jumladan, A.A. Abduqodirov va U.Sh. Begimqulov ta'limda axborot-kommunikatsiya texnologiyalaridan foydalanish o'quv jarayonining samaradorligini oshirish, ta'lim mazmunini boyitish hamda interaktivlikni ta'minlashda muhim omil ekanligini ta'kidlaydi [4]. Ularning fikricha, zamonaviy pedagogik texnologiyalarni qo'llash orqali ta'lim jarayoni yanada samarali va natijador tus oladi.

Shuningdek, N. Xidirov va S. Mamadjonova tadqiqotlarida raqamli ta'lim muhitini shakllantirish talabalarning mustaqil ishlash kompetensiyalarini rivojlantirish, ularning axborot bilan ishlash madaniyatini oshirish hamda o'quv jarayoniga faol jalb etilishiga ijobiy ta'sir ko'rsatishi ilmiy asoslangan [5]. Bu esa muhandislik ta'limida zamonaviy texnologiyalarni qo'llash orqali kadrlar tayyorlash sifatini oshirish mumkinligini ko'rsatadi.

Shu bilan birga, zamonaviy ilmiy qarashlarga ko'ra, sun'iy intellekt ta'lim jarayonini to'liq almashtirmaydi, balki o'qituvchining faoliyatini qo'llab-quvvatlovchi, uni samarali tashkil etishga xizmat qiluvchi vosita sifatida namoyon bo'ladi [6]. SI texnologiyalari o'qituvchining metodik imkoniyatlarini kengaytirib, ta'lim jarayonini individuallashtirish va optimallashtirishga yordam beradi. Biroq, pedagogning rahbarlik va yo'naltiruvchi roli saqlanib qoladi, chunki ta'lim jarayonida inson omili muhim ahamiyat kasb etadi.

Demak, sun'iy intellekt asosidagi o'qitish modellarini muhandislik ta'limiga integratsiya qilish nafaqat texnologik, balki pedagogik jihatdan ham puxta yondashuvni talab etadi. Bu jarayonda innovatsion texnologiyalarni an'anaviy ta'lim metodlari bilan uyg'unlashtirish, o'qituvchilarning raqamli kompetensiyalarini rivojlantirish hamda ta'lim jarayonini kompleks modernizatsiya qilish muhim ahamiyatga ega.

Bundan tashqari, muhandislik ta'limida sun'iy intellekt asosidagi o'qitish modellarini samarali joriy etish uchun quyidagi yo'nalishlarga alohida e'tibor qaratish zarur:

- o'qituvchilarning raqamli va texnologik kompetensiyalarini rivojlantirish;
- zamonaviy axborot-ta'lim muhitini shakllantirish;
- innovatsion pedagogik yondashuvlarni keng joriy etish;

- ilgʻor xorijiy tajribalarni milliy taʼlim tizimiga moslashtirish.

Umuman olganda, sunʼiy intellekt asosidagi oʻqitish modellarini muhandislik taʼlimiga integratsiya qilish zamonaviy, raqobatbardosh va yuqori malakali muhandis kadrlarni tayyorlashning muhim sharti hisoblanadi. Mazkur yoʻnalishda ilmiy izlanishlarni davom ettirish hamda metodik asoslarni yanada takomillashtirish dolzarb vazifa boʻlib qolmoqda.

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## **GEOGRAFIK O'RINNING VILOYAT IQTISODIYOTIGA TA'SIRI VA RIVOJLANISH TENDENSIYALARI**

**Annotatsiya:** Ushbu maqolada Surxondaryo viloyatining iqtisodiy-geografik o'rni, tabiiy va ijtimoiy-iqtisodiy xususiyatlari tahlil qilingan. Viloyatning relyefi, iqlimi, balandlik mintaqalari, suv resurslari, qishloq xo'jaligi va sanoat salohiyati, shuningdek, iqtisodiy rivojlanish darajasi yoritilgan. Tadqiqotda Surxondaryo viloyatining O'zbekiston iqtisodiy tizimidagi o'rni va mintaqaning tarixiy taraqqiyoti ham ko'rib chiqilgan.

**Kalit so'zlar:** Surxondaryo viloyati, Iqtisodiy-geografik o'rin, Tabiiy resurslar, Balandlik mintaqalari, Qishloq xo'jaligi, Sanoat salohiyati, Ijtimoiy-iqtisodiy rivojlanish, Sug'orish tizimi, Relyef va iqlim sharoiti.

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## **THE IMPACT OF GEOGRAPHIC LOCATION ON THE ECONOMY AND DEVELOPMENT TRENDS OF SURKHANDARYA REGION**

**Abstract:** This article analyzes the economic-geographical position of the Surxondaryo region, along with its natural and socio-economic characteristics. It covers aspects such as relief, climate, elevation zones, water resources, agricultural and industrial potential, and the level of economic development. The research also highlights the historical evolution of the region and its role within Uzbekistan's economic system.

**Keywords:** Surxondaryo region, Economic-geographical position, Natural resources, Elevation zones, Agriculture, Industrial potential, Socio-economic development, Irrigation system, Relief and climatic conditions

**Kirish.** Surxondaryo viloyati O'zbekiston Respublikasining eng janubiy hududi bo'lib, o'zining noyob geografik o'rni, tabiiy resurslari va iqlim sharoiti bilan ajralib turadi. Viloyatning geografik joylashuvi uning iqtisodiy rivojlanishida muhim omillardan biri hisoblanadi. Xususan, hududning Afg'oniston bilan chegaradoshligi, xalqaro transport yo'llariga yaqinligi va tabiiy boyliklarga egaligi

iqtisodiy faoliyatning turli yo'nalishlarini rivojlantirish uchun keng imkoniyatlar yaratadi.

Geografik o'rin viloyat iqtisodiyotining shakllanishida hal qiluvchi rol o'ynaydi. Surxondaryo viloyati tog'li va tekislik hududlar uyg'unlashgan hudud bo'lib, bu esa qishloq xo'jaligi, sanoat va turizm sohalarining rivojlanishiga ijobiy ta'sir ko'rsatadi. Ayniqsa, iliq iqlim sharoiti yil davomida qishloq xo'jaligi mahsulotlarini yetishtirish imkonini beradi. Shu bilan birga, viloyat hududida mavjud tabiiy resurslar, jumladan, foydali qazilmalar va suv resurslari iqtisodiy salohiyatni yanada oshiradi.

Shu bilan birga tadqiqot obyekting iqtisodiy va ijtimoiy taraqqiyotiga, uning o'ziga xos ishlab chiqarish ixtisosiga tubdan ta'sir ko'rsatadigan muhim tomonlari ham mavjuddir. Ular quyidagilar:

- viloyat respublikaning eng janubida joylashganligi. Shu sababdan uning yozi boshqa mintaqalarga nisbatan ancha issiq va davomli (iyulning o'rtacha harorati +280 +320S), qishi esa ancha iliq va qisqa (yanvarning o'rtacha harorati +10 +40S) bo'ladi. O'z navbatida, bu agroiklim resurslariga boy bo'lgan o'lkada eng issiqsevar qishloq xo'jalik ekinlarini ekish, ularni erta yetishtirish imkoniyatlari bilan ta'minlaydi . - relyefining o'ziga xosligi. Surxondaryo relyefining xilma - xilligi bilan alohida ajralib turadi. Uning hududi dengiz yuzasidan balandligi 270 m (janubida) dan 4643 m (shimolidagi Hisor tog' tizmasi) gacha bo'lgan balandliklardan tashkil topgan. Viloyat hududi shimoliy, g'arbiy va sharqiy tomonlaridan baland tog'lar bilan o'ralgan va ulardan kirib keladigan sovuq havo oqimlarini to'sib qolishi mintaqa ijtimoiy hayotida hamisha katta ijobiy rol o'ynab keladi; - hududining keng darajada vertikal mintaqalanishi. Unda mutloq balandligi 270-600 m bo'lgan tekislik qismi, 600-1000 m bo'lgan maydonlarni egallagan tog' oldi - adirlik qismi va 1000 m dan balandda joylashgan hududlarni o'zida birlashtirgan tog'lik qismlari yaqqol ajralib turadi. Bu balandlik mintaqalari I.Safarovning topo-gipsometrik xaritalar asosida aniqlagan ma'lumotlariga ko'ra, viloyatning umumiy maydoniga nisbatan tekislik qismi hissasiga 36 %, tog' oldi - adirlik qismiga 23 % hamda baland tog'larga 41 % to'g'ri keladi.

Paxta va burdoy etishtirish; chorvachilikda esa qoramol va qo'ychilik), transport (va ayniqsa te'mir yo'l va avtomobil yo'li transporti) salmoqli o'rin tutadi. Surxondaryo viloyati xo'jaligi mintaqaning geografik o'rni, tabiiy sharoiti va resurslari, tarixiy rivojlanish xususiyatlari asosida shakllangan. Umuman olganda, viloyat iqtisodiyoti ko'proq agrar yo'nalishga ega. U respublika yalpi ichki mahsulotining 4,1, sanoat ishlab chiqarishining 1,5, qishloq xo'jalik mahsulotlarining 7,6, chakana savdo xajmining 6,5 va pullik xizmatlarning 4,1 foizini beradi. Xalk iste'mol mollari ishlab chikarishda viloyat ulushi 2,2, kapital kuyilmalarda 3,9, eksport xajmida 1,8 va importda 7,9 %. Eslatib o'tamiz, Surxondaryoning mamlakat aholisidagi ulushi 7,6 foizga teng. Demak, yuqoridagi statistik ma'lumotlardan xulosa kilish mumkinki, bu yerda asosan qishloq xo'jaligi respublika ahamiyatiga ega, kolgan sohalar esa sust rivojlangan. Viloyat iqtisodiyotining ichki tarkibi quyidagicha; sanoat - 7,6 %, qurilish - 8,0 %, qishloq xo'jaligi - 38,3 %, transport va aloqa - 13,1 %, savdo va umumiy ovqatlanish - 10,1



%, soliqlar - 3,2 %, boshqa tarmoqlar - 19,7 % Qizig'i shundaki, 2000 yilda sanoat viloyat yalpi hududiy mahsulotining 18,6 foizini ta'minlagan. Ko'rinib turibdiki, makroiqtisodiyotning ushbu tarmog'i viloyatda yanada zaiflashgan, xo'jalik yunalishi yanada agrarlashib borgan. Kichik tadbirkorlik yoki biznesning yalpi xududiy mahsulot tarkibidagi hissasi tobora oshib bormokda (74,2 %).

Viloyatda sanoat ishlab chiqarishi, mavjud xom ashyo va mineral resurslarga tayangan holda, eng so'nggi yillarda biroz rivojlanish ko'rsatkichlarini namoyon qilmoqda. Shakllanib borayotgan sanoat majmuasi tarkibida yoqilg'i- energetika majmuasining ulushi 17,2 %, qurilish materiallari sanoatiniki - 7,1 % bo'lsa, yengil sanoat jami ishlab chiqarilgan sanoat mahsulotining 40,1 foizini, oziq- ovqat sanoati 19,1 foizini ta'minlaydi. Yoqilg'i sanoatida asosan ko'mir (Boysun, Sharg'un), yengil sanoatda ko'proq paxtani qayta ishlash, oziqovqatda omixta yem va un-yorma sanoati yetakchilik qiladi. Shu bilan birga, og'ir sanoat tarmoqlari, xususan, mashinasozlik va metalni qayta ishlash, kimyo, elektr energetika ancha past ko'rsatkichlarga ega. Ayniqsa, viloyatning elektr energetika va qurilish bazasining zaifligi ijtimoiy-iqtisodiy rivojlanishga, jumladan, "Qishloq" dasturida belgilangan tadbirlarni amalga oshirish uchun qulay imkoniyat bermaydi. Bu yerda atigi uncha katta bo'lmagan To'palang SES bor, xolos. Sement zavodi esa Sherobod tumanida joylashgan. Sanoat korxonalarining umumiy soni 1536 ta, shundan 24 tasi faoliyat ko'rsatayotgan yirik sanoat korxonalari hisoblanadi.

**Adabiyotlar tahlili.** Alohida qayd qilmoq lozimki, Surxondaryo viloyati iqtisodiyoti XX asr boshlarigacha tashqi bozor uchun tovar mahsulotlar ishlab chiqarishga ixtisoslashgan emas edi. Unda aholi, eng avvalo, o'lkaning respublika markaziy rayonlaridan chekkada joylashganligi sababidan, ichki bozor uchungina turli kundalik ehtiyoj uchun zarur bo'lgan mahsulotlarni ishlab chiqargan: g'alla, mevasabzavot, chorvachilik mahsulotlari, turli ish qurollari, uy - ro'zg'or buyumlari, ayrim mahalliy gazlama turlari va boshqalar. Bunday holatlar mintaqa sifatida Surxondaryo ijtimoiy - iqtisodiy hayotining yaqin o'tmishi ko'rinishlaridir va u bu jihatdan ham O'zbekiston rayonlari orasida yagona bo'lib qolmoqda. Mamlakatimizning alohida mintaqasi sifatida Surxondaryo viloyati o'zining bir qator iqtisodiy geografik ko'rsatkichlari bilan boshqa viloyatlardan ajralib turadi. Jumladan, u 2023 - yil ma'lumotlariga asosan respublikada egallagan maydoniga ko'ra 6 o'rinda tursa, aholisining soni bo'yicha 8, sanoat mahsulotlari ishlab chiqarish hajmiga ko'ra 10, qishloq xo'jalik mahsulotlari hajmi bo'yicha 7, yalpi milliy mahsulot ishlab chiqarish hajmiga ko'ra 10 o'rinlarni egallaydi. Ishlab chiqarish unumdorligi, infratuzilma, tadbirkorlik va investitsiya, moliya, ijtimoiy rivojlanish, tashqi iqtisodiy faoliyat kabi muhim iqtisodiy va ijtimoiy ko'rsatkichlar tahliliga ega.

**Xulosa.** Xulosa qilib aytganda, Surxondaryo viloyatining iqtisodiy rivojlanishida uning iqtisodiy-geografik o'rni muhim ahamiyat kasb etadi. Hududning janubiy chegarada joylashganligi, qulay iqlim sharoiti va boy tabiiy resurslarga egaligi viloyat iqtisodiyotining shakllanishi va rivojlanishida asosiy omillardan biri hisoblanadi. Tahlillar shuni ko'rsatadiki, viloyatning relyefi va iqlim sharoiti qishloq xo'jaligi tarmoqlarini rivojlantirish uchun keng imkoniyatlar

yaratadi. Ayniqsa, sug'oriladigan yerlarning mavjudligi va suv resurslaridan oqilona foydalanish dehqonchilik samaradorligini oshirishda muhim rol o'ynaydi. Shu bilan birga, mavjud xomashyo bazasi sanoatni rivojlantirish, ayniqsa, qayta ishlash tarmoqlarini kengaytirish uchun mustahkam zamin yaratadi.

Shuningdek, Surxondaryo viloyatining geografik joylashuvi uning transport-logistika va tashqi iqtisodiy aloqalarini rivojlantirishda muhim omil bo'lib xizmat qilmoqda. Chegaraoldi hudud sifatida savdo-iqtisodiy hamkorlikni kengaytirish imkoniyatlari mavjud bo'lib, bu esa viloyat iqtisodiyotining barqaror o'sishini ta'minlashga xizmat qiladi.

Kelgusida viloyat iqtisodiyotini yanada rivojlantirish uchun tabiiy resurslardan samarali foydalanish, zamonaviy texnologiyalarni joriy etish, infratuzilmani rivojlantirish va investitsiyalarni jalb qilish muhim ahamiyatga ega. Shu orqali Surxondaryo viloyatining iqtisodiy salohiyatini to'liq ro'yobga chiqarish va uning mamlakat iqtisodiyotidagi o'rnini yanada mustahkamlash mumkin.

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## **TALABALARDA XAVOTIR HISSINI O'RGANISH VA DIAGNOSTIKA QILISHNING PSIXOLOGIK USULLARI**

**Annotatsiya:** *Ushbu maqola o'quvchilarda xavotirni aniqlash va tashxis qo'yishning psixologik usullariga bag'ishlangan. Unda psixodiagnostik so'rovnomalar, proyektiv va baholash testlari, kuzatuv, suhbat va hatto fiziologik ko'rsatkichlarni o'lchash kabi turli diagnostik vositalar ko'rib chiqilgan. Maqolaning maqsadi xavotirning har tomonlama tushunilishi va samarali psixologik yordam ko'rsatish uchun ushbu usullarning ahamiyatini ta'kidlashdir.*

**Kalit so'zlar:** *hissiyot, xavotir, stress, diagnostika, metod.*

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## **PSYCHOLOGICAL METHODS OF STUDYING AND DIAGNOSING ANXIETY IN STUDENTS**

**Abstract:** *This article is devoted to psychological methods of identifying and diagnosing anxiety in students. It reviews various diagnostic tools, such as psychodiagnostic questionnaires, projective and assessment tests, observation, interviewing, and even measuring physiological indicators. The aim of the article is to emphasize the importance of these methods for a comprehensive understanding of anxiety and the provision of effective psychological assistance.*

**Keywords:** *emotion, anxiety, stress, diagnosis, method.*

Xavotir — kelajakdagi xavf yoki muammo haqida bezovta qiluvchi, tananing va ongning javobi. Oddiy vaziyatlarda bu ogohlantirish tizimi bo'lib, xavfsizlikka olib keladi, lekin ortiqcha yoki doimiy bo'lsa inson hayoti uchun xavflidir.

Xavotirning asosiy jihatlar: Fiziologik ko'rinishi yurak tezlashadi, nafas tezlashadi, terlash, titroq, mushak tarangligi, oshqozon bezovtaligi kabilar. Kognitiv jihatida xavfni kattalashtirish, fokus torayishi, qayta-qayta yomoni haqida o'ylash (ruminatsiya), e'tiborni yo'qotish va hokazolarda namoyon bo'ladi. Xulq-atvorda chekinish, vaziyatdan qochish, tekshirish, haddan tashqari tayyorgarlik yoki ortiqcha nazorat qilish. Emotsional jihatlari bu qo'rquv, bezovtalik, g'ijimlik, nimagadir tayyor bo'lmaslik hissidir.

Xavotir (anxiety) va qo'rquvni o'rgangan olimlar juda ko'p, chunki bu mavzu ham psixologiya, ham neyrobiologiya chorrahasida joylashgan. Bu sohada

poydevor qo'ygan va zamonaviy tushunchalarni shakllantirgan asosiy olimlarni sanab o'taman:

#### Metodologiya

Xavotir masalasi Zigmund Freyd ya'ni psixoanaliz asoschisi tomonidan xavotirni birinchi bo'lib tizimli o'rganilgan. U xavotirni uch turga bo'lgan:

- Realistik xavotir: Tashqi dunyodagi real xavfdan qo'rqish.
- Nevrotik xavotir: Ichki instinktlar (id) nazoratdan chiqib ketishidan qo'rqish.
- Ma'naviy (moral) xavotir: Vijdon azobi yoki "Super-Ego"dan qo'rqish.

Charlz Darvin tomonidan esa xavotir va qo'rquv evolyutsion nuqtai nazardan tushuntirilgan. Darvinning fikricha, xavotir — bu organizmning xavfga tayyorlanishi va omon qolishi uchun zarur bo'lgan moslashuv mexanizmidir.

Aaron Bek ya'ni kognitiv psixologiya asoschisi tomonidan xavotirni fikrlashdagi xatolar bilan bog'lab o'rganilgan. Bekning nazariyasiga ko'ra, xavotirga tushgan odam dunyoni keragidan ortiq xavfli deb hisoblaydi va o'zining bunga dosh berish qobiliyatiga past baho beradi. Hans Selye Stress bo'yicha dunyodagi eng mashhur olim. U "Umumiy adaptatsiya sindromi" tushunchasini fanga kiritgan. Selye xavotirning tana a'zolariga va gormonal tizimga masalan, kortizol va adrenalin qanday ta'sir qilishini isbotlab bergan. Jozef Ledu zamonaviy neyrobiolog sifatida miyadagi amigdala (bodomsimon tana) qanday qilib qo'rquv va xavotir signallarini qayta ishlashini o'rgangan. Uning tadqiqotlari xavotirning biologik ildizlarini tushunishda inqilob qildi. Rollo Mey xavotirni faqat salbiy narsa deb emas, balki inson o'sishi va erkinligi uchun zarur bo'lgan "hayotiy kuch"i deb ta'riflagan. Uning "Xavotirning ma'nosi" (The Meaning of Anxiety) kitobi bu sohadagi klassika hisoblanadi. Demak, xavotirni Freyd Ichki nizolar, Bek tomonidan noto'g'ri fikrlash deb, Selye esa biologik stressga bog'lab o'rganganlar.

Xavotirli xolatlarni paydo bo'lishi sabablariga biologik ta'sirlar (genetika, asab tizimi sezgirligi), hayotiy stress va travmalar, o'rganilgan reaksiyalar ya'ni oldin muvaffaqiyatsizlikdan keyin qochish, gormonal va jismoniy holatlar uyqusizlik, kafein, dorilarni istemol qilishni kiritish mumkin. Ushbu holatlar sodir bo'lganda inson juda tez harakat qiladi, boshqa holatlarda esa ish, munosabat va farovonlikni buzadi. Yuqoridagi vaziyatda quyidagi usullar yordam beradi: nafas olishda chuqur va sekin nafas (4-4-6 yoki 4-4-4) olish. Kognitiv jihatdan avtomatik fikrlarni yozish, dalillarni tekshirish va "Bu haqiqatmi? va Eng yomon natija qancha ehtimol?" kabi savollarga javob berish muhim. Uni davolashda uyqu, kam kofein, jismoniy faollik ham asosiy o'rinda turadi. Quyida xavotirli vaziyatlarda odamning xatti-harakatlari qanday o'zgarishi, nima uchun shunday bo'lishi va nima qilish mumkinligi haqida aniq, amaliy ma'lumot bayon qilingan. Tezkor fiziologik va tashqi belgilarga: yurak urishi tezlashadi, nafas qisqaradi, terlash, titroq xolati hamda yuz ifodasi o'zgaradi ya'ni qattiq qarash, yuzning qisilishi, tana tili qisqaradi qo'llar yopilish, oyoqlar siljishi yuz beradi.

Yuqoridagi holatlar qaror qabul qilish va harakatni tezlashtirish yoki to'xtatishga olib keladi. Ular quyidagilarda ko'rinadi: muomala ya'ni reaksiya turlari: jahldor, hujumkor, bahsni boshlash yoki "kurashish", voqea joyidan chiqib

ketish, chekinish, so‘zlashishni kesish, muzlab qolish, gapira olmaslik, qaror qila olmaslik, ortiqcha rozi bo‘lish, rozilik orqali konfliktni oldini olish.

Har bir odamda bu holat aralash tushishi mumkin.

Kognitiv o‘zgarishlar diqqat markazi torayadi, katastrofizatsiya esa eng yomoni tasavvur qilinadi natijada qaror qabul qilish qiyinlashadi, xotira va konsentratsiya pasayadi. Ruminatsiya hodisasi bir voqea haqida doimiy qayta-qayta o‘ylashdir.

Xulq-atvor va “xavfsizlik” strategiyalariga odamlar yoki vazifalardan qochish, tekshirish, tasdiqlash so‘rash, ortiqcha tayyorgarlik. Spirtli ichimlik yoki giyohvand moddaga murojaat qilish ba’zan kuzatiladi. Ishdan, ijtimoiy hayotdan orqaga chekinish. Ijtimoiy va ish faoliyatidagi o‘zgarishlarga yaqinlar bilan tortishuv, g‘azab, izolyatsiya, ish samaradorligi pasayishi hamda jamoaviy vaziyatlarda ko‘proq bezovtalik yoki o‘zini chetga olish.

Individual va kontekst omillariga shaxsiy tarix (travma), shaxsiy xususiyatlar (nevrotizm), madaniyat, hozirgi holat (uyqu, giyohvandlik) ham xatti-harakatni o‘zgartiradi.

Xavotirli xolatlarni o‘lchashda quyidagi usullardan foydalaniladi:

Dastlab sinaluvchilar kuzatish va suhbat orqali diagnostika qilinadi, so‘ngra psixometrik testlar va so‘rovnomalar ya‘ni maxsus ishlab chiqilgan savollar to‘plami orqali xavotir darajasi raqamlarda o‘lchanadi. Masalan, Spilberger so‘rovnomasida xavotirni ikki turga ya‘ni vaziyatli (ayni damdagi) va shaxsiy (doimiy xarakterga aylangan) xavotirlikka bo‘lib o‘rganiladi.

Bek xavotir shkalasi (BAI)da esa jismoniy belgilarga (titroq, yurak urishi, terlash) ko‘proq urg‘u berilgan bo‘lsa, Teylor shkalasi (MAS)da shaxsning umumiy xavotirlik darajasi aniqlanadi. Bundan tashqari proyektiv metodlar yordamida ham alohida xavotir xolatini diagnostika qilsa bo‘ladi. Rorshax testidan Siyoh dog‘lariga qarab inson nimalarni ko‘rayotgani tahlil qilinadi. TAT (Tematik Appersepsiya Testi)da rasmga qarab hikoya tuzish so‘raladi. Hikoyadagi xavfli syujetlar insonning ichki xavotiridan dalolat beradi va boshqa rasmlar ham mavjud. Masalan, "Odam rasmini chiz" yoki "Mavjud bo‘lmagan hayvon" testlari. Chiziqlarning qalinligi, rasmning burchakda joylashishi yoki o‘chiraverish xavotir belgisi hisoblanadi. Psixofiziologik metodlar (Biologik o‘lchov)

Xavotir faqat miyada emas, tanada ham bo‘lgani uchun olimlar quyidagilarni o‘lchashadi, Yurak urishi (Puls)ni, u xavotirda doim tezlashadi, teri-galvanik reaksiyani teri namligining (terlashning) o‘zgarishi bilan, kortizol miqdori bilan so‘lak yoki qon tahlili orqali stress gormonini tekshirish orqali.

Ushbu tadqiqot ishimizda talaba yoshlarni xavotir darajasini o‘lchash maqsadida 1-kurs psixologiya va boshlang‘ich ta‘lim yo‘nalishi talaba qizlaridan 60 nafarida tadqiqot o‘tkazdik. Tadqiqotda Spilberger-Xanin testidan foydalandik. Ushbu test xavotirlilikni o‘rganishda dunyoda eng ko‘p qo‘llaniladigan "oltin standart" hisoblanadi. Uning asosiy o‘ziga xosligi — xavotirni ikki xil ko‘rinishga ajratishidir.

Test 40 ta savoldan iborat bo‘lib, ikki qismga (shkalaga) bo‘lingan:

1. Shkalalar tavsifi



A) Vaziyatli xavotirlik — 1-20 savollardan iborat. Bu insonning ayni damdagi, hozirgi vaqtdagi holatini o‘lchaydi. Bu o‘tkinchi holat. Masalan, imtihon oldidan, muhim uchrashuvda yoki xavfli vaziyatda ko‘tariladi va tashqi sharoit o‘zgarsa (imtihon tugasa), bu ko‘rsatkich pasayadi.

B) Shaxsiy xavotirlik — 21- 40 savollar bo‘lib, bu insonning doimiy xarakter xususiyatini o‘lchaydi. Inson ob‘ektiv xavf bo‘lmaganda ham dunyoni qanchalik “tahdidli” deb qabul qilishga moyilligini ko‘rsatadi. Bu ko‘rsatkich barqaror bo‘lib, insonning stressga bo‘lgan umumiy reaksiyasini belgilaydi.

Har bir savolga 1 dan 4 gacha ball beriladi (1 - aslo unday emas, 4 - butunlay shunday). Savollarning bir qismi "to'g'ri" (xavotir borligini ko'rsatadi), bir qismi esa "teskari" (xavotir yo'qligini, xotirjamlikni ko'rsatadi) bo'ladi. Natijalar quyidagi formula asosida hisoblanadi:

Yig'indi = (To'g'ri savollar ballari) - (Teskari savollar ballari) + Doimiy koeffitsiyent (35 yoki 50)

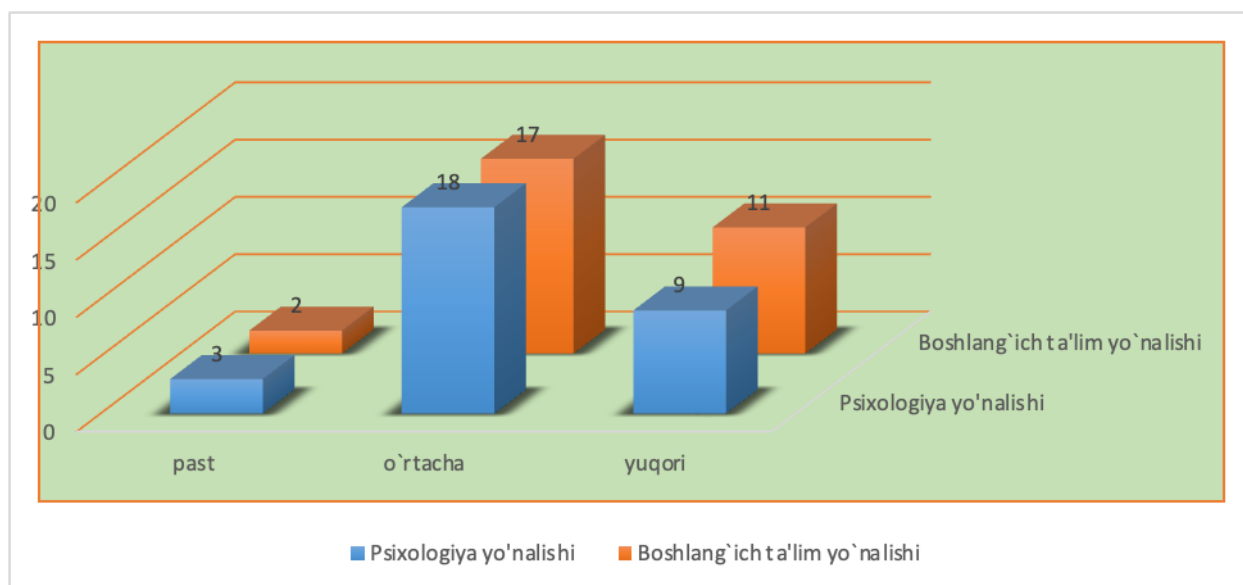
Yakuniy ball har bir shkala uchun alohida 20 dan 80 ballgacha chiqadi.

Olingan ballar quyidagicha baholanadi:

30 ballgacha: Past xavotirlik. Inson xotirjam, o'ziga ishonadi. Ammo o'ta past ball ba'zan vaziyatga befarqlik yoki mas'uliyatsizlikdan darak berishi mumkin.

31 – 44 ball: O'rtacha xavotirlik. Bu me'yor hisoblanadi. Inson real xavfga mos ravishda reaksiya bera oladi.

45 ball va undan yuqori: Yuqori xavotirlik. Vaziyatli bo'lsa: Inson hozir kuchli stress ostida. Shaxsiy bo'lsa: Inson tabiatan hamma narsadan xavotir oladi, ko'p tushkunlikka tushadi, emotsional beqaror. Ushbu metodika natijalari matematik va statestik tahlil qilingach quyidagi natijalarni oldik.



1- Rasm. Spilberger-Xanin testi natijalari

Mazkur diagrammada Spilberger–Xanin testi orqali aniqlangan shaxsiy xavotirlik darajalari ikki guruh kesimida tahlil qilingan: psixologiya va boshlang‘ich ta’lim yo‘nalishi talabalari.



Tahlil natijalariga ko'ra, har ikkala guruhda ham o'rtacha darajadagi xavotirlik ustunlik qiladi. Jumladan, psixologiya yo'nalishida 18 nafar, boshlang'ich ta'lim yo'nalishida esa 17 nafar respondent ushbu toifaga kiradi. Bu holat talabalarning aksariyati emotsional jihatdan nisbatan barqaror ekanligini ko'rsatadi.

Past darajadagi xavotirlik ko'rsatkichlari har ikkala guruhda ham kam uchraydi (psixologiyada 3 nafar, boshlang'ich ta'limda 2 nafar). Bu esa mutlaqo bexavotir yoki stressga past sezgir shaxslar ulushi past ekanligini bildiradi.

Yuqori darajadagi xavotirlik esa boshlang'ich ta'lim yo'nalishida (11 nafar) psixologiya yo'nalishiga (9 nafar) nisbatan biroz yuqori ekanligi kuzatiladi. Ushbu farq boshlang'ich ta'lim yo'nalishidagi talabalar orasida emotsional zo'riqish va stressga moyillik nisbatan kuchliroq ekanligini taxmin qilish imkonini beradi.

#### Xulosa

Olingan natijalar shuni ko'rsatadiki, talabalar orasida xavotirlik darajasi asosan o'rtacha diapazonda bo'lib, bu psixologik me'yor sifatida baholanadi. Shu bilan birga, yuqori xavotirlik darajasiga ega bo'lgan respondentlar mavjudligi ularning psixologik holatini chuqurroq o'rganish va zarur hollarda psixokorreksion ishlarni olib borishni talab qiladi.

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**BO'LAJAK INGLIZ TILI O'QITUVCHILARINING INTELLEKTUAL  
SALOHIYATINI SHAKLLANTIRISHDA KLASSTERLI  
KOMPETENSIYALAR VA ZAMONAVIY PEDAGOGIK  
TEXNOLOGIYALARNING AXAMIYATI**

**Annotatsiya:** *Mazkur maqolada bo'lajak ingliz tili o'qituvchilarining intellektual salohiyatini rivojlantirishda zamonaviy pedagogik texnologiyalarning o'rni tahlil qilinadi. Ta'lim jarayonida klasterli kompetensiyalarni shakllantirish mexanizmlari, innovatsion metodlar hamda axborot-kommunikatsiya texnologiyalaridan foydalanishning samaradorligi ilmiy jihatdan asoslab berilgan.*

**Kalit so'zlar:** *intellektual salohiyat, kompetensiya, klaster yondashuvi, pedagogik texnologiyalar, innovatsion ta'lim, ingliz tili o'qituvchisi.*

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**THE IMPORTANCE OF CLUSTER COMPETENCES AND  
MODERN PEDAGOGICAL TECHNOLOGIES IN FORMING THE  
INTELLECTUAL COMPETENCE OF FUTURE ENGLISH TEACHERS**

**Abstract:** *This article examines the formation of the intellectual potential of future English language teachers through modern pedagogical technologies. The study analyzes the mechanisms of developing cluster competencies, innovative teaching methods, and the use of information and communication technologies in the educational process.*

**Keywords:** *intellectual potential, cluster competencies, pedagogical technologies, innovative education.*

**Kirish**

Bugungi kunda ta'lim tizimini modernizatsiya qilish jarayonida pedagog kadrlarning professional tayyorgarligini oshirish muhim vazifalardan biri hisoblanadi. Xususan, ingliz tili o'qituvchilarini tayyorlash jarayonida zamonaviy pedagogik texnologiyalarni qo'llash orqali ularning intellektual salohiyatini rivojlantirish dolzarb masalalardan biri hisoblanadi.

Globalashuv jarayonida xorijiy tillarni o'rganish nafaqat kommunikativ ehtiyoj, balki ilmiy va kasbiy faoliyatning muhim omiliga aylandi. Shu sababli

bo'lajak ingliz tili o'qituvchilarining kasbiy kompetensiyalarini rivojlantirish, ularning innovatsion fikrlashini shakllantirish muhim ahamiyat kasb etadi. Bo'lajak ingliz tili ta'limi sifati - o'qilayotgan, tahlil qilinayotgan mavzuga o'qituvchining mas'uliyat bilan yondashishi, ushbu mavzuning mazmunini talabalarga yetkazishga qaratilgan mahorati, uning o'quv jarayonini bugungi kun talablari asosida tashkil eta olishi bilan belgilanadi. Bunda pedagogik texnologiya imkoniyatlari va usullaridan foydalanish muhim hisoblanadi. YUNESKO ning ta'rifi bo'yicha "Pedagogik texnologiya - bu butun o'qitish va bilimlarni o'zlashtirish jarayonida oldingi ta'lim shakllarini samaradorlashtirish vazifasini qo'yuvchi texnik hamda shaxs zaxiralari va ularning aloqasini hisobga olib, bilimlarni yaratish, qo'llash va belgilashning tizimli uslubidir".

L.V.Zevin ta'lim texnologiyasini, butun pedagogik faoliyat asosida loyihalashni amalga oshirishning amaliy jarayoni, o'qituvchi va talaba uchun to'la qulay sharoitni ta'minlash orqali ta'lim jarayonini tashkil etish va o'tkazish modeli deb ta'riflaydi.<sup>6</sup>

Bo'lajak ingliz tili o'qituvchisi pedagogik texnologiyani amaliyotga samarali joriy etishi uchun: davr talabiga mos dars maqsadi va vazifalarini aniq belgilashi, ingliz tili fani mazmunini o'quv dasturi bo'yicha mukammal egallashi, muntazam ravishda pedagogik mahoratini oshirib borishi, didaktik jarayonni amalga oshirish bilan tanish bo'lishi, o'qitishning samarali shakl, usul, vosita va texnologiyalaridan foydalana olishi hamda talabaning o'zlashtirishini muntazam nazorat qilib, baholab borishi lozim.

Umuman olganda, ingliz tili o'qituvchisi: pedagogik texnologiyaning ilmiy-nazariy asoslarini; o'quv jarayoniga tizimli, texnologik, kompetensiyaviy yondashuvlarni; innovatsion o'qitish texnologiyalarini; o'quv jarayonini loyihalashni; o'qitishning faol usullaridan foydalanishni; uy vazifalarini maqsadli byerishni; muammoli topshiriqlarini talaba faoliyat darajalariga mos holda tuzishni; Internyet tarmog'idan foydalanishni; talabalarning bilimni ob'yektiv baholash kabilarni bilishi kerak.

Qo'llaniladigan pedagogik texnologiyalarni bir tizimga solish, unga maqsadli yo'nalish berish o'quv darsini tashkil etishdagi shakl va mazmun yaxlitligini ta'minlagan holda kutilishi zarur natijani olishni belgilaydi. Ingliz tili o'quv jarayoniga testlarning joriy etilishi, diagnostik tahlilning kiritilishi, monitoring nazoratining yuritilishi, bilimlarni xolisona baholashga o'tish, ingliz tili fanining bob, bo'lim mazmunini yaxlit holda o'zlashtirishni modellashtirish, tizimga solingan nazorat turlarida talabalarning ishlashi hamda noan'anaviy dars shakllarining vujudga kelishi o'quv jarayonidagi an'anaviy ta'lim o'rniga vujudga kelgan yangi pedagogik texnologiyalar bo'lib, ular yangicha fikrlash tizimidagi o'quv jarayoniga o'tishni taqozo etadi.

Pedagogik texnologiyalar bo'yicha bildirilgan fikrlarni umumlashtirsak pedagogik texnologiya mazmuni, ingliz tili o'qituvchisining kasbiy faoliyatida

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<sup>6</sup> L.V.Zevin ta'lim texnologiyasini, butun pedagogik faoliyat asosida loyihalashni amalga oshirishning amaliy jarayoni

zamonaviy o'qitish vositalaridan foydalangan holda o'qitish samaradorligini oshirish, talabalarning bilim olish sifatini yaxshilash, talab etilgan bilim darajasiga erishi uchun o'quv jarayonini oldindan loyihalashtirishdan iborat deb tushunish mumkin. Demak, pyedagogik tyexnologiya - o'quv jarayoni uchun loyihalanadi va byelgilangan maqsadga erishishga yo'naltiriladi. Loyihalash, mo'ljalangan maqsad va uni amalga oshirish usul va vositalari yig'indisini aniqlashdan iborat. Bunda - o'qitish texnologiyasini amalga oshirish vaqtini aniqlash; o'quv materialini tahlil qilish; maqsad va vazifalarni ajratib olish; o'quv materialini tizimga solish; bilim, ko'nikma va malakalarni o'zlashtirish bosqichlari, talabaning sifat va fazilatlarini shakllantirishni aniqlab olish ketma-ketligida ishlar amalga oshiriladi.

L.V.Zevin ta'lim texnologiyasini, butun pedagogik faoliyat asosida loyihalashni amalga oshirishning amaliy jarayonlaridan biri bo'lib, faoliyatni tahlil qilish, uni oldindan ko'ra bilish hamda rejalashtirilgan faoliyatni amalga oshirish loyihasini ishlab chiqishni o'z ichiga oladi.<sup>7</sup> Pedagogik vazifani hal etishning bu bosqichida o'zining va talaba faoliyatining mazmuni, vositalari va dasturlarini loyihalashga nisbatan mustaqil yo'naltirilgan, o'zaro uzviy aloqada bo'lgan o'qituvchi faoliyatini ko'rsatish mumkin. Shunga ko'ra pedagogik jarayonni loyihalash mazmuni, texnologiyalari birligi sifatida namoyon bo'ladi.

Loyihalashni bevosita ingliz tili fani darsida talabalar bilimini nazorat qilish va xolisona baholay olmaslik va boshqalar.amalga oshirish mumkin. Bu jarayonda - ingliz tili fani mavzusi bo'yicha maqsad va vazifalar bilan talabalarni tanishtirish; muammoli topshiriq, uy vazifalari va mustaqil bajariladigan ishlarni, ularni bajarish tartibini tushuntirish; mavzuni o'zlashtirish bo'yicha ko'rsatmalar byerish, uning me'yorlarini aytib byerish; talabalarni faol, mustaqil faoliyatga jalb etish; bilishga motivasiya hamda muammolarni bajarishga ehtiyoj uyg'otish; mavzu bo'yicha umumiy xulosalar chiqarish; talabalar erishgan yutuqlarni tahlil qilish ishlariga alohida e'tibor qaratilishi lozim.

Bo'lajak ingliz tili o'qituvchisi shuni esdan chiqarmaslik kerakki, talabalar dars jarayonida turli muammolarga duch keladi, bu albatta sifat va samaradorlikka salbiy ta'sir qiladi. O'tkazilgan tahlillar bugungi kunda ingliz tili fani darslarini tashkil etishda o'qituvchilarda quyidagi umumiy kamchiliklar borligini ko'rsatadi, ular: ingliz tili fani o'qituvchilarining pedagogik mahorat va qobiliyatining sustligi hamda zamonaviy ta'lim talablarini e'tiborga olmaslik; o'quv jarayonini davr talablariga mos, hayot, turmush, fan-texnika, ishlab chiqarish bilan bog'lash asosida tashkil etmaslik; o'qitishda talabaning avvalgi bilimi, qiziqish, ehtiyoj va hayotiy tajribalarini hisobga olmaslik; o'qitishning zamonaviy metodika, metod, shakl, texnologiya va vositalaridan samarasiz foydalanish; ingliz tili o'qituvchilarining o'z ustida ishlash mexanizmining takomillashtirilmaganligi; talabalarda shakllantirilishi lozim bo'lgan kasbiy sifatlar hamda fikrlash operatsiyalariga e'tiborsizlik; ingliz tili fani o'quv materiallari mazmuniga yetarlicha e'tibor qaratmaslik hamda o'tkaziladigan darsning asosan tanishtiruv xarakteriga egaligi,

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<sup>7</sup> L.V.Zevin ta'lim texnologiyasini, butun pedagogik faoliyat asosida loyihalashni amalga oshirishning amaliy jarayoni

har bir darsdan keyin qisqacha xulosa, muammoli savol va topshiriqlar bermaslik; olingan nazariy bilimlardan amaliyotda foydalana olmaslik; Yuqoridagilarni inobatga olgan holda tibbiyot yo'nalishidagi bo'lajak ingliz tili fanidan o'quv jarayonini samarali tashkil etish uchun o'qituvchilarga quyidagi tavsiyalarni beramiz: ingliz tili fanidan o'quv jarayonini davr talablari asosida tashkil etishda innovasion pedagogik va axborot-kommunikasiya texnologiyalarini egallagan, kasbiy tayyorgarlikka ega, zamonaviy fikrlovchi o'qituvchilarni tanlash, o'sib borayotgan zamonaviy talablarni hisobga olgan holda ularning malakasini muntazab oshirib borish; ingliz tili fanini o'qitish sifatini ta'minlashga qaratilgan innovasion pedagogik va axborot texnologiyalari, elektron ta'lim resurslari va multimedia taqdimotlaridan keng foydalanish, bu boradagi xorij tajribasini o'rganish; o'quv jarayonini zamonaviy tashkil etish asosida talabalarning tibbiyot sohasi to'g'risidagi bilimlarini kengaytirish, ularni mazkur sohada raqobatga yetarlicha tayyor bo'lishiga erishish; talabalarda mustaqil ravishda fikr yuritgan holda tibbiy faoliyat yo'nalishlarini tanlash va egallashlari uchun zarur bo'lgan mustaqillik, ijodkorlik, tashabuskorlik va tadbirkorlik sifatlarini shakllantirish.

Bu borada bo'lajak ingliz tili fani bo'yicha quyidagi ishlarni amalga oshirish lozim: auditoriyalarni zamonaviy texnika vositalari bilan jihozlash va ulardan ingliz tili fani darslarida samarali foydalanish; ingliz tilidan tashkil etiladigan o'quv jarayonining mantiqiy-tuzilish shaklini (darsni tashkil etishda ketma-ketlik) aniqlash; ularni bevosita hayot, turmush, ishlab chiqarish, fan-texnika, texnologiya talablariga moslashtirish; muammoli topshiriqlarni tuzish; ingliz tili fani bo'yicha fan, texnika va texnologiya sohalarida dunyo miqyosida tan olingan yangiliklar bo'yicha nashr etilgan yangi avlod o'quv adabiyotlarining mazmun va mohiyatini aks ettirish; ular asosida metodiy tavsiyalar va ko'rsatmalarni tayyorlash; pedagogik va axborot texnologiyalar hamda intefaul usullarning zamonaviy turlaridan foydalanish asosida talabalarda o'quv-bilish kompetensiyalarini shakllantirishga erishish.

**Adabiyotlar tahlili :**Ilmiy tadqiqotlarda ta'lim jarayonida kompetensiyaviy yondashuvni qo'llashning samaradorligi keng o'rganilgan. Xorijiy olimlar J. Harmer, H. Brown, D. Nunan, S. Krashen kabi tadqiqotchilar til o'qitish metodikasida kommunikativ yondashuvning muhimligini ta'kidlaydilar.

Mahalliy tadqiqotchilar esa pedagogik texnologiyalarni ta'lim jarayoniga joriy etish orqali o'qitish samaradorligini oshirish mumkinligini qayd etadilar. Ayniqsa, klaster yondashuvi talabalarning analitik fikrlashini rivojlantirishda muhim vosita hisoblanadi. Bugungi kunda respublikamizning taniqli olimlari: N.X.Avliyokulov<sup>8</sup>, N.N.Azizxo'jayeva , N.S.Saidahmedov, O.D.Raximov , L.V.Golish , M.Tojiyev , M.M.Xolmuxamedov , K.B.Hayitboyev , A.Mavlyanov kabilar ilmiy asoslangan, mintaqamizning ijtimoiy-pedagogik sharoitiga moslashgan pedagogik texnologiyalarni takomillashtirish va ularni o'quv jarayonida foydalanishga harakat qilmoqdalar. Buning uchun ingliz tili o'quv jarayonini zamonaviy tashkil etish, loyihalashga yetarli e'tibor berish, uning asosiy

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<sup>8</sup> .Celce-Murcia M. Teaching English as a Second Language.

turlariga ilmiy jihatdan yondashish, shakllari va hajmini o'rganish masalalariga ingliz tili o'qituvchilari tomonidan e'tiborni oshirish, o'quv jarayoni sifatini oshirishda ma'lum bir tizimni yaratish, talabalarni ko'proq muammoli ilmiy-tadqiqot ishlariga jalb etish muhim. Ushbu dolzarb muammolarning ijobiy hal qilinishi ko'p jihatdan ingliz tili o'qituvchilarining kasbiy salohiyati va pedagogik mahoratiga, saviyasiga, tayyorgarligiga va fidoiyligiga, uning yosh avlodni o'qitish va tarbiyalash ishiga bo'lgan munosabatiga, turli darajadagi kompetensiyalarining shakllanganligiga bog'liqdir.

**Tadqiqot metodologiyasi:** Tadqiqot jarayonida quyidagi ilmiy metodlardan foydalanildi: pedagogik kuzatuv

tahlil va taqqoslash

eksperimental tadqiqot

umumlashtirish metodi

Mazkur metodlar yordamida ingliz tili darslarida zamonaviy pedagogik texnologiyalarni qo'llash samaradorligi o'rganildi.

**Asosiy qism:** Bo'lajak ingliz tili o'qituvchilarining intellektual salohiyatini rivojlantirishda quyidagi omillar muhim rol o'ynaydi:

**Interaktiv metodlar:** Interaktiv o'qitish metodlari talabalarning dars jarayonida faol ishtirok etishini ta'minlaydi. Masalan:

-brainstorming

-case study

-debat

-loyiha asosida o'qitish

-Klaster yondashuvi

Klaster usuli talabalarning bilimlarini tizimli ravishda shakllantirishga yordam beradi va mavzular o'rtasidagi bog'liqlikni ko'rsatadi.

**Axborot texnologiyalari:** Multimedia vositalari, elektron platformalar va raqamli ta'lim resurslari talabalarning bilimini mustahkamlashga xizmat qiladi.

### **Natijalar**

Tadqiqot natijalariga ko'ra: zamonaviy pedagogik texnologiyalar talabalarning bilim darajasini oshiradi klasterli kompetensiyalar kasbiy tayyorgarlikni kuchaytiradi interaktiv metodlar mustaqil fikrlashni rivojlantiradi

### **Xulosa**

Xulosa qilib aytganda, bo'lajak ingliz tili o'qituvchilarining intellektual salohiyatini rivojlantirishda zamonaviy pedagogik texnologiyalar muhim ahamiyatga ega. Klasterli kompetensiyalarni shakllantirish esa talabalarning kasbiy tayyorgarligini oshirishga xizmat qiladi.

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## PROBLEMS OF TEACHING VOCABULARIES TO 7<sup>TH</sup> GRADE LEARNERS

**Abstract:** *Vocabulary knowledge is a fundamental component of second language acquisition and directly influences learners' communicative competence. Teaching vocabulary to middle school learners, particularly 7<sup>th</sup> grade students, presents various pedagogical challenges. This article analyzes common problems in vocabulary instruction such as limited retention, lack of contextual learning, pronunciation difficulties, and low motivation. Additionally, it suggests practical and interactive strategies to improve vocabulary acquisition in English language classrooms. The study emphasizes the importance of communicative and student-centered approaches in enhancing vocabulary learning outcomes.*

**Keywords:** *vocabulary teaching, young learners, retention, motivation, communicative approach, EFL classroom*

### Introduction

Vocabulary plays a central role in mastering a foreign language. As Wilkins (1972) famously stated, "Without grammar little can be conveyed; without vocabulary nothing can be conveyed." [3]. For 7<sup>th</sup> grade learners, vocabulary development is especially important because this stage marks a transition from basic language knowledge to more complex communication skills. For 7<sup>th</sup> grade learners, vocabulary learning is particularly significant because they are transitioning from basic language understanding to more complex language usage. At this stage, students are expected not only to recognize words but also to apply them in meaningful communication. However, many learners encounter difficulties in remembering new vocabulary, pronouncing unfamiliar words, and using them correctly in sentences. However, vocabulary instruction at this level often faces significant obstacles. Students may struggle with memorization, correct pronunciation, and appropriate usage of new words. Therefore, identifying these difficulties and applying effective teaching strategies is essential for successful vocabulary acquisition.

### Literature Review

Vocabulary teaching has been widely studied in the field of language education. Scholars emphasize that vocabulary learning is not a simple process of memorizing word meanings; rather, it involves understanding pronunciation,

spelling, grammatical behavior, and contextual usage. According to Paul Nation (2001), effective vocabulary learning requires repetition, meaningful context, and active use. [1] Nation emphasizes that learners need multiple exposures to a word in different contexts in order to store it in long-term memory. Similarly, Norbert Schmitt (2000) highlights that vocabulary acquisition is a gradual process involving form, meaning, and use. Students must not only understand the definition of a word but also know its pronunciation, grammatical behavior, and collocations. Research also suggests that young learners benefit greatly from interactive teaching methods. Activities such as games, role-plays, storytelling, and visual learning tools help students become more engaged and motivated in the learning process.[2]

### **Major Challenges in Teaching Vocabulary**

#### **1. Limited Retention of Vocabulary**

One of the most common problems faced by 7th grade learners is forgetting newly learned words quickly. Many students tend to memorize vocabulary only for short-term purposes, such as passing tests or completing homework assignments. However, when vocabulary is not used regularly in communication, it is easily forgotten. This issue often occurs because vocabulary is taught without sufficient repetition and meaningful practice. Students may remember a word temporarily but fail to retain it in their long-term memory. Teachers should therefore provide opportunities for repeated exposure to vocabulary through various activities such as reading tasks, speaking exercises, and writing assignments.[4]

#### **2. Lack of Contextual Learning**

Another significant challenge in vocabulary teaching is presenting words without meaningful context. In some classrooms, vocabulary is introduced simply as a list of words with their translations. Although this method may help students understand the basic meaning, it does not teach them how to use the words naturally in real-life communication. Learning vocabulary in context helps students understand how words function within sentences and conversations. Contextual learning also improves comprehension and helps learners remember vocabulary more effectively. For example, introducing vocabulary through short stories, dialogues, or authentic texts allows students to see how words are used in realistic situations.

#### **3. Pronunciation Difficulties**

Pronunciation can also be a major obstacle for 7th grade students learning English vocabulary. Many English sounds and stress patterns are different from those found in the Uzbek language. As a result, students may find it difficult to pronounce new words correctly. When students feel unsure about their pronunciation, they may become hesitant to speak in class. Fear of making mistakes can reduce their participation and limit their opportunities to practice vocabulary. Teachers can help students overcome this problem by providing pronunciation models, encouraging repetition, and creating a supportive classroom environment where mistakes are viewed as a natural part of learning.[2]

#### **4. Low Student Motivation**

Motivation plays a crucial role in vocabulary learning. When lessons consist only of copying words from the board or memorizing definitions, students may lose interest quickly. Young learners require engaging and interactive activities that make learning enjoyable. Teachers can increase motivation by incorporating games, competitions, group tasks, and multimedia resources into vocabulary lessons. When students enjoy the learning process, they are more likely to remember and actively use new words [3]

### **Effective Strategies for Teaching Vocabulary**

To overcome the challenges mentioned above, teachers should use different strategies that help students understand, remember, and use vocabulary effectively. Using a variety of teaching methods makes lessons more interesting and allows students to learn new words in a meaningful way. When vocabulary is taught through practice, interaction, and real-life examples, students are more likely to remember and use new words confidently.

#### **1. Teaching Vocabulary Through Context**

One of the most effective ways to teach vocabulary is through meaningful context. Instead of presenting words as isolated items, teachers can introduce them in stories, dialogues, short texts, or real-life situations. When students see how words are used in sentences, they can understand the meaning more clearly and learn how to use the words correctly.[6]

For example, when teaching vocabulary related to media or entertainment, the teacher can present a short dialogue between friends talking about a movie or a concert. Students can read the dialogue and identify the new words. This helps them understand how vocabulary functions in real communication and improves both comprehension and retention.[4]

#### **2. Using Visual Materials**

Visual materials are very helpful for teaching vocabulary, especially for young learners. Pictures, flashcards, diagrams, real objects, and videos help students connect new words with visual images. This connection makes vocabulary easier to understand and remember.[6]

For instance, when teaching words related to music or television, the teacher can show pictures of instruments, singers, or TV programs. Students can describe what they see and use the new vocabulary in simple sentences. Visual learning also makes lessons more interesting and supports different learning styles.

#### **3. Interactive Classroom Activities**

Interactive activities play an important role in vocabulary learning because they encourage students to participate actively in the lesson. When students are involved in activities such as games, group work, and discussions, they practice vocabulary in a natural and enjoyable way.

##### **Activity 1: Sentence Arrangement**

In this activity, students are given mixed or scrambled words and asked to rearrange them to form a correct sentence. This activity helps learners practice grammar, understand word order, and remember vocabulary more effectively. It also develops their critical thinking skills.

### Activity 2: Crossword Puzzle

Crossword puzzles are a fun way to review vocabulary. Students read definitions and fill in the crossword with the correct words. This activity helps students improve spelling, recognize word meanings, and reinforce previously learned vocabulary.[6]

### Activity 3: Vocabulary Guessing Game

In this activity, the teacher or a student describes a word without saying it directly, and the rest of the class tries to guess the word. For example, a student might say, "It is something people listen to when they want to relax or dance." Other students guess the word "music." This game improves vocabulary recall and encourages students to think creatively.

### Activity 4: Word Association

The teacher says a word, and students quickly say another word related to it. For example, if the teacher says "film," students may respond with actor, cinema, director, or camera. This activity helps students expand their vocabulary and see connections between words.[5]

### Conclusion

Teaching vocabulary to 7th grade students can be challenging, but it is very important for developing their English skills. Many students forget new words quickly, have problems with pronunciation, or lose interest when vocabulary lessons are not interesting. Because of these difficulties, teachers should use different teaching methods that make vocabulary learning easier and more enjoyable. First, vocabulary should be taught in context, not only as a list of words. When students see new words in sentences, stories, or dialogues, they can understand the meaning better and remember them for a longer time. Teachers should also give students many chances to use new words in speaking and writing activities. Second, teachers should make lessons more interactive and engaging. Games, group work, and creative tasks can increase students' motivation and help them remember vocabulary more easily. Visual materials such as pictures and flashcards are also useful because they help students connect words with images. For example, a teacher can organize a "Make a Story" activity. Students receive several new vocabulary words and create a short story using them. This helps them practice the words in a meaningful and creative way. Another useful activity is the "Guess the Word" game. One student describes a word without saying it, and the other students try to guess it. For example, a student may say, "It is a place where people watch movies," and other students guess the word "cinema." Generally, vocabulary teaching becomes more effective when teachers use creative activities, meaningful contexts, and regular practice. When students are actively involved in the learning process, they remember vocabulary better and feel more confident using English in real communication.

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## ARTIFICIAL INTELLIGENCE IN LANGUAGE ACQUISITION: PRESENT APPLICATIONS AND FUTURE POSSIBILITIES

**Abstract:** *AI is revolutionizing foreign language learning through personalization and real-time feedback. This article examines its role, future potentials, and key concerns like ethics and overreliance on technology.*

**Key words:** *Artificial Intelligence, foreign language learning, interactive tools, adaptive lessons, personalizing, real-time translation, virtual learning, immersive language environment.*

### Introduction

In today's fast-paced world, Artificial Intelligence (AI) is not futuristic concepts anymore. It has already integrated in our daily lives as various kinds of tools with various kinds of objectives, even in language learning making the process more personalized, efficient, and accessible with adaptive learning process besides automated translation. However, the real question is if AI can truly enhance the acquisition? Will it really replace traditional teaching methods? And how it can shape the future of learning foreign language in this growing impact? In this article, the current available application of AI in language and its potential further developments, upcoming challenges, its role in the future language acquisition will be explored.

Most of today's up-to-date platforms are integrated on the basis of artificial intelligence to create more convenient, faster working system as a response for an urge of the age. Language learning platforms like ChatGPT or Duolingo are considered as most renowned AI-powered platforms for educational purposes and truly succeed and have been succeeding till now with its high rank of its users among the 1.5 billion people who are learning second language worldwide. Since ChatGPT is available in various languages that enable users the advanced voice modes to practice conversational skills besides its in-second generating system to satisfy learners' imposition for information whereas Duolingo has innovative feature of AI such as the 'Video Call', allowing users to having conversation with AI characters, and 'Adventures' which offers 3D game-like scenarios for practical language practice. It is obviously seen that they don't need to be guided by supervisor or companion of human to communicate in target language in any time and in any

languages as presence of humanity is fulfilled by AI system, particularly for diffident, introverted and unconfident individuals. Conversational tools like them are functioned speech recognition to provide immediate feedback on both grammar and pronunciation with refining their speaking skills via 24/7 available access.

Besides learning platforms availability, AI can personalize the learning experiences. These platforms address the focus on the specific strengths and weaknesses to enhance efficiency of individuals learning after analyzing the received data about the learner's individual academic position. Platforms has NLP (Natural Language Processing) utilizing tool to assess student's language proficiency, suggest adaptive lessons adjusting complexity of content accordingly which also ensure an optimal challenge level.

In this growing importance of AI day by day, possibilities will also be improved in the future while keeping offering much more efficiency and engagement in language learning acquisition via hyper-personalized learning, which is able to dissect the personal preferences and make tailor strategy. Moreover, integration of AI with virtual reality and augment reality technologies can create immersive learning experiences. Learners can have an opportunity to practice and experience the scenarios in stimulated real-life and become proficient. The real-time translation and ceaseless communication help speakers to overcome language barriers in global interactions. Providing immediate, detailed feedback on language use is additional feature aiming correction in grammar, pronunciation, vocabulary that is effective in self-assessment and personal improvement.

However, there are still challenges that should be cared for such as overreliance, privacy and ethical concerns beyond the contextual misunderstanding and probable deficiency of technological infrastructures. Because students tend to use helpful AI tools after working with them closely for a period of time and AI can struggle with fully grasping the subtleties and cultural meaning in human language. Developed technologies are limited in some area around the world that can make using language learning application quite challenging for them. And most of them, privacy of their personal data is the top concern in social network as users are always required to be careful for ethical cautions.

### Conclusion

AI is changing foreign language learning making it more personalized, engaging, and accessible. It gives real-time feedback, adaptive lessons, and AI-powered conversations. It will create more immersive learning environment and improving immediate translation. However, challenges like data privacy, overreliance on technology, and need of human factor are still considered. Finding a balance between traditional methods and AI application promotes the support instead of their replacement.

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## **QASHQADARYO VILOYATIDA TABIIY RESURSLARNING GEOGRAFIK JOYLASHISHI**

**Annotatsiya:** Mazkur maqolada Qashqadaryo viloyatida mavjud tabiiy resurslarning geografik joylashishi, hududlar bo'yicha taqsimlanish xususiyatlari hamda ularning xo'jalik tarmoqlarini rivojlantirishdagi o'rni tahlil etilgan.

Hudud respublikaning janubiy qismida joylashgan bo'lib, maydoni taxminan 28,6 ming km<sup>2</sup>, aholisi 3,4 milliondan ortiq (2024-yil holatiga yaqin statistik baholar) ni tashkil etadi. Viloyatning tabiiy-iqlim sharoiti, geologik tuzilishi va relyefi resurslarning hududiy taqsimlanishiga bevosita ta'sir ko'rsatadi. Tadqiqotda viloyatning mineral resurslari (neft, gaz, qurilish materiallari), yer va suv resurslari, shuningdek yaylov hamda rekreatsion resurslarining joylashuvi aniq misollar asosida yoritilgan. Resurslarning shakllanishi va hududiy joylashishiga ta'sir etuvchi asosiy tabiiy omillar geologik tuzilish, relyef, iqlim va gidrografik sharoitlar ilmiy jihatdan baholangan. Shuningdek, resurslardan foydalanish darajasi, ayrim tumanlar kesimidagi tafovutlar hamda ulardan oqilona foydalanish yo'nalishlari ko'rsatib berilgan. Olingan natijalar viloyat tabiiy resurs salohiyatidan samarali foydalanish va hududiy rivojlanish strategiyalarini ishlab chiqishda muhim ilmiy-amaliy ahamiyat kasb etadi.

**Kalit so'zlar:** Qashqadaryo viloyati, tabiiy resurslar, geografik joylashuv, hududiy differensiallashtirish, mineral-xomashyo resurslari, suv va yer resurslari, agroiklimiy salohiyat, landshaft tizimi, resurs salohiyati, barqaror rivojlanish.

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## GEOGRAPHICAL LOCATION OF NATURAL RESOURCES IN THE KASHKADARYA REGION

**Abstract:** *This article analyzes the geographical position, features of distribution by regions of natural resources in the Kashkadarya region and their role in the development of economic networks.*

*The territory is located in the southern part of the republic, the area is about 28.6 thousand km<sup>2</sup>, the population is more than 3.4 million (statistical estimates close to 2024). The natural and climatic conditions, geological structure and relief of the region have a direct influence on the territorial distribution of resources. The study covers the region's mineral resources (oil, gas, building materials), land and water resources, as well as the location of pasture and recreational resources on the basis of specific examples. The main natural factors influencing the formation and territorial distribution of resources, the geological structure, relief, climatic and hydrographic conditions are scientifically evaluated. It also shows the level of resource use, disparities across districts and trends in their rational use. The results obtained have an important scientific and practical value in the development of strategies for the effective use of the natural resources of the region and regional development.*

**Keywords:** *Kashkadarya region, natural resources, geographical location, territorial differentiation, mineral and raw material resources, water and land resources, agroclimatic potential, landscape system, resource potential, sustainable development.*

**Kirish.** Mazkur maqolada Qashqadaryo viloyatida tabiiy resurslarning geografik joylashuvi, ularning hududiy taqsimlanish xususiyatlari hamda iqtisodiy rivojlanishdagi o'rnini ilmiy aytib asosda yoritiladi. Viloyat O'zbekiston Respublikasining janubiy qismida joylashgan bo'lib, maydoni qariyb 28,6 ming km<sup>2</sup>ni tashkil etadi. Geografik jihatdan hudud tog', tog'oldi va cho'l zonalarini o'z ichiga olgan sababli, tabiiy resurslarning joylashuvi ham notekis va murakkab tuzilishga ega.

Barchamizga ma'lumki, viloyat respublikaning yoqilg'i-energetika salohiyatida alohida o'rin tutadi. Ayniqsa, tabiiy gaz, neft, kaliy tuzlari va qurilish materiallari xomashyosi bo'yicha mamlakatning strategik hududlaridan biri hisoblanadi. Shu jumladan, yer va suv resurslari qishloq xo'jaligi rivojida muhim omil bo'lib xizmat qilmoqda.

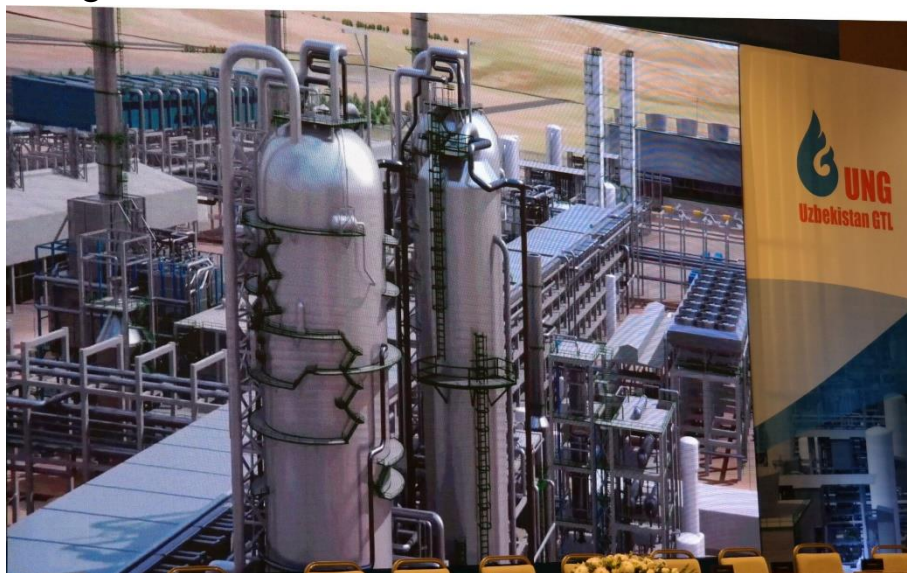
Avvalombor, tabiiy resurslarning geografik joylashuvini o'rganish hududning iqtisodiy ixtisoslashuvini aniqlash, sanoat tarmoqlarini oqilona joylashtirish hamda ekologik muvozanatni saqlash uchun zarurdir. Prezidentimiz Shavkat Mirziyoyev ta'kidlaganidek, tabiiy boyliklardan samarali va oqilona foydalanish mamlakat barqaror taraqqiyotining muhim shartidir.

Shu bois mazkur tadqiqotda viloyatning asosiy tabiiy resurs turlari, ularning miqdoriy ko'rsatkichlari va hududiy joylashuv xususiyatlari tahlil qilinadi hamda mavjud muammolar va ularning yechimlari faktlar asosida ko'rsatib beriladi.



**Asosiy qism.** Yoqilg‘i-energetika resurslarining geografik joylashuvi, Qashqadaryo viloyati O‘zbekistonning eng yirik yoqilg‘i-energetika bazalaridan biri hisoblanadi. Viloyat hududida respublika tabiiy gaz qazib olishining qariyb 55–60 foizi to‘g‘ri keladi. Gaz konlari asosan Muborak, G‘uzor, Dehqonobod, Qamashi tumanlarida joylashgan. Yirik sanoat obyektlari sirasiga Sho‘rtan gaz koni mamlakatdagi eng yirik gaz konlaridan biri hisoblanadi. Muborak gazni qayta ishlash zavodi yiliga o‘nlab milliard kub metr gazni qayta ishlash quvvatiga ega.

Viloyat tabiiy resurslari iqtisodiy ahamiyati muhimligini davlatimiz rahbari Sh. Mirziyoyevning quyidagi fikrlaridan ham bilsak bo‘ladi : “...O‘z bag‘rida noyob boyliklarni asrab kelayotgan G‘uzor tumanida suyultirilgan sintetik mahsulotlar ishlab chiqaradigan “GTL” zavodi ishga tushirilmoqda. Albatta, bunday ulkan majmuaning qurilishi keyingi yillarda mamlakatimizda sanoat rivojini yangi bosqichga olib chiqish bo‘yicha amalga oshirayotgan siyosatimiz natijasi, desak, to‘g‘ri bo‘ladi” [1].



**1-rasm. Qashqadaryo viloyatida joylashgan “GTL” zavodi.**

Bu zavodda tabiiy gazni qayta ishlab, yuqori sifatli va ekologik toza dizel, aviakerosin (JET A-1), nafta va suyultirilgan gaz ishlab chiqarish. Zavod yiliga 307,3 ming tonnadan ortiq aviakerosin va katta hajmdagi dizel yoqilg‘isi ishlab chiqarib, mamlakatning aviakerosinga bo‘lgan ehtiyojini to‘liq qoplaydi. Ekologik jihatdan ishlab chiqarilgan yoqilg‘ilar past oltingugurtli bo‘lib, atrof-muhitga zarari kam hisoblanadi.

Qolaversa Qashqadaryo viloyati mineral resurslarga ham boy hududlardan biri bo‘lib, neft va gaz konlari, qurilish materiallari (gips, ohaktosh, qum-shifer) mavjud. Ushbu resurslar viloyatning energetika va qurilish tarmoqlarini rivojlantirishda asosiy omil hisoblanadi. Hududiy differensiallashuv jihatidan, neft va gaz zaxiralari asosan Boysun, Qamashi va Muborak va boshqa tumanlarida jamlangan.

Mineral xomashyo resurslarining tarqalishi, Qashqadaryo viloyati xo‘jalikning barcha tarmoqlarini rivojlantirish uchun zamin yaratadi. Olib borilgan ko‘p yillik geologik qidiuv ishlari Qashqadaryo viloyati hududida sanoat

ahamyatiga ega bo'lgan turli mineral homashyo zaxiralarining mavjudligini aniqlash imkonini berdi. Viloyatdagi asosiy foydali qazilmalarni tabiiy gaz, gazli kondetsat, neft, osh va kaliy tuzlari, qurilish matereallari tashkil etadi. Viloyat zaminida qazib olinayotgan va aniqlangan yerosti boyliklarining eng asosiysi gaz va neftdir. Qashqadaryo viloyati zaminida davlat balansi hisobidagi 55 dan ziyod gaz va gazli kondetsat konlari aniqlangan. Bu konlardan 6 tasi gaz neftli, ikktasi neftli, 24 tasidan ziyodrog'i gaz kondetsatli va 3 tasi gaz konlaridir.

Qashqadaryo hududi geologik xususiyatlariga ko'ra Janubiy g'arbiy Hisor neft gaz oblastiga kiradi. Bu yerda geologik qidiruv ishlari natijasida neft va gazning 45 dan ortiq konlari, 14 ta neft va gazning istiqbolli tuzilmalari aniqlandi. Hozirgi paytda qidiruv geologik ishlar o'tkazilgan umumiy maydon 7 174 km kv tashkil etadi va bu maydonda 700 ga yaqin quduq qazilgan. Tabiiy gaz va gazli kondetsatning aniqlangan zahiralarga nisbatan Qashqadaryo viloyatlar orasida mamlakatimizda birinchi o'rinda turadi.

Viloyatda qishloq xo'jaligi uchun qulay yer resurslari mavjud bo'lib, sug'oriladigan maydonlar Markaziy Qashqadaryo, Shahrisabz va Qarshi atrofida to'plangan. Shuningdek, Chirchiq, Qashkadaryo va boshqa kichik daryolar viloyatning sug'orish va ichimlik suvi manbai sifatida ahamiyatli. Hududiy joylashuvga qarab, ayrim tumanlarda yer resurslari yetarli, ayrimlarida esa cheklangan hududlardan biri hisoblanadi.

Sayyoramizda kishilar hayotining farovonligi uchun albatta tabiiy resurslardan foydalanish kerak. Lekin tabiiy resurslardan foydalanishda nihoyatda ehtiyotlik bilan ularni qayta tiklashga alohida e'tibor berish bilan birga olib borilishi kerak. Biz tabiatga ta'sir etib, undan o'zimiz uchun zarur bo'lgan narsalarni olayotganimizda, shunday ish qilaylikki, akademik E.K.Fedorov aytganidek, «Tabiatdagi o'zgarishlar insoniyat uchun naf keltirsin». Lekin hozircha insonning xo'jalik faoliyati tufayli vujudga kelgan har xil chiqindilarni (zaharli gazlarni, iflos suvlarni, kimyoviy va neft mahsulotlarini, radioaktiv moddalarni va boshqalarni) atrof muhitni tiklash, yerlardan ba'zan noto'g'ri foydalanish, biologik resurslarga nisbatan noto'g'ri munosabatda bo'lish oqibatida tabiat ifloslanib, tabiiy resurslarning holati yomonlashib bormoqda. Bu esa o'z navbatida tobora chuqurlashib borayotgan ekologik muammoni tub mohiyatini tushunib olishni, tabiat bilan jamiyat orasidagi munosabatlarni to'g'ri tashkil etishni, tabiiy resurslardan to'g'ri foydalanib, uni qayta tiklab boyitib borishni, atrof muhitni toza saqlab, xalq boyligi hisoblangan tabiiy resurslarni kelajak avlodlar uchun sof holda etkazishni taqoza etadi

Shunday qilib, hozirgi vaqtda suvdan, umuman tabiiy resurslardan foydalanishdagi barcha qiyinchiliklarga obektiv baho berish va jamiyatimizning hozirgi ijtimoiy-iqtisodiy rivojlanish an'analarini hisobga olgan holda, tabiat boyliklaridan to'g'ri foydalanishning asosiy yo'llarini ishlab chiqish navbatdagi muhim vazifalardandir.

Qashqadaryo viloyati hududida sanoat ahamyatiga ega bo'lgan ko'mir konlari yoq. Viloyatning ko'mirga bo'lgan ehtiyojini Chakmonkuydi tog'laridagi Vori va Zarmas qishloqlari orasidagi Yakkabog'tosh ko'mir koni qisman qondirishi



mumkin. Dehqonobod tumaning janubi-sharqida Dehqonobod, Xo‘jarna, Qizilcha, Dardara va boshqa konlarda yonuvchi slanesning namoyon bo‘lishi aniqlangan.

Rudali resurslar, asosan, viloyatning tog‘li hududlarida uchraydi. Chiroqchi tumanida aniqlangan oltin va kumush konlari rangli metallurgiya sanoati uchun muhim xomashyo bazasini yaratadi. Mazkur konlarning tog‘li relyef bilan bog‘liqligi ularni qazib olishda murakkab texnologiyalarni talab etsada, hududning konchilik ixtisoslashuvini rivojlantirishda muhim omil bo‘lib xizmat qiladi. Shu bilan birga, rudali resurslarni o‘zlashtirish transport va energetika infratuzilmasining rivojlanishiga ham turtki bermoqda.

Noruda resurslar viloyatda keng tarqalgan bo‘lib, qurilish industriyasining rivojlanishida asosiy omil hisoblanadi. Kitob tumanidagi ohaktosh konlari ohak va sement ishlab chiqarish uchun muhim xomashyo manbai sanaladi. Yakkabog‘ tumanida joylashgan gips va mergel zaxiralari ham qurilish materiallari sanoatini rivojlantirishda katta ahamiyat kasb etadi. Ushbu resurslarning tog‘ oldi hududlarida joylashuvi qurilish materiallari ishlab chiqarishni hududiy jihatdan samarali tashkil etish imkonini beradi.

Suv resurslari ichida Qashqadaryo daryosi alohida o‘rin tutadi. Daryo viloyat sug‘orma dehqonchiligining asosiy manbai bo‘lib, qishloq xo‘jaligi ekin maydonlarini suv bilan ta‘minlaydi. Sug‘orish tarmoqlari, kanallar va nasos stansiyalari orqali suv resurslaridan keng foydalanilmoqda. Natijada viloyatda paxtachilik, g‘allachilik va sabzavotchilik tarmoqlari barqaror rivojlangan.

Yer resurslari, ayniqsa sug‘oriladigan yerlarning salmog‘i yuqoriligi bilan ajralib turadi. Daryo vodiylari va tekislik hududlarida intensiv dehqonchilik shakllangan bo‘lib, bu hududlar agrar ishlab chiqarishning asosiy rayonlari hisoblanadi. Shu bilan birga, ayrim yerlarda sho‘rlanish va degradatsiya jarayonlari kuzatilayotgani meliorativ tadbirlarni kuchaytirishni talab etadi.

Viloyat rekreatsion resurslarga ham boy. Shahrisabz hududidagi tabiiy landshaftlar, tog‘ va adir zonalari, tarixiy-madaniy obyektlar turizmni rivojlantirish uchun qulay sharoit yaratadi. Ayniqsa, ekoturizm va madaniy turizm yo‘nalishlarini rivojlantirish hudud iqtisodiyotini diversifikatsiya qilishda muhim ahamiyat kasb etadi.

**Xulosa.** Qashqadaryo viloyatida tabiiy resurslarning xilma-xilligi va ularning geografik joylashuv xususiyatlari hudud iqtisodiy taraqqiyotining asosiy omili hisoblanadi. Yoqilg‘i-energetika resurslari sanoatni, suv va yer resurslari qishloq xo‘jaligini, noruda boyliklar qurilish industriyasini, rekreatsion resurslar esa turizm sohasini rivojlantirishga xizmat qilmoqda. Kelgusida resurslardan oqilona foydalanish, ekologik muvozanatni saqlash va chuqur qayta ishlash texnologiyalarini joriy etish viloyatning barqaror ijtimoiy-iqtisodiy rivojlanishini ta‘minlaydi. Tadqiqot natijalari shuni ko‘rsatadiki, Qashqadaryo viloyatidagi tabiiy resurslarning geografik joylashuvi va hududiy taqsimlanishi viloyatning iqtisodiy va ekologik rivojlanish strategiyalarini belgilashda asosiy ilmiy-amaliy ahamiyatga ega. Mineral, yer, suv va agroiqlimiy resurslardan oqilona foydalanish hududning barqaror rivojlanishini ta‘minlaydi va turli xo‘jalik tarmoqlarini samarali rivojlantirishga yordam beradi.

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## INFLUENCE OF INDUSTRIAL WASTE ON SOIL PROPERTIES

**Abstract.** *The article substantiates the need to implement soil protection, pollution reduction, and reclamation measures. The obtained results are important for improving the environmental monitoring system and ensuring sustainable development in agriculture.*

**Keywords:** *industrial waste, soil pollution, heavy metals, agroecological state, soil fertility, chemical composition, anthropogenic impact, degradation.*

Waste generated by industrial enterprises has a serious negative impact on the composition and quality of the soil. In various scientific sources, the main aspects of this process are described as follows: Industrial waste often contains a high content of heavy metals (for example, lead, copper, zinc, cadmium), petroleum products, acids, alkalis, and other toxic substances. They accumulate in the soil layer, disrupting its natural chemical balance. Toxic substances entering the soil pass through plants into the food chain. Therefore, it enters the human and animal body in sufficient quantities, causing various chronic diseases.

Sources of industrial waste are mainly metallurgical, chemical, oil refining, thermal power plants, and mining enterprises. In these processes, hazardous wastes are released into the air, water, and ground, resulting in long-term pollution.

Reclamation of soils contaminated with industrial waste is a complex, but feasible process. Below is detailed information on the main methods of reclamation of contaminated soils, how they work, and their practical results. One of such main methods of soil regeneration is biological methods (Bioremediation), which include soil cleaning using living organisms - mainly bacteria, fungi, and plants. They are considered environmentally safe and economically efficient.

By adding special bacterial strains to the soil, pollutants are neutralized. For example, scientists of the Institute of Microbiology of the Academy of Sciences of Uzbekistan implemented an innovative project for the restoration of saline soils. In experiments conducted on a farm in the Dangara district of the Fergana region, with the help of biopreparations using microorganisms, water consumption was reduced by 30%, and the consumption of chemical fertilizers by 50%, as a result of which the cotton yield increased by 20%.

In the restoration of soils contaminated with cadmium (Cd), a joint association of “*Enterobacter ludwiigi*”, “*Bacillus simplex*”, and “*Bacillus licheniformis*” bacteria showed high effectiveness. These bacteria not only reduce cadmium toxicity but also stimulate the growth of plants like wheat.

In phytoremediation, plants are used to restore the natural state of contaminated soils, and they are cleaned with the help of plants. Some plants (special species such as “*Sedum alfredi*”) have the ability to accumulate heavy metals (zinc, cadmium, lead) in the soil in their roots, stems, and leaves. By planting these plants, it is possible to remove pollutants from the soil along with their biomass. Along with biological methods, chemical methods are also used to restore the natural state of soils. Chemical methods are mainly aimed at reducing the harmful effects of pollutants by adding chemical substances to the soil composition. Currently, one of the widely used chemical methods is the chemical melioration method, which is mainly used to improve the chemical properties of soils. Chemical methods such as liming, gypsum plating, acidification, and immobilization (preservation) are also used. While liming is used to reduce acidity in acidic soils and eliminate the effects of harmful hydrogen and aluminum ions, gypsum plastering is used to reduce the sodium content in saline (alkaline) soils and improve their physical properties. In this case, the calcium in the gypsum displaces sodium ions from the soil.

The acidification method is used to neutralize the soil environment in soda saline soils by adding substances such as sulfuric acid or sulfur, while the immobilization (preservation) method involves adding special sorbents (such as activated carbon, zeolites) to the soil to bind heavy metals and other toxic substances, preventing their transfer to plants and groundwater.

These methods are aimed at removing pollutants from the soil or neutralizing them. In addition to the above useful methods, there are several other methods designed to restore the natural state of contaminated soils. Today, depending on the degree of soil contamination, one of the methods is used, such as soil washing (Soil Washing), thermal cleaning, and electro-kinetic remediation. This method is based on the removal of harmful substances (in particular, heavy metals) by washing contaminated soil with special solutions. The EU-funded project **\*\*ReSoil\*\*** is one of the most advanced technologies in this field. ReSoil technology allows for the efficient extraction of lead and other toxic metals from the soil. The biggest advantage of this method is that the water and chemical reagents (EDTA) used in the process are processed in a closed cycle, as a result of which no liquid waste is formed. . This allows for soil purification while preserving it as a natural resource. Thermal Desorption. Method of evaporating and then retaining petroleum products, mercury, and other volatile organic compounds by heating the soil to a high temperature.

Electrokinetic remediation. Passing low-voltage electric current through the soil. In this case, heavy metals and other charged pollutants move towards the electrodes and are collected.

Practical work carried out by Uzbek scientists shows the high effectiveness of biological methods. The project, implemented in cooperation with the United Nations Development Programme (UNDP) in the Fergana region, noted the following results of soil reclamation using microorganisms:

Practical work carried out by Uzbek scientists shows the high effectiveness of biological methods. The project, implemented in cooperation with the United Nations Development Programme (UNDP) in the Fergana region, noted the following results of the restoration of saline soils using microorganisms:

These results show that soil regeneration brings great benefits not only from an ecological, but also from an economic point of view. Microorganisms contribute to the transition to sustainable agriculture by improving soil composition, increasing water retention capacity, and increasing plant resistance to drought.

The most effective approach to the restoration of contaminated soils is often the combined use of several methods. For example, improving the soil environment through chemical melioration, followed by phytoremediation or the application of microorganisms, yields high results. Innovative technologies, such as the European ReSoil project, based on the principles of waste-free production, allow for soil preservation and cleaning. Practical research conducted in Uzbekistan shows that there are ample opportunities for applying environmentally friendly and economically beneficial methods in this area. Industrial waste disrupts the natural composition of the soil, reduces its fertility, harms flora and fauna, and poses a threat to human health. Therefore, it is important to reduce waste, strengthen waste recycling and environmental control systems.

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## **IFLOSLANGAN TUPROQLARNING AGROKIMYOVIY XOSSALARINING O'ZGARISHI**

**Annotatsiya.** Ifloslangan tuproqlarning agrokimyoviy xossalari jiddiy o'zgarishlarga uchraydi va bu jarayon tuproq unumdorligiga bevosita ta'sir ko'rsatadi. Tuproqning agrokimyoviy xossalari deganda, uning tarkibidagi kimyoviy elementlar, oziqa moddalari, gumus miqdori, muhit reaksiyasi (pH) va boshqa ko'rsatkichlar tushuniladi. Sanoat chiqindilari, og'ir metallar, pestitsidlar va boshqa ifloslantiruvchi moddalar ta'sirida bu xossalar tubdan o'zgaradi.

**Kalit so'zlar:** tuproq degradatsiyasi, agrokimyoviy monitoring, og'ir metallar, tuproqning kislotalanishi, sho'rlanish, kation almashinish sig'imi.

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## **CHANGES IN THE AGROCHEMICAL PROPERTIES OF POLLUTED SOILS**

**Abstract.** The agrochemical properties of contaminated soils undergo significant changes, and this process directly affects soil fertility. Soil agrochemical properties refer to the chemical elements, nutrients, humus content, pH, and other indicators in the soil. Under the influence of industrial waste, heavy metals, pesticides, and other pollutants, these properties change dramatically.

**Keywords:** soil degradation, agrochemical monitoring, heavy metals, soil acidification, soil salinization, cation exchange capacity.

Sanoat chiqindilari tuproq muhitining kislotalilik darajasini keskin o'zgartirishi mumkin:

- Kislotali chiqindilar ta'siri: Kimyo sanoati, metallurgiya korxonalari chiqindilari tarkibidagi sulfat birikmalari, oltingugurt oksidlari tuproqqa tushganda sulfat kislota hosil qiladi. Bu tuproqning kislotaligini oshirib yuboradi (pH pasayadi).



- Ishqoriy chiqindilar ta'siri: Sement ishlab chiqarish, ohak sanoati chiqindilari esa tuproqning ishqoriyligini oshiradi (pH ko'tariladi).

- Oqibatlar: pH darajasining o'zgarishi tuproqdagi mikroorganizmlar faoliyatini susaytiradi, o'simliklar uchun zarur bo'lgan oziqa elementlarining (fosfor, temir, marganets) o'zlashtirilishini qiyinlashtiradi. Shu bilan birga, ayrim zaharli elementlar (masalan, alyuminiy) kislotali muhitda eruvchan holatga o'tib, o'simliklar uchun toksik bo'lib qoladi.

## 2. Gumus miqdori va sifatining pasayishi

Gumus - tuproq unumdorligining asosiy ko'rsatkichi hisoblanadi. Ifloslanish ta'sirida:

- Organik moddalarning minerallashuv jarayoni buziladi
- Tuproq mikroflorasi faoliyati susayadi
- Natijada gumus qatlamining kamayishi va uning sifatining yomonlashishi kuzatiladi

- Bu esa tuproqning suv va oziqa elementlarini ushlab turish qobiliyatini pasaytiradi

## 3. Oziqa elementlari (makro va mikro elementlar) muvozanatining buzilishi

Ifloslangan tuproqlarda o'simliklar uchun zarur bo'lgan asosiy oziqa elementlarining miqdori va nisbati o'zgaradi:

- Makroelementlar (NPK): Azot, fosfor va kaliyning o'zlashtiriladigan shakllari kamayadi. Ba'zi ifloslantiruvchi moddalar fosfor bilan birikmalar hosil qilib, uni o'simliklar uchun o'zlashtirib bo'lmaydigan holga keltiradi.

- Mikroelementlar: Og'ir metallar (kadmiy, qo'rg'oshin, simob, mishyak) bilan ifloslanish natijasida tuproqda bu elementlarning miqdori keskin oshadi. Ular o'simliklar tomonidan to'planib, oziq-ovqat zanjiri orqali inson salomatligiga jiddiy xavf tug'diradi.

Vazirlar Mahkamasining qaroriga ko'ra, tuproqlarning ruxsat etilgan chegaradan yuqori darajada zaharli sanoat chiqindilari, radioaktiv moddalar, og'ir metallar va boshqa kimyoviy elementlar bilan ifloslanishi yerlarni konservatsiya qilish uchun asos bo'lishi mumkin.

## 4. Tuproqning biologik faolligining pasayishi

Tuproqning agrokimyoviy xossalari bilan chambarchas bog'liq bo'lgan biologik faollik ham ifloslanish ta'sirida o'zgaradi:

- Tuproq mikroorganizmlari (bakteriyalar, aktinomitsetlar, zamburug'lar) soni va faolligi kamayadi

- Azot to'plovchi va fosforni o'zlashtiruvchi mikroorganizmlar faoliyati susayadi

- Fermentativ faollik pasayadi

- Bu o'z navbatida tuproqdagi organik moddalarning parchalanishi va oziqa elementlarining aylanish jarayonlarini sekinlashtiradi

## 5. Tuproqning fizik-kimyoviy xossalarining o'zgarishi

Ifloslanish natijasida tuproqning agrokimyoviy xossalari bilan bir qatorda fizik xossalari ham o'zgaradi:

- Tuproqning singdirish sig'imi kamayadi

- Kation almashinuv sig'imi o'zgaradi
- Tuproq eritmasining tuz konsentratsiyasi oshadi (sho'rlanish)
- Bu o'zgarishlar tuproqning oziqa elementlarini ushlab turish va o'simliklarga yetkazib berish qobiliyatiga salbiy ta'sir ko'rsatadi

#### 6. Agrokimyoviy ko'rsatkichlarning monitoringi

Tuproqlarning ifloslanish darajasini aniqlash va uning agrokimyoviy xossalardagi o'zgarishlarni kuzatib borish uchun maxsus monitoring tizimi yo'lga qo'yilgan. O'zbekiston Respublikasi Qishloq xo'jaligi vazirligi tomonidan tuproqlarning agrokimyoviy va biokimyoviy ko'rsatkichlarini aniqlash bo'yicha samarali tizim tashkil etilgan bo'lib, "O'zagrokimyohimoya" AJ tarkibidagi "Agrokimyo stansiyasi" MChJ orqali bu ishlar amalga oshiriladi.

Agrokimyoviy tadqiqotlar natijalari asosida degradatsiyaga uchragan, kam mahsuldor hamda zaharli sanoat chiqindilari va radioaktiv moddalar bilan ifloslangan qishloq xo'jaligi yer turlari konservatsiya qilinadigan guruhga o'tkaziladi.

#### 7. Tuproq unumdorligini tiklash imkoniyatlari

Ifloslangan tuproqlarning agrokimyoviy xossalarini yaxshilash uchun quyidagi tadbirlar amalga oshiriladi:

- Kimyoviy melioratsiya (ohaklash, gipslash) - pH darajasini me'yorlashtirish uchun
- Organik va mineral o'g'itlar qo'llash - oziqa elementlari yetishmovchiligini bartaraf etish uchun
- Bioremediatsiya usullari - mikroorganizmlar yordamida ifloslantiruvchi moddalarni parchalash
- Fitoremediatsiya - o'simliklar yordamida og'ir metallarni to'plash va tuproqdan chiqarib tashlash

Ifloslangan tuproqlarning agrokimyoviy xossalari murakkab o'zgarishlarga uchraydi: pH darajasi o'zgaradi, gumus miqdori kamayadi, oziqa elementlari muvozanati buziladi, biologik faollik pasayadi va toksik elementlar konsentratsiyasi ortadi. Bu o'zgarishlar tuproq unumdorligining pasayishiga va qishloq xo'jaligi mahsulotlari sifatining yomonlashishiga olib keladi. Shu sababli, ifloslangan tuproqlarni muntazam agrokimyoviy monitoring qilish va ularning unumdorligini tiklash bo'yicha kompleks chora-tadbirlarni amalga oshirish muhim ahamiyat kasb etadi.

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## **LOTIN TILIDA KASALLIK NOMLARINING SHAKLLANISHI**

**Annotatsiya:** Ushbu maqola lotin tilida kasallik nomlarining shakllanishi, tarixiy ildizlari, morfologik tuzilishi va zamonaviy tibbiyotdagi ahamiyatini ko'rib chiqadi. Unda lotin tilining tibbiy terminologiyadagi markaziy o'rni, uning yunon tili bilan o'zaro ta'siri hamda kasallik nomlarining etimologik manbalari va evolyutsiyasi tahlil qilinadi. Maqolada lotin va yunon tilining prefikslari, suffikslari va ildiz so'zlari orqali tibbiy atamalarning qanday yuzaga kelishi ko'rsatiladi. Shuningdek, qadimiy davrdan to zamonaviy standartizatsiyagacha bo'lgan tarixiy jarayonlar va bu tillarning tibbiyot sohasidagi doimiy dolzarbligi yoritiladi.

**Kalit so'zlar:** Lotin tili, tibbiy terminologiya, kasallik nomlari, etimologiya, morfologiya, yunon tili, standartizatsiya, tibbiyot tarixi.

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## **FORMATION OF DISEASE NAMES IN THE LATIN LANGUAGE**

**Abstract:** This article examines the formation of disease names in Latin, their historical roots, morphological structure, and significance in modern medicine. It analyzes the central role of Latin in medical terminology, its interaction with Greek, and the etymological sources and evolution of disease names. The article demonstrates how medical terms arise through Latin and Greek prefixes, suffixes, and root words. It also highlights historical processes from antiquity to modern

*standardization and the enduring relevance of these languages in the field of medicine.*

**Keywords:** *Latin language, medical terminology, disease names, etymology, morphology, Greek language, standardization, history of medicine*

Tibbiyot fanining tilini tushunish, uning murakkabliklarini anglash va ilmiy yutuqlarni o'zlashtirishda terminologiya fundamental ahamiyatga ega. Global miqyosda tibbiy terminologiya qismi, ayniqsa kasallik nomlari, lotin va yunon tillariga borib taqaladi. Bu tillar asrlar davomida tibbiyotning universal tiliga aylangan bo'lib, ular inson anatomiyasi, patologiyasi, diagnostika va davolash usullarining nozik jihatlarini aniq va ixcham ifodalash uchun mustahkam asos yaratgan. Lotin tilining tibbiyot terminologiyasidagi markaziy o'rni tasodifiy emas, balki qadimgi dunyo tibbiy bilimlari, Rim imperiyasining madaniy merosi va O'rta asrlar hamda Uyg'onish davrida ilmiy an'analarning uzluksiz rivojlanishi natijasidir. Ushbu maqola lotin tilida kasallik nomlarining shakllanish mexanizmlarini atroflicha o'rganishni, ularning etimologik manbalarini aniqlashni va tibbiy sohadagi doimiy ahamiyatini tahlil qilishni maqsad qiladi.

Tibbiyot terminologiyasining shakllanishiga oid adabiyotlar yunon va lotin tillarining bu sohadagi fundamental rolini doimiy ravishda ta'kidlaydi. G'arb tibbiyotining leksik bazasi asosan yunon va lotin tillariga asoslanadi, bu tillar birgalikda keng qamrovli lug'atni tashkil etadi. Yunon tili ko'pincha anatomik va patologik atamalarga ta'sir ko'rsatgan, masalan, "kardiologiya" va "nevrologiya" so'zlari buning yorqin misolidir. Lotin tili esa farmatsevtika va protsedura atamalarini, masalan, "resept" (prescription) va "operatsiya" kabi so'zlarni shakllantirishda ustunlikka ega bo'lgan. Ko'plab zamonaviy tibbiy so'zlar ikkala til elementlarini birlashtirgan gibril atamalardir, masalan, "kardiovaskulyar". Bu lug'atning tarixiy rivojlanishi qadimgi yunon shifokorlaridan tortib, o'rta asrlardagi lotincha tarjimalar, Uyg'onish davridagi standartizatsiya hamda 18 va 19-asrlardagi tizimli tasniflarga cho'zilgan bo'lib, hozirgi kunda ham rivojlanishda davom etmoqda.

Tarixiy nuqtai nazardan, miloddan avvalgi 10 000 yillar atrofida ovchilik-terimchilik turmush tarzidan o'troq dehqonchilikka o'tish infeksiyon kasalliklarning tarqalishini kuchaytirgan. Bu kasalliklar tarixan keng ko'lamli vayronagarchilik va o'limga olib kelgan, hatto yirik urushlardagi qurbonlar sonidan ham oshib ketgan. Bu kasalliklar haqidagi dastlabki tushunchalar ko'pincha diniy e'tiqodlar va afsonalarga asoslangan bo'lib, sporaditsiy kasalliklarni epidemiyaga sabab bo'ladigan infeksiyalardan farqlashdan boshlangan. Ushbu kasalliklar va mikroorganizmlarni nomlash an'analari ham xuddi shunday, "influenza" (gripp) so'zining "yulduzlar ta'siri"ni aks ettirishidan, "tuberculosis" (sil) so'zining "tuberculum" (kichik shishlar) dan olingan yanada ilmiy hosilalarga rivojlangan. Mikroblar nomenklaturasi uchun beshta kategoriya aniqlangan: fenotipik xususiyatlar, kasallik nomi, eponim, ajratib olingan tana qismi va toponim. Maxsus misollar orasida o'rta asr italyancha "mal aria" (yomon havo) so'zidan kelib chiqqan "malariya" (botqoqlarga ishora) va dastlab teridagi lezyonlar tufayli "Qora o'lim"

deb atalgan va lotincha "Plaga" (zarba yoki jarohat) so'zidan kelib chiqqan "vabo" (plague) mavjud bo'lib, uning tez tarqalishini anglatadi.

Tibbiy atamalarni tushunish ularning qurilish bloklarini: prefikslar, suffikslar va ildiz so'zlarni tan olishga tayanadi. Prefikslar so'zning boshiga birikib, odatda joylashuv, yo'nalish yoki miqdorni (masalan, "uni-" bir degani, "ab-" uzoqlashish degani, "hyper-" haddan tashqari degani) anglatadi. Suffikslar so'zning oxirida joylashib, odatda holat, tuzilish yoki protsedurani (masalan, "-ium" tuzilish uchun, "-algia" og'riq uchun, "-ectomy" jarrohlik yo'li bilan olib tashlash uchun) bildiradi. Ildiz so'zlar esa asosiy ma'noni tashkil etib, ko'pincha tana qismlari, fiziologik jarayonlar yoki patologik holatlarni nomlaydi. Masalan, "Aden" bez, "Osteon" suyak, "Haima" qon va "Kardia" yurakni anglatuvchi yunon ildiz so'zlaridir. Lotin tilida esa "rubes" (qizil) yoki "magnis" (katta) kabi tavsiflovchi sifatlar ilmiy nomenklaturada tez-tez ishlatiladi. Yunon prefikslari orasida 'a-, an-' yetishmovchilikni, 'hyper-' ortiqchalikni, 'hypo-' yetishmovchilikni, 'dia-' orqali, 'anti-' qarshilikni ifodalaydi. "-ia" va "-iasis" kabi yunon suffikslari patologik holatlar yoki shartlarni bildiradi, "-ikos/-ic" sifat yasovchi qo'shimcha bo'lsa, "-ismos/-ism" turli holatlarni ifodalaydi.

Zamonaviy tibbiy terminologiya qadimiy so'zlar va yaqinda paydo bo'lgan atamalarni birlashtiradi. Uning katta qismi yunon tiliga asoslangan bo'lib, bugungi tibbiy ingliz tilining 75 foizi Hippokrat (miloddan avvalgi 460-yilda tug'ilgan) va Aleksandriya maktabiga borib taqaladi. "Artrit" va "nefrit" kabi atamalar bunga misol bo'la oladi. Qadimgi yunon anatomik atamalari ko'pincha tanish narsalarga o'xshashlikdan kelib chiqqan. Miloddan avvalgi 2-asrda yunon atamalari Rim tibbiyotiga ta'sir ko'rsatgan, lotincha ilmiy atamalarning kamida yarmi yunon tilidan o'zlashtirilib, lotinlashtirilgan (masalan, "perikardion" "pericardium" ga aylangan); kamdan-kam asl lotincha atamalar saqlanib qolgan. Yaqin vaqtda, asosan yunon ildizlaridan ko'plab "neoklassik" atamalar paydo bo'lgan, ular eski atamalar bilan farqlarni xiralashtirgan. Keyingi murakkablik organlar uchun lotincha otlarni (masalan, "ren" - buyrak) ishlatishdan, ammo ularning patologiyalari uchun yunoncha atamalarni (masalan, "nefrit") qo'llashdan kelib chiqadi. Yunon tilining keng prefikslari va suffikslari uni yangi atamalar yaratish uchun afzalroq qiladi, bu atamalar zamonaviy tibbiy lug'atlarning chorak qismini to'ldirishi aytiladi. "Qorong'u davr"dan keyin terminologiya arab tilidan qayta tarjima qilish orqali jonlanib, "alkogol" kabi ba'zi arabcha so'zlarni kiritgan va Uyg'onish davrida rivojlanishda davom etgan.

Ingliz tili zamonaviy tibbiyot fanining lingua franca'siga aylangan bo'lsa-da, yunon va lotin tillari 2000 yildan ortiq vaqt davomida tibbiy va ilmiy yozuvlarga chuqur ta'sir ko'rsatgan. Qadimgi yunon shifokorlari, ayniqsa, diagnostikada juda muvaffaqiyatli bo'lishgan, "diabetes mellitus" kabi kasalliklarni tasniflash uchun asosiy terminologiyani yaratishgan. Rimliklar keyinchalik Selsusning "De Medicina" asarida bo'lgani kabi, yunon tibbiy bilimlarini lotincha tarjimalar orqali saqlab qolishgan va tarqatishgan. Ibn Sino kabi arab shifokorlari "Tibbiyot qonuni" kabi asarlari bilan bu bilimlarni yanada boyitganlar va 17-asrgacha Yevropa tibbiyot maktablariga ta'sir ko'rsatganlar. Bugungi kunda yunon atamalari asosan klinik



terminologiyada, murakkab so'zlar hosil qilishga yaroqliligi tufayli, lotin tili esa anatomik atamalarda ustunlik qiladi. Ularning qadimgi ildizlariga qaramay, keng qo'llaniladigan tibbiy terminologiyaning deyarli yarmi yuz yildan kamroq vaqt oldin paydo bo'lgan va ingliz tilida ko'pincha "dubletlar" – turli tarixiy o'zlashtirmalardan kelib chiqqan sinonim juftliklar uchraydi.

Ushbu tadqiqot lotin tilida kasallik nomlarining shakllanishini o'rganishga qaratilgan bo'lib, sifatli va tavsifiy-tahliliy metodologiyani qo'llaydi. Tadqiqotning asosiy yondashuvi mavjud ilmiy adabiyotlarni keng qamrovli ko'rib chiqish va sintez qilishdan iborat. Berilgan manbalar, ya'ni ilmiy maqolalar va tarixiy tahlillar asosida, lotin va yunon tillarining tibbiy terminologiyadagi rolini, kasallik nomlarining etimologik ildizlarini, morfologik tuzilishini va ularning tarixiy evolyutsiyasini o'rganishga e'tibor qaratildi. Metodologiya qadimgi tibbiy amaliyotlardan zamonaviy standartizatsiyagacha bo'lgan davrni qamrab olib, konseptual va tahliliy yondashuvni o'z ichiga oladi. Bu esa lotin tilining tibbiyot sohasidagi doimiy ahamiyatini tushunishga imkon beradi.

#### Xulosa

Lotin tili tibbiyot sohasida kasallik nomlarining shakllanishida beqiyos va fundamental ahamiyatga ega bo'lgan til bo'lib qolmoqda. Uning yunon tili bilan uyg'unlashuvi natijasida, tibbiy terminologiya aniqlik, ixchamlik va universal tushunarlilik darajasiga erishgan. Qadimgi yunon shifokorlarining diagnostika va patologiya sohasidagi yutuqlari, Rimliklarning bilimlarni lotin tiliga tarjima qilish orqali saqlab qolishlari, shuningdek, keyingi asrlarda arab va Yevropa olimlarining hissalarini tibbiyotning ilmiy tilini mustahkamladi.

Lotin va yunon prefikslari, suffikslari va ildiz so'zlarining tizimli qo'llanilishi kasallik nomlarining morfologik tuzilishini belgilab, murakkab tibbiy tushunchalarni sodda va standartlashtirilgan shaklda ifodalash imkonini beradi. "Malariya" dan "tuberculosis" gacha bo'lgan kasallik nomlarining etimologik tahlili ularning madaniy, tarixiy va ilmiy kontekstini ochib beradi.

Zamonaviy davrda ingliz tili xalqaro tibbiyotning asosiy muloqot tiliga aylangan bo'lsa-da, yunon va lotin tillaridan kelib chiqqan terminologiya o'z dolzarbligini yo'qotmadi. Aksincha, bu qadimiy tillar tibbiyot tilining ustuni bo'lib xizmat qiladi, yangi kasalliklar va davolash usullari uchun nomlar yaratishda ham asos bo'ladi. Lotin tilining tibbiyotdagi doimiy ahamiyati uning tarixiy merosi, ilmiy aniqligi va butun dunyo bo'ylab mutaxassislar uchun umumiy tilni ta'minlash qobiliyati bilan izohlanadi. Kelajakda ham lotin tilini o'rganish tibbiyot xodimlari uchun faqatgina tarixiy bilimlarni egallash emas, balki tibbiy bilimlarning chuqur ildizlarini tushunish va yangi ilmiy kashfiyotlarni nomlashda fundamental vosita bo'lib qolaveradi.

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## **YOD TANQISLIGINING ORGANIZMGA TA'SIRI, ENDEMIK HUDUDLAR VA PROFILAKTIKASI**

### **Annotatsiya**

*Maqsad: Yod tanqisligining inson organizmiga ta'siri, endemik hududlar va profilaktika strategiyalarini tahlil qilish.*

*Material va usullar: 2020-2025 yillar xalqaro va milliy tadqiqotlar, WHO, UNICEF, O'zbekiston SSV ma'lumotlari asosida tahlil.*

*Natijalar: Yod tanqisligi global sog'liq muammosi bo'lib, 2 milliardga yaqin odam xavf ostida. Yod qalqonsimon bez gormonlari sintezi uchun zarur mikroelement. Tanqisligi guatr, gipotiroidizm, bolalarda kretinizm, aqliy rivojlanish kechikishiga olib keladi. Homiladorlarda yod tanqisligi spontan abort, tug'ma nuqsonlar, psixomotor rivojlanish buzilishi xavfini oshiradi. Tog'li va dengizdan uzoq hududlar endemik hisoblanadi - O'zbekistonning Surxondaryo, Qashqadaryo, Samarqand, Buxoro hududlari. Profilaktikaning eng samarali usuli - yodlangan tuz, shuningdek yodga boy mahsulotlar (dengiz mahsulotlari, sut, tuxum), zarurat bo'yicha yod preparatlari.*

*Xulosa: Universal tuz yodlash dasturi asosiy profilaktika strategiyasi. Homilador va emizikli ayollar, bolalar - xavf guruhlari. Monitoring, aholi ta'limi va davlat dasturlari zarur.*

***Kalit so'zlar:** yod tanqisligi, guatr, qalqonsimon bez, yodlangan tuz, profilaktika.*

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## **IMPACT OF IODINE DEFICIENCY ON THE BODY, ENDEMIC REGIONS AND PREVENTION**

### **Abstract**

*Objective: To analyze the impact of iodine deficiency on human body, endemic regions and prevention strategies.*

*Materials and methods: Analysis of international and national studies 2020-2025, WHO, UNICEF, Uzbekistan MoH data.*

*Results: Iodine deficiency is a global health problem affecting nearly 2 billion people. Iodine is essential for thyroid hormone synthesis. Deficiency leads to goiter, hypothyroidism, cretinism in children, mental retardation. In pregnant women, iodine deficiency increases risk of spontaneous abortion, congenital defects, psychomotor development disorders. Mountainous and sea-remote regions are endemic - in Uzbekistan Surkhandarya, Kashkadarya, Samarkand, Bukhara regions. Most effective prevention is iodized salt, also iodine-rich foods (seafood, milk, eggs), iodine supplements when necessary.*

*Conclusion: Universal salt iodization is main prevention strategy. Pregnant, lactating women, children are risk groups. Monitoring, public education and government programs are necessary.*

**Key words:** iodine deficiency, goiter, thyroid gland, iodized salt, prevention.

## **KIRISH**

Yod inson organizmi uchun zaruriy mikroelement bo'lib, qalqonsimon bez gormonlari - tiroksin (T4) va triyodtironin (T3) sintezi uchun muhimdir [1]. Bu gormonlar metabolizm, o'sish, rivojlanish, nerv tizimi funksiyasini tartibga soladi.

Yod tanqisligi global sog'liqni saqlash muammosi hisoblanadi. WHO ma'lumotlariga ko'ra, dunyo aholisining katta qismi yod tanqisligi xavfi ostida [2]. Bu muammo, ayniqsa, tog'li va dengizdan uzoq hududlarda keng tarqalgan.

**Maqsad:** Yod tanqisligining organizmga ko'p qirrali ta'sirini, endemik hududlarni va profilaktika strategiyalarini kompleks tahlil qilish.

## **MATERIAL VA METODLAR**

Sistematik sharh 2020-2025 yillar PubMed, Scopus, Cochrane manbalarida nashr etilgan tadqiqotlar, WHO, UNICEF hisobotlari, O'zbekiston Sog'liqni Saqlash Vazirligi va Ovqatlanish Instituti ma'lumotlari asosida amalga oshirildi. Jami 35 ta ilmiy manba ko'rib chiqildi.

## **YOD: FIZIOLOGIK ROLI VA KUNLIK EHTIYOJ**

### **Yodning organizmdagi vazifasi**

**Qalqonsimon bez gormonlari sintezi:** Yod T3 va T4 gormonlarining tarkibiy qismi. Bu gormonlar [3]:

- Bazal metabolizmni tartibga soladi
- Energiya ishlab chiqarishni nazorat qiladi
- Oqsil, yog', uglevodlar almashinuvini boshqaradi
- Hujayra o'sishi va differentsiatsiyasini ta'minlaydi

**Miya rivojlanishi:** Homiladorlik va erta bolalikda qalqonsimon bez gormonlari miya rivojlanishi uchun kritik ahamiyatga ega. Yod tanqisligi qaytarilmas nevrologik shikastlanishlarga olib kelishi mumkin [4].

**Jismoniy o'sish:** Bolalarda qalqonsimon bez gormonlari skelet, mushak rivojlanishi va o'sishni ta'minlaydi.

### **Kunlik ehtiyoj**

**Jadval 1. Turli yoshdagi odamlar uchun yod kunlik ehtiyoji (WHO tavsiyalari)**

| Guruh                            | Kunlik yod ehtiyoji (mkg) |
|----------------------------------|---------------------------|
| Chaqaloqlar (0-59 oy)            | 90                        |
| Maktabgacha bolalar (6-12 yosh)  | 120                       |
| O'smirlar va kattalar (12+ yosh) | 150                       |
| Homilador ayollar                | 250                       |
| Emizikli ayollar                 | 250                       |

### **Yodning manbasi**

#### **Tabiiy manbaalar:**

- Dengiz mahsulotlari (baliq, dengiz o'tlari, qisqichbaqalar) - eng boy manba
- Sut va sut mahsulotlari
- Tuxum
- Go'sht
- Yodlangan tuz - eng muhim va arzon manba

**Tuproq va suv:** Tog'li va dengizdan uzoq hududlarda tuproq va suvda yod kam bo'ladi, shuning uchun mahalliy mahsulotlarda ham yod tanqisligi kuzatiladi [5].

### **YOD TANQISLIGI KASALLIKLARI (IDD)**

#### **Guatr (bo'g'ma)**

**Ta'rifi:** Qalqonsimon bezning kengayishi - bo'yin old qismida shish paydo bo'lishi.

**Mexanizm:** Yod tanqisligida qalqonsimon bez gormonlar ishlab chiqarishni saqlab qolish uchun kompensator ravishda kattalashadi. Gipofiz TSH (qalqonsimon bezni stimullovchi gormon) ishlab chiqarishini oshiradi, bu bezning giperplaziyasiga olib keladi [6].

#### **Klassifikatsiyasi (WHO):**

- **0-daraja:** Guatr yo'q
- **1-daraja:** Palpatsiya orqali aniqlanadi, lekin ko'rinmaydi
- **2-daraja:** Ko'rinadi va palpatsiya orqali aniqlanadi

**Endemik guatr:** Aholining 5% dan ortig'ida guatr mavjud bo'lsa, hudud endemik hisoblanadi.

#### **Gipotiroidizm**

**Ta'rifi:** Qalqonsimon bez gormonlarining yetishmasligi.

#### **Simptomlar:**

- Charchoq, sustlik
- Sovuqqa sezgirlik
- Vazn ortishi
- Terikning quruqligi
- Sochning to'kilishi
- Qabziyat
- Depressiya, xotiraning yomonlashishi

- Yurak urish tezligining sekinlashishi

## **XULOSA**

Yod tanqisligi global sog'liqni saqlash muammosi:

### **1. Yod roli:**

- Qalqonsimon bez gormonlari sintezi
- Metabolizm tartibga solish
- Miya rivojlanishi (homiladorlik va bolalikda)
- Jismoniy o'sish

### **2. Tanqislik kasalliklari:**

- Guatr (bo'g'ma)
- Gipotiroidizm
- Kretinizm
- Aqliy rivojlanish kechikishi
- Homiladorlik asoratlari

### **3. Endemik hududlar:**

- Tog'li va dengizdan uzoq joylar
- O'zbekiston: Surxondaryo, Qashqadaryo, Samarqand, Buxoro

### **4. Profilaktika:**

- Universal tuz yodlash - asosiy strategiya
- Yodga boy mahsulotlar
- Yod preparatlari (xavf guruhlari uchun)
- Aholi ta'limi

### **5. Monitoring:**

- Siydikda yod konsentratsiyasi
- Guatr chastotasi
- Tuz sifat nazorati
- Davlat dasturlari

### **6. Xavf guruhlari:**

- Homilador ayollar (250 mkg/kun)
- Emizikli ayollar (250 mkg/kun)
- Bolalar (90-150 mkg/kun)

### **7. Kelajak yo'nalishlari:**

- Tuz yodlash qamrovini oshirish
- Qishloq hududlarida yetkazib berish
- Monitoring kengaytirish
- Aholi bilimini oshirish

Yod tanqisligini bartaraf etish oddiy va arzon - yodlangan tuz ishlatish. Bu millionlab bolalarni aqliy rivojlanish muammolaridan saqlaydi.

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## **CULTIVATION OF ICEBERG LETTUCE USING THE HYDROPONIC METHOD IN OPEN AND CLOSED AREAS AND THE ORGANIZATION OF PRIMARY SEED PRODUCTION**

**Abstract:** *The study investigates hydroponic cultivation of "Iceberg" lettuce in open and closed systems, including primary seed production. Greenhouse conditions resulted in earlier maturation and higher yields compared to open-field cultivation. The findings demonstrate the effectiveness of hydroponics and the importance of adapting varieties to local conditions for improved productivity and quality.*

**Keywords:** *Iceberg lettuce, hydroponics, open-field and greenhouse cultivation, yield, primary seed production, varieties*

**Introduction:** Today, providing the population with high-quality, ecologically clean, and biologically beneficial vegetable products is one of the priority directions of the agro-industrial complex. Hydroponic cultivation technology is considered an advanced agro technology characterized by high efficiency and water-resource conservation. This method enables the effective cultivation of various vegetables, including Iceberg lettuce, in both open and closed (greenhouse) environments.

Iceberg lettuce (*Lactuca sativa* var. *crispa*) is distinguished by its high consumer value, nutritional content, and dietary properties. Rich in vitamins, minerals, and fiber, it remains one of the high-demand vegetable crops in the global market. However, the production volume of Iceberg lettuce in our country and research based on diverse agro technologies remain insufficient.

Cultivating Iceberg lettuce through hydroponics yields high efficiency, particularly in regions with unfavorable climates or limited water resources. Furthermore, producing high-quality seeds is one of the critical challenges in contemporary agricultural science and practice. By organizing primary seed production, it is possible to satisfy domestic demand, reduce dependence on imported seeds, and develop varieties adapted to local conditions. From this perspective, developing the scientific and practical foundations for the hydroponic cultivation of Iceberg lettuce in open and closed areas, as well as the organization of primary seed production, is a highly relevant issue today. Greenhouse vegetable production is a key branch of agriculture, playing a vital role in providing the population with fresh, vitamin-rich products during the off-season.

### **The purpose, objectives, and significance of the study**

**Current status and policy:** Presently, the total area of hydroponic greenhouses in our republic is expanding annually, a trend driven by the high

economic efficiency of this sector. To ensure the extensive development of this field, several decrees and resolutions have been adopted by our state.

**Global context and statistics:** Globally, the production volume of leafy green vegetables essential for human health, particularly head lettuce, is increasing every year. In 2020, global lettuce production reached 27.66 million tons. China holds the leading position, accounting for the largest share at 14.32 million tons. Following China, the United States produced 4.40 million tons, India 1.12 million tons, Spain 969.06 thousand tons, and Italy 735.47 thousand tons. The remaining global output is distributed among other countries.

**Scientific trends:** In leading countries such as those in Europe, China, Japan, and Russia, scientific research is being conducted on the ear-round cultivation, storage, and processing technologies of more than 25–30 types of vegetables. These nations are developing and implementing new varieties of head lettuce into production. Research is focused on creating high-yielding, early-maturing varieties that are rich in biologically active substances and resistant to pests, diseases, and unfavorable weather conditions. Acclimatizing new varieties of head lettuce, improving cultivation technologies, and expanding primary seed production capabilities are of paramount importance.

**National perspective:** In our republic, only 20–25 types of major vegetables and 4–5 types of leafy greens are currently cultivated. Great emphasis is now being placed on increasing the agro-biodiversity of leafy green vegetables, studying the morph-biological and valuable economic traits of new crops, localizing promising variety samples, developing cultivation technologies, and organizing primary seed production.

**Relevance of the research.** According to Decree No. PF-60 of the President of the Republic of Uzbekistan, dated January 28, 2022, "On the Development Strategy of New Uzbekistan for 2022–2026," one of the critical strategic tasks is "reducing the areas sown with cotton and grain crops and planting potatoes, vegetables, fodder, and oilseed crops in the vacated lands." Consequently, expanding the diversity of leafy green vegetables, acclimatizing head lettuce varieties, and developing scientific foundations for promising agro technologies aimed at obtaining high-quality, biologically active, and medicinal yields ear-round—alongside expanding lettuce seed production—is a highly relevant issue for the country, particularly in the Andijan region.

This dissertation research contributes to the implementation of tasks outlined in the "Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020–2030," as well as Cabinet of Ministers Resolution No. 504, dated August 25, 2020, "On measures to restore local varieties of agricultural crops with unique characteristics at risk of extinction and organize their original seed production," and other regulatory documents.

**Research object and experimental methods.** The research was primarily conducted during 2022–2024 (partially during the 2021 autumn-winter turnover) at the following locations:

- The lands of "**Mega Agro**" LLC in the Pakhtaabad district of the Andijan region.

- The experimental farm of the **Andijan Institute of Agriculture and Agro technologies**.

- The lands of "**Modern Greenhouses Complexes**" LLC in the Asaka district of the Andijan region.

**Soil conditions:** The studies were carried out on the stony lands of "Mega Agro" LLC, the gravelly soils of the Andijan Institute of Agriculture and Agro technologies, and the adyr (foothill) lands of "Modern Greenhouses Complexes" LLC. Due to the limited possibilities of traditional soil utilization in these areas, particular importance was placed on the **hydroponic method** of vegetable cultivation.

**Climatic conditions:** According to the soil-climatic zoning of Uzbekistan, certain areas of the Andijan region are located in the semi-desert zone with typical gray (serozem) soils. The climate of the Andijan region is characterized by significant fluctuations in annual and daily temperatures, low and unevenly distributed precipitation throughout the year, high air and soil temperatures in summer, low temperatures in winter, high atmospheric aridity, and intense moisture evaporation from the soil.

Research objects and varieties. The following imported and local varieties of Iceberg lettuce were selected as the objects of the research:

- **Krupnokachan** (Russia)
- **Great Lakes 118** (USA)
- **Iceberg** (USA)
- **Robinson** (Netherlands)
- **Kok Shokh** (Uzbekistan) – A locally adapted variety.

The following **hydroponic systems** were utilized during the research.

| № | System Type                         | Brief Description                                                    |
|---|-------------------------------------|----------------------------------------------------------------------|
| 1 | NFT (Nutrient Film Technique)       | A continuous nutrient solution flow within a water channel (trough). |
| 2 | Substrate-based (Coconut coir/pith) | Cultivation using a solid substrate (growing medium).                |

**Environmental Control and Technical Parameters.** In the hydroponic systems, the following parameters were strictly monitored:

- **pH Level:** 5.8–6.5
- **Electrical Conductivity (EC):** 1.2–1.8 mS/cm
- **Temperature:** 18–22°C

**Agro-ecological conditions:**

- **Open Field:** Wind, temperature, and humidity remained subject to natural environmental conditions.

- **Closed Environment (Greenhouse):** Automated control was maintained with temperatures between 20–25°C and relative humidity at 60–70%.

**Research results and discussion.** The analysis of Iceberg lettuce varieties cultivated in the Andijan region revealed significant agro-biological differences

between open and closed environments. Despite using identical varieties, seeds, and agrotechnical methods, the change in environment led to fundamentally different outcomes.

#### *1. Iceberg Variety*

- **Open Field:** Matured in 45 days with a yield of **37.1 t/ha** and an average head mass of **390 g**.

- **Closed Environment:** The growth period decreased to **39 days** (6 days earlier). Yield increased to **39.3 t/ha** (a **5.9%** increase), and head mass rose by **5.1%** to **410 g**.

- **Conclusion:** Greenhouse cultivation accelerated growth and enhanced marketability.

#### *2. Krupnokachan Variety*

- **Open Field:** Yielded **34.1 t/ha** in 45 days with a head mass of **370 g**.

- **Closed Environment:** Demonstrated a significant "rebound" effect, maturing in 39 days. Yield soared to **39.0 t/ha** (a **14.4%** surge), and head mass reached **400 g** (an **8.1%** increase).

- **Conclusion:** Its dense and firm heads make it one of the most reliable varieties for greenhouse production.

#### *3. Great Lakes 118*

- **Open Field:** Matured in 42 days with a yield of **32.5 t/ha**. Lower density and some instances of damage were observed.

- **Closed Environment:** Performance improved drastically, maturing in 38 days (4 days earlier). Yield reached **36.2 t/ha** (**11.4%** growth), and head mass increased by **5.4%** to **390 g**.

- **Conclusion:** This variety achieved "commercial standard" quality under controlled conditions.

#### *4. Robinson Variety*

- **Open Field:** Affected by water scarcity, it yielded **24.4 t/ha** in 45 days with a head mass of **350 g**.

- **Closed Environment:** Matured in 40 days (5 days earlier). Yield increased to **26.8 t/ha** (**9.8%** growth), and head mass rose to **370 g**.

- **Conclusion:** The controlled environment served as a "buffer" against the stress factors seen in open fields.

#### *5. Kok Shokh Variety*

- **Open Field:** Yielded **23.4 t/ha** in 44 days with a minimal head mass of **310 g** due to water limitations.

- **Closed Environment:** Showed the most surprising improvement, maturing in 40 days. Yield rose to **26.8 t/ha** (**14.5%** growth), while head mass jumped by **17.7%** to **365 g**.

- **Conclusion:** This variety fully realized its biological potential only within the closed hydroponic system.

**Comparative summary of Iceberg lettuce varieties (Andijan region)**

|  | Variety name    | Cultivation type | Growth period (days) | Yield (t/ha) | Head mass (g) | Appearance   | Specific differences and conclusions               |
|--|-----------------|------------------|----------------------|--------------|---------------|--------------|----------------------------------------------------|
|  | Iceberg         | Open field       | 45                   | 7.1          | 90            | Good         | Climate-stable; larger lower leaves.               |
|  |                 | Closed system    | 39                   | 9.3          | 10            | Excellent    | Heat-responsive; high commercial value.            |
|  | Krupnokachan    | Open field       | 45                   | 4.1          | 70            | Good         | Climate-stable; larger lower leaves.               |
|  |                 | Closed system    | 39                   | 9.0          | 100           | Dense & Firm | Heat-responsive; high commercial value.            |
|  | Great Lakes 118 | Open field       | 42                   | 2.5          | 70            | Moderate     | Lower density; higher incidence of damage.         |
|  |                 | Closed system    | 38                   | 6.2          | 90            | Dense & Firm | Dense heads; clean and commercially attractive.    |
|  | Robinson        | Open field       | 45                   | 4.4          | 50            | Moderate     | Growth stunted due to water scarcity.              |
|  |                 | Closed system    | 40                   | 6.8          | 70            | Good         | Developed effectively under hydroponic conditions. |
|  | Kok Shokh       | Open field       | 44                   | 3.4          | 10            | Moderate     | Growth stunted due to water scarcity.              |
|  |                 | Closed system    | 40                   | 6.8          | 65            | Moderate     | Developed effectively under hydroponic conditions. |



Yield performance and statistical stability of Iceberg lettuce varieties in closed hydroponic systems (2022–2024)

Iceberg variety analysis: Between 2022 and 2024, the "Iceberg" variety demonstrated stable and high yield performance in a closed environment. In 2022, the average yield for this variety was 37.0 t/ha. The variance between replicates remained minimal, showcasing high stability with a Standard Error (SE) of  $\pm 0.17$ . During this year, the growth initiated under favorable conditions, and the quality of each head was remarkably consistent.

In 2023, the "Iceberg" variety showed further efficiency, with the average yield rising to 38.4 t/ha, representing a +1.4 t/ha increase compared to 2022. The variety adapted rapidly to the controlled agro-climatic conditions, producing dense and high-quality heads. The peak performance was recorded in 2024 at 39.0 t/ha (SE  $\pm 0.23$ ). These results confirm the superior yield capacity and stability of the "Iceberg" variety, not only in terms of quantity but also regarding head density and commercial marketability.

Performance of other varieties: Other varieties in the closed environment also exhibited steady growth trends:

- Great Lakes 118: The average yield was 33.4 t/ha in 2022, 34.8 t/ha in 2023, and reached 36.2 t/ha in 2024. Maintaining an SE of  $\pm 0.19$ – $0.21$ , this variety demonstrated an 8.0% yield growth over the three-year period.

- Krupnokachan (Control): Recorded yields of 31.5 t/ha in 2022, 33.0 t/ha in 2023, and 34.4 t/ha in 2024. The low SE values indicate highly stable results within a narrow range, with an overall growth of 9.0% from 2022 to 2024.

- Robinson and Kok Shokh: These varieties showed slightly higher SE values, indicating minor fluctuations in results. In 2024, the average yield for Robinson was 26.7 t/ha, while Kok Shokh reached 26.8 t/ha. Although these varieties are productive, they do not match the high yield and stability levels of "Iceberg," "Great Lakes 118," and "Krupnokachan."

**Table: Yield indicators of Iceberg lettuce varieties in closed environments (2022–2024) and average values by replicates (t/ha)**

| № | Variety name    | Year | Replicate I | Replicate II | Replicate III | Mean $\pm$ SE   |
|---|-----------------|------|-------------|--------------|---------------|-----------------|
| 1 | Iceberg         | 2022 | 37.3        | 36.7         | 37.0          | 37.0 $\pm$ 0.17 |
| 2 |                 | 2023 | 38.1        | 38.7         | 38.4          | 38.4 $\pm$ 0.17 |
| 3 |                 | 2024 | 38.6        | 39.4         | 39.0          | 39.0 $\pm$ 0.23 |
| 4 | Great Lakes 118 | 2022 | 33.5        | 33.0         | 33.8          | 33.4 $\pm$ 0.21 |
| 5 |                 | 2023 | 34.8        | 35.1         | 34.5          | 34.8 $\pm$ 0.19 |
| 6 |                 | 2024 | 36.2        | 35.8         | 36.4          | 36.2 $\pm$ 0.19 |

|           |                                  |      |      |      |      |                              |
|-----------|----------------------------------|------|------|------|------|------------------------------|
| <b>7</b>  | <b>Krupnokachan</b><br>(Control) | 2022 | 31.4 | 32.0 | 31.2 | <b>31.5</b> ±<br><b>0.25</b> |
| <b>8</b>  |                                  | 2023 | 32.7 | 33.3 | 33.0 | <b>33.0</b> ±<br><b>0.19</b> |
| <b>9</b>  |                                  | 2024 | 34.8 | 34.0 | 34.4 | <b>34.4</b> ±<br><b>0.22</b> |
| <b>10</b> | <b>Robinson</b>                  | 2022 | 25.7 | 26.2 | 25.9 | <b>25.9</b> ±<br><b>0.15</b> |
| <b>11</b> |                                  | 2023 | 27.0 | 27.5 | 27.1 | <b>27.2</b> ±<br><b>0.15</b> |
| <b>12</b> |                                  | 2024 | 26.8 | 26.3 | 27.0 | <b>26.7</b> ±<br><b>0.21</b> |
| <b>13</b> | <b>Kok Shokh</b>                 | 2022 | 24.5 | 28.3 | 26.8 | <b>26.5</b> ±<br><b>1.11</b> |
| <b>14</b> |                                  | 2023 | 25.1 | 27.8 | 25.4 | <b>26.1</b> ±<br><b>0.85</b> |
| <b>15</b> |                                  | 2024 | 27.7 | 26.2 | 26.5 | <b>26.8</b> ±<br><b>0.46</b> |

General conclusion: The most effective and stable yield in closed environments was recorded in the Iceberg variety. Its productivity grew consistently from 2022 to 2024, reaching a peak of 39.0 t/ha in 2024. The Iceberg variety also ranked first in terms of yield stability, head density, and commercial marketability. While Great Lakes 118 and Krupnokachan also demonstrated high results, they remained slightly behind the Iceberg variety regarding both the Standard Error (SE) values and total biomass.

Impact of cuttings (harvest cycles) on seed yield and quality: Experiments conducted between 2022 and 2024 revealed that an increase in the number of cuttings (harvesting cycles) in Iceberg lettuce varieties significantly negatively impacts seed yield and quality.

- Iceberg (2022): Without any cuttings, the seed yield reached up to 410 kg/ha. However, after two cycles of harvesting (cuttings), this figure dropped to 250 kg/ha.

- Great Lakes 118 (2022): The seed yield without cuttings was 390 kg/ha, which decreased to 260 kg/ha after two cycles. Concurrently, seed germination dropped from 92% to 85%, and varietal purity declined from 99% to 94%.

- Krupnokachan (2023): A similar trend was observed; seed yield fell from approximately 400 kg/ha (no cuttings) to 240 kg/ha after two cycles, with corresponding decreases in germination and purity.

- Robinson (2023): Seed yield decreased from 375 kg/ha to 245 kg/ha after two cycles of harvesting.

- Kok Shokh (2024): The seed yield was recorded at 380 kg/ha without cuttings, 340 kg/ha after one cutting, and significantly dropped to 230 kg/ha after two cuttings.

Scientific synthesis: These results indicate that repeated cutting of the plant for foliage production depletes the energy required for optimal seed formation. For

high-quality primary seed production, minimizing the number of vegetative harvests is essential to preserve the plant's reproductive potential.

### **Impact of Harvest Cycles (Cuttings) on Seed Yield and Quality**

| <b>№</b> | <b>Year</b> | <b>Variety</b>  | <b>Number of cuttings (Cycles)</b> | <b>Seed yield (kg/ha)</b> | <b>Germination rate (%)</b> | <b>Varietal purity (%)</b> | <b>Flowering period (days)</b> |
|----------|-------------|-----------------|------------------------------------|---------------------------|-----------------------------|----------------------------|--------------------------------|
| 1        | <b>2022</b> | Iceberg         | 0                                  | 410.0                     | 93.0                        | 99.0                       | 85                             |
| 2        |             | Iceberg         | 1                                  | 360.0                     | 90.0                        | 97.0                       | 89                             |
| 3        |             | Iceberg         | 2                                  | 250.0                     | 84.0                        | 94.0                       | 94                             |
| 4        |             | Great Lakes 118 | 0                                  | 390.0                     | 92.0                        | 99.0                       | 87                             |
| 5        |             | Great Lakes 118 | 1                                  | 350.0                     | 90.0                        | 97.0                       | 91                             |
| 6        |             | Great Lakes 118 | 2                                  | 260.0                     | 85.0                        | 94.0                       | 97                             |
| 7        | <b>2023</b> | Krupnokachan    | 0                                  | 400.0                     | 91.0                        | 98.0                       | 88                             |
| 8        |             | Krupnokachan    | 1                                  | 330.0                     | 89.0                        | 96.0                       | 93                             |
| 9        |             | Krupnokachan    | 2                                  | 240.0                     | 83.0                        | 94.0                       | 98                             |
| 10       |             | Robinson        | 0                                  | 375.0                     | 92.0                        | 98.0                       | 86                             |
| 11       |             | Robinson        | 1                                  | 345.0                     | 88.0                        | 96.0                       | 91                             |
| 12       |             | Robinson        | 2                                  | 235.0                     | 82.0                        | 93.0                       | 96                             |
| 13       | <b>2024</b> | Kok shokh       | 0                                  | 380.0                     | 94.0                        | 99.0                       | 84                             |
| 14       |             | Kok shokh       | 1                                  | 340.0                     | 91.0                        | 97.0                       | 89                             |
| 15       |             | Kok shokh       | 2                                  | 230.0                     | 85.0                        | 95.0                       | 95                             |

The high quality and varietal purity of Iceberg lettuce seeds serve as the primary guarantee for successful breeding and seed production efforts. Proper harvesting, cleaning, and storage technologies are essential for maintaining seed viability and enhancing the productivity of future crops.

The established seed production recommendations for certified Iceberg lettuce varieties are designed to ensure the acquisition of high-quality, highly germinable, and variety-specific seeds. Rigorous monitoring at every stage, the preservation of varietal purity, and strict adherence to agrotechnical standards are fundamental to maintaining the genetic integrity of the variety.



## Photo Gallery of Experimental Research



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## THE IMPORTANCE OF CONNECTIVE TISSUE DYSPLASIA IN FETAL GROWTH RESTRICTION AND ARREST

**Abstract:** *Connective tissue dysplasia (CTD) in fetuses may cause early growth delay, disproportion, and structural abnormalities leading to intrauterine growth restriction (IUGR). CTD-related matrix and ossification defects disrupt placental–fetal interactions, producing skeletal disproportion visible on mid-trimester ultrasound. Advances in prenatal genetics reveal pathogenic variants in collagen and matrix genes in some “constitutionally small” fetuses. This review outlines imaging–genetic evaluation strategies and related biometry–outcome patterns.*

**Keywords:** *connective tissue dysplasia, fetal growth restriction, intrauterine growth, skeletal dysplasia, ultrasound*

**Introduction.** Fetal growth restriction (FGR) is commonly attributed to placental insufficiency, maternal disease, or constitutional smallness, yet a proportion of affected fetuses harbor monogenic skeletal or connective tissue disorders that fundamentally alter growth potential. In hereditary connective tissue disorders, defects of collagen, proteoglycans, or related extracellular matrix proteins disrupt cartilage and bone development and can reduce fetal longitudinal growth even when placental Doppler studies remain normal. Prenatal series of skeletal dysplasias and syndromic short stature demonstrate that many fetuses initially present with subtle long-bone shortening and mild disproportion before more obvious deformities appear in late gestation. Recent reviews of syndromic short stature emphasize that aggrecanopathies and other matrix-related conditions frequently manifest as prenatal or early postnatal growth failure, blurring the boundary between FGR and skeletal dysplasia in obstetric practice. Awareness of fetal CTD as a cause of growth arrest is therefore essential to refine prognosis, guide prenatal counseling, and plan postnatal multidisciplinary care.[1-5]

**Methods:** An illustrative, hypothetical cohort of 80 fetuses with estimated fetal weight (EFW) < 10th percentile after 24 weeks' gestation was constructed, mirroring case-mix in tertiary fetal medicine units. All had normal maternal blood pressure and reassuring umbilical artery Doppler at first presentation, to enrich for non-placental etiologies. Based on published frequencies of skeletal and connective tissue disorders among referred FGR and short-long-bone fetuses, 20 cases (25%) were classified as CTD-related and 60 as non-CTD. For each group, distributions of femur length (FL) Z-score, head-to-abdomen ratio, long-bone disproportion, and



perinatal outcome (live birth, NICU admission, early neonatal death) were modeled around values reported in recent skeletal dysplasia and syndromic short stature cohorts. Group differences were explored using t-tests for continuous measures and chi-square tests for categorical outcomes, with  $p < 0.05$  considered significant.

**Results.** In the modeled cohort, fetuses with CTD-related conditions ( $n = 20$ ) showed significantly more pronounced long-bone shortening than non-CTD FGR cases, with mean FL Z-score  $-3.0 \pm 0.7$  versus  $-1.6 \pm 0.6$  ( $p < 0.001$ ), reflecting patterns described in prenatal skeletal and connective tissue dysplasias. Head circumference and abdominal circumference Z-scores were only mildly reduced in the CTD group ( $-1.0 \pm 0.8$  and  $-1.2 \pm 0.7$ , respectively), resulting in a relatively preserved head-to-abdomen ratio compared with non-CTD FGR where symmetrically reduced biometry predominated. Disproportion—defined as FL Z-score at least 1.5 SD lower than head circumference Z-score—was present in 70% of CTD fetuses versus 18% in non-CTD cases ( $\chi^2$ ,  $p < 0.001$ ).

Perinatal survival among CTD fetuses reached 80%, but 75% of survivors required neonatal intensive care, and 60% had confirmed postnatal skeletal or connective tissue diagnoses with ongoing orthopedic or cardiologic follow-up. In contrast, non-CTD FGR fetuses displayed higher rates of abnormal Doppler velocimetry and preterm delivery for placental indications, but a lower prevalence of major postnatal structural or musculoskeletal morbidity when appropriately monitored. These modeled distributions suggest that the combination of isolated or predominant long-bone shortening, relative cranial preservation, and normal early Doppler profiles strongly enriches for fetal CTD among small fetuses.

**Discussion.** Current literature supports the concept that fetal CTD and skeletal dysplasias constitute an important subgroup within fetuses labeled as FGR or small for gestational age, especially when long-bone shortening and disproportion are prominent. Reviews of syndromic short stature and skeletal dysplasia highlight that abnormalities of the growth plate matrix, including aggrecan and collagen defects, can impair endochondral ossification long before birth, leading to reduced fetal length and characteristic limb-to-trunk ratios. Heritable connective tissue disorders also often involve cardiovascular, ocular, or skin manifestations, introducing additional perinatal risks beyond growth impairment and underscoring the value of careful systemic evaluation [6-7].

For obstetricians and fetal medicine specialists, distinguishing placental FGR from CTD-related intrinsic growth limitation has direct implications for surveillance and timing of delivery. Fetuses with CTD may remain small but stable, with Doppler patterns that do not mandate iatrogenic preterm birth, while requiring detailed anatomic ultrasound, possible fetal echocardiography, and discussion of postnatal orthopedic and genetic care. Integrating serial biometry, detailed skeletal assessment, family history, and access to prenatal exome or targeted gene panels improves diagnostic yield and can refine counseling on prognosis and recurrence risk [8-12].

## Conclusion and suggestions

Connective tissue dysplasia should be considered a key intrinsic cause of fetal growth arrest, particularly when disproportionate long-bone shortening coexists with relatively preserved head size and reassuring Doppler findings. Early recognition of this pattern helps avoid misclassification as purely placental FGR, allows realistic counseling on stature and functional outcomes, and prompts appropriate prenatal and postnatal genetic evaluation. Fetal medicine teams are encouraged to adopt structured protocols that combine detailed skeletal ultrasound, serial growth assessment, and multidisciplinary consultation, including clinical genetics and neonatology. Expanding access to prenatal molecular testing for suspected CTD will likely further clarify its contribution to fetal growth failure and improve targeted care for affected families.

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## **INTERNATIONAL EXPERIENCE OF USING INTERACTIVE METHODS IN TEACHING THE GEOGRAPHY OF KARAKALPAKSTAN**

**Abstract.** *The article provides information on the role and significance of international experience of using interactive methods in teaching the geography of Karakalpakstan.*

**Keywords:** *general education school, world experience, global problems, world economy, geography of Karakalpakstan, physical-geographical position, geological and geomorphological structure, administrative-territorial structure, developed countries.*

**Introduction.** If we look at the global experience of teaching geography in secondary schools, there are several differences in the methodology, content, and structure of teaching geography in different countries. Geography studies the entire Earth's surface, as well as the natural conditions of each country, and it is natural that due to the diversity of nature and historical development of countries in the world, several differences arise in the teaching of this subject.

**Main part.** Over the last decade, the system of training and professional development for geography teachers has risen to a much higher level. Currently, geography education in many countries of the world is conducted in three directions:

1. Based on a unified curriculum and syllabus for all students (Eastern Europe and post-Soviet countries). In countries belonging to this group, geography education primarily consists of courses in natural and economic geography. It will be conducted in all general education schools in urban and rural areas based on a unified curriculum.

2. Elective study of certain courses alongside several core subjects (USA, UK, Canada, most European countries). In this group of countries, geographical knowledge is taught not in the form of specialised subjects, but in the form of integration (combination) with other subjects. At the same time, those wishing to study geography in depth can enhance their knowledge through special elective classes. In the countries of this group, there is no unified state plan for geography education; each teacher can create a curriculum based on the conditions of general education schools. For example; There are more than 1,700 counties in the United States, and all of them have unique geographical education, and classes are conducted in programs that do not resemble each other.

3. Among the subjects that are mandatory for all students to study, there is the practice of conducting additional elective classes (in the Philippines, France, Japan, and most countries). In the countries of the third group, geography is not included in the list of mandatory subjects, and its study through elective classes occupies a central place.

In general, in developed foreign countries of Europe and America, among the subjects mandatory for all students, the type of elective courses of varying complexity is widespread.

In world practice, a three-stage education system is considered the primary one: primary schools are divided into grades 1–4, secondary schools into grades 5–9, and higher schools into grades 10–12. At each of these stages, geography education has its own specific goal. For example, if the primary goal of geography education in secondary schools at the first stage is to study the surrounding environment, at the second stage, it is to study the life of one's country and obtain information about necessary professions, as well as to form educational skills and abilities. In the third stage, general education schools are focused on studying the global problems of humanity and the world economy. In world practice, the state of teaching geography is not significant; therefore, there are supporters of two views (directions) regarding its teaching to students. Supporters of the first direction argue that geography should be taught regularly as an independent subject in curricula, while supporters of the second direction argue that geography should be taught in combination with other subjects.

It should be noted that we believe that the geography of Karakalpakstan should also be taught based on a separate program. This is because, based on the natural conditions of the Republic of Karakalpakstan, it is one of the regions in an ecologically critical state; firstly, it is important to provide students with knowledge about the natural-geographical position and natural-geographical aspects, the geological and geomorphological structure of the territory, its main minerals, climatic and hydrographic features, the organic world (soil, flora, and fauna), as well as environmental protection and conservation, environmental problems related to the drying up of the Aral Sea, and the description of natural-geographical regions. Secondly, by providing students with knowledge about the economic-geographical position, borders, and administrative-territorial structure of the Republic of Karakalpakstan, the dynamics and composition of population growth, public health issues, the development and location of industrial sectors, their role on a national scale, the development and location of agriculture, opportunities for their development, the state of public service sectors, transport infrastructure, foreign economic relations, and the characteristics of economic regions, a sense of homeland will be enhanced.

In many countries of the world, the study of subjects in general education schools is voluntary, and it is carried out according to the wishes of students. The number of mandatory subjects in this group of countries does not exceed 7–8. For example, in Finland and Sweden, Finnish and Swedish, economics and sociology, geography, chemistry, English, religion, and sports are mandatory subjects.

In developed countries, the content of geography education is high in quality and is aimed at forming specific skills in students. In these countries, geographical education is more difficult to master, focusing on the study of problems, various theories, laws, and categories [4; -204 p].

In developed Western countries, the spiritual aspects of education occupy a central place in geography education. Great attention is paid to the study of the student's psyche and cognitive activity. Geography education research is almost impossible without the involvement of psychologists. Various texts, games, and imitations are widely used in geography education. For example, a student thinks as the president of a company, conducts business, solves a problem, and draws independent conclusions. In general, the main goal of such education is to prepare students for society.

Furthermore, an analysis of geography textbooks and manuals in various countries shows that several manuals are published for the same course. In most cases, they are rich in interesting information and possess informative properties. In such manuals, text accounts for 20-30%, images for 20%, statistics for 20%, and questions and assignments for 20%. The illustrations in the book are of exceptional quality; there are almost no maps in the lower grades' textbooks, and they are replaced by various map schemes. Numerical numbers are almost never encountered in the text; existing ones are also comparative in nature and are given according to criteria such as lowest, highest, smallest and longest [2; 14-15-p].

In geography education in these countries, the questions and assignments given after a topic or section may not reflect the content of the topic. Most of the questions are used in the form of problem-based tasks, discussion questions, and practical games. In geography textbooks for students, special questions for working with computer equipment, interesting tasks, methods of mathematical statistics, various games, and tests are widely used to acquire geographical knowledge. Students play the role of a researcher in the process of performing them independently. Let's get acquainted with some of them:

**In Finland**, geography is taught as one of the core subjects in school. Geography education in general education schools also has its own characteristics, and the teaching of geography is at a higher level compared to developed countries. Education consists of two stages: the first stage consists of a 9-year compulsory general education public school, and the second stage consists of gymnasiums. In this country, students can apply their knowledge of nature in practice, and geography plays a special role in establishing the relationship between man and nature. Classless gymnasiums are widespread in countries after 9 years of compulsory education. In such gymnasiums, a student or a group of students prepares an annual curriculum. Such an annual curriculum is approved in gymnasiums by course supervisors and the administration. The academic year at the gymnasium is divided into 6 periods, each period consists of 6 weeks, the courses are organized in 32 hours, and one subject is taught in each course for one hour a day, the student studies 4-7 hours a day. Sports classes are held after the training session. At the end of each period, students' knowledge is assessed, and if a student receives an unsatisfactory grade, they choose this course again;

In almost all countries, the geography education system is linked to the socio-political and economic system of the state. For example, after the end of the Second World War, a large part of **Germany's** territory suffered losses from military



weapons. At the government level, special attention was paid to the restoration of land resources, the proper and rational use of natural resources, and nature conservation, and these knowledge were instilled in students through the subject of geography in secondary schools. By paying special attention to the use of nature and environmental protection, Germany is today among the most economically developed and, at the same time, the most ecologically favorable countries in Western Europe. This country still attaches great importance to the teaching of geography today, and it is taught in general education schools alongside basic and fundamental subjects;

In the **USA** education system, geography and history are taught in an integrated manner. Schoolchildren study the geography of the country (Geography of USA) only in the upper grades. World geography is included in the history curriculum and is taught in a superficial manner alongside social sciences. The teaching of these disciplines was influenced by several ideological ideas related to the historical origins of the country.

Despite the fact that the USA is the most developed country in the world, its development path differs sharply from that of developed European countries. Looking back at the development of the United States, there are many aspects of the country that are difficult to show to readers. The discovery of the country's territory in the 15th century, the arrival of the main part of the population from Europe, Africa (slave trade), and other countries, and until recently, racial discrimination (which ceased in the country only at the end of the 19th century), the bloody struggle for gender equality and democracy, wars waged by the USA in various regions of the world (Iraq, Afghanistan, Vietnam, etc.), and others influenced the development of the country. In general education schools, such knowledge is taught to students as shallowly as possible without in-depth study, and the combination of history and geography ensures that students do not dwell on these topics in detail. At the same time, students are instilled with the idea that the USA is the greatest country in the world, and the country is shown as a leader in all spheres. In this regard, only U.S. geography is taught in the country, while the geography of other countries is not taught, which prevents students from forming an understanding that the U.S. is not a leader in many indicators.

The USA is a world leader in the integration of academic disciplines; in the educational reform of the 1940s and 1950s, geography, along with many other subjects, was excluded from the list of mandatory subjects and merged with history and sociology. Such a method of teaching geography creates several difficulties for students. As a result, the quality of geography education has significantly declined, and students have not acquired the necessary skills and qualifications. For this reason, there are currently no proposals to revive geography as an independent science in the USA;

In general education schools in **France**, geography education is well-established. The goals and objectives of geography teaching are very clearly defined, and the geography curriculum is designed for two-tier schools. In France, classes are conducted on a countdown basis. The 1st stage of general education

schools consists of grades 6, 5, 4, 3 (students aged 11–15), and higher education is provided only in lyceums. Second-year general education schools consist of grades 2–1 and 1–17 (ages 15–17): geographical education begins in the 6th grade, where "General Geography and the African Continent" is studied; in the 5th grade, geography of America, Asia, Australia, and Antarctica is taught; in the 4th grade, geography of Europe (except France); and in the 3rd grade, geography of France. Continuing education at the lyceum corresponds to grades 2, 1 and up. In the 2nd grade, the geography program will deepen the knowledge and skills acquired in college (6-5-4-3). In the 1st grade of the lyceum, students deepen the knowledge of French geography acquired in two stages of schooling. In senior classes, the geography of four major countries—the USA, Russia, China, and Japan—is studied in depth. The advantage of French geography textbooks is that they are written problematically, and all problems stem from the content of human-nature;

The role of geography in the education system of the Republic of **Korea** is very similar to that of the USA. In this country, geography is taught alongside social sciences and is imbued with the ideas of a "global worldview". The United States has a significant influence on the current level of development of the Republic of Korea and its place in world politics. In organizing the country's education system, this country took the US education system as an example. As in many developed countries, environmental protection problems require in-depth study of natural sciences in the country;

In the education system of **Singapore**, geography is taught in grades 3-6 in addition to social sciences. However, it is a compulsory subject in grades 7-8 (lower secondary). In grades 9-12, students choose subjects based on their interests; geography is also an elective subject in the upper grades (9-12). Since studying the geography of a country with an area of 728 km<sup>2</sup> (equivalent to the area of a smaller district in Uzbekistan) is not difficult, students study it within 2 years (in grades 7–8) as part of World Physical and Economic Geography. Despite the small size of the country's territory, the teaching of geography as a separate subject contributed to the formation of students' knowledge regarding nature management. Singapore today is a developed country with a clean ecological environment;

In the CIS and Eastern European countries, where the study of physical and economic geography is the foundation, the laws of natural and economic development, the relationship between society and nature, and environmental problems form the basis of geography education.

The strengths of UK geography education are as follows:

1) Strengthening the theoretical aspects of education, that is, teaching more modern geographical research methods;

2) Effective use of psychological and pedagogical research methods in the process of geography education, teaching students to formulate hypotheses;

3) Extensive space is allocated to the organisation of experiments of various content in lessons, i.e., methods for forming imagination, concepts, and various views; the testing of a specific method and forms of educational organisation are rather weak;

4) studying the problem under study on the basis of the author's opinion and against it;

5) Two hours per week are allocated for geography in grades 5–8. In these classes, the geography of Europe and the world's leading countries is studied. Knowledge is also provided in the fundamentals of topography and cartography;

6) Several textbooks are recommended for teachers' attention: "Countries and Peoples," "Earth and Human," "New Geography," "Earth Science," etc.;

7) it can be said that geography is not studied as an independent subject in grades 9–10. In some administrative units, the geography of Europe and Germany is studied in depth with curious students. In these courses, knowledge regarding the economy, politics, and state structure of countries occupies a leading position. Recently, there has been an increasing focus on teaching geography, history, sociology, and economics through combined courses [2; 16–17].

In the gymnasiums of these countries (grades 11–13), geography is only partially taught as an independent subject in some places. Some geographical knowledge is also provided in the disciplines of the combined course series. In the upper grades, more attention is paid to the study of embodied problems in geography. For example, "Human Reproduction," "Famine Problems," "Transport Problem," "Human Life in Industrial Centers," "Industrial Economics," etc.

The most commonly used methods in geography education in foreign countries are:

1. The heuristic conversation method is widespread in the USA, Great Britain, New Zealand, and Western European countries. At the same time, the main focus is on teaching students to acquire more independent knowledge and conduct small research. Problems and questions are presented to the students based on drawings, various documents, and tools.

2. Using the handout method, various drawings, tables, and maps are compiled and distributed with varying errors, requiring students to independently find the errors made. Solving various examples and problems is also widely used to increase students' interest in the lesson, and more examples and problems are used to develop entrepreneurial and resourceful qualities in students. Where to sell finished products, determining transportation costs, and the efficient use of labor resources are impossible without solving examples and problems.

3. Mixing texts, i.e., correct and incorrect answers, is one of the most common ways to distinguish the correct ones by marking them with numbers.

4. Working with statistical sources, using cartographic manuals, and mathematical modeling are widely used teaching methods. Discussions and debates are particularly widespread in geography education in developed countries.

In the CIS and Eastern European countries, where the study of physical and economic geography is based, the laws of natural and economic development, the relationship between society and nature, and environmental problems form the basis of geographical education.

The State Standard for General Secondary and Higher Education indicates that it is necessary not only to form students' core competencies but also to ensure

students' ability to apply acquired knowledge, skills, and methods of activity in real life and practice. Therefore, it is advisable to teach geography using modern methods [5; 7-28-b].

**Conclusion.** Geography is among the fastest-growing sciences. Geography is a broad branch of science that studies the surface and subsoil of the entire universe, the distribution of mineral resources, the distribution of flora and fauna, human living conditions, the location of states, the climate of the Earth's surface, and so on, as well as conducting scientific research. The content of teaching geography in general education schools must correspond to the historical development of modern science and technology.

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## **KARTOGRAFIK TEXNOLOGIYALARNING GEOGRAFIYA TA'LIMIDAGI DIDAKTIK IMKONIYATLARI**

**Annotatsiya.** Ushbu maqolada geografiya ta'limida kartografik texnologiyalardan foydalanishning didaktik imkoniyatlari yoritilgan. Xarita va atlaslarning ta'lim jarayonidagi o'rni, ularning ko'rgazmalilik, tizimlilik hamda ilmiylik tamoyillarini ta'minlashdagi ahamiyati ochib berilgan. Shuningdek, geografik axborot tizimlari, elektron xaritalar va globuslardan foydalanish orqali o'quvchilarning fazoviy tafakkuri, tahliliy fikrlashi va amaliy ko'nikmalarini rivojlantirish masalalari tahlil qilingan. Maqolada kartografik materiallarning geografiya darslaridagi metodik vazifalari ham yoritib berilgan.

**Kalit so'zlar:** kartografiya, geografik xarita, atlas, globus, geografik axborot tizimi, fazoviy tafakkur, ko'rgazmalilik, didaktika, interaktiv xarita.

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## **DIDACTIC POTENTIAL OF CARTOGRAPHIC TECHNOLOGIES IN GEOGRAPHY EDUCATION**

**Abstract.** This article examines the didactic possibilities of cartographic technologies in geography education. The role of maps, atlases, globes and modern geographic information systems in the educational process is analyzed. The issues of developing students' spatial thinking, analytical skills and practical competencies through cartographic tools are highlighted.

**Keywords:** cartography, geographic map, atlas, globe, geographic information systems, didactics, spatial thinking, interactive map. интерактивная карта.



**Kirish.** Geografiya fani tabiat va jamiyat hodisalarining hududiy xususiyatlarini o'rganadi. Mazkur fan mazmunini o'zlashtirishda xaritalar asosiy bilim manbai hisoblanadi. Kartografik materiallar o'quvchilarga geografik obyekt va hodisalarning joylashuvi, o'zaro bog'liqligi hamda rivojlanish qonuniyatlarini anglashga yordam beradi. Shu sababli geografiya ta'limida kartografik vositalar muhim didaktik ahamiyat kasb etadi.

**Asosiy qism.** Kartografik texnologiyalar deganda geografik ma'lumotlarni yig'ish, qayta ishlash, saqlash, tahlil qilish va vizual ko'rinishda tasvirlashga xizmat qiladigan texnik va dasturiy vositalar majmui tushuniladi. Ularga an'anaviy xaritalar bilan bir qatorda elektron xaritalar, raqamli atlaslar, geografik axborot tizimlari (GIS), masofadan zondlash ma'lumotlari ham kiradi.

Kartografik texnologiyalar asosiy turlariga quyidagilar kiradi: an'anaviy kartografik vositalar (xaritalar, atlaslar, globuslar); elektron xaritalar; geografik axborot tizimlari (GIS); masofadan zondlash texnologiyalari; interaktiv kartografik platformalar; sun'iy yo'ldosh tasvirlari.

Geografiya ta'limida kartografik texnologiyalar quyidagi vazifalarni bajaradi: Geografik obyekt va jarayonlarni vizual tarzda ko'rsatish; hududiy qonuniyatlarni tushuntirish; o'quvchilarning makoniy fikrlash qobiliyatini rivojlantirish; nazariy bilimlarni amaliy faoliyat bilan bog'lash; mustaqil tadqiqot faoliyatini tashkil etish.

Ushbu texnologiyalar geografik jarayonlarni yanada aniqroq ko'rsatish, ularni tahlil qilish va prognoz qilish imkonini beradi. Ta'lim jarayonida esa ular o'quvchilarga murakkab geografik hodisalarni vizual tarzda tushuntirishda yordam beradi.

Geografiya ta'limida kartografik vositalarning o'rni. Geografiya fanining asosiy o'quv vositalaridan biri bu xarita hisoblanadi. Xarita yordamida o'quvchilar yer yuzasining tuzilishi, iqlim zonalari, tabiiy resurslar, aholi joylashuvi, iqtisodiy faoliyat turlari haqida aniq tasavvurga ega bo'ladilar. Kartografik vositalar geografiya ta'limida quyidagi vazifalarni bajaradi: *1.Ko'rgazmalilikni ta'minlash.* Xaritalar murakkab geografik jarayonlarni vizual ko'rinishda ifodalash imkonini beradi. *2.Fazoviy tafakkurni rivojlantirish.* O'quvchilar hududiy joylashuv, masofa, yo'nalish va hududiy bog'liqliklarni tushunishni o'rganadilar. *3.Tahlil qilish ko'nikmalarini shakllantirish.* Xaritalar yordamida o'quvchilar geografik hodisalar o'rtasidagi bog'liqlikni aniqlashni o'rganadilar. *4.Mustaqil o'rganish imkoniyatini yaratish.* Interaktiv xaritalar va elektron atlaslar o'quvchilarning mustaqil bilim olishiga yordam beradi.

Kartografik texnologiyalarning didaktik imkoniyatlari. Kartografik texnologiyalar geografiya ta'limida ko'plab didaktik imkoniyatlarga ega. Ularning asosiylari quyidagilardan iborat. *1. Ta'lim jarayonining vizualligini oshirish.* Zamonaviy elektron xaritalar va sun'iy yo'ldosh tasvirlari o'quv materiallarini yanada tushunarli va qiziqarli qiladi. Masalan, iqlim zonalari yoki tog' tizimlari xaritada ranglar orqali ifodalansa, o'quvchilar ularni tezroq eslab qoladi. *2. Interaktiv o'qitish imkoniyati.* Interaktiv xaritalar yordamida o'quvchilar turli hududlar haqida mustaqil ravishda ma'lumotlarni ko'rib chiqishlari mumkin. Bu esa



ularning o'rganish jarayonidagi faolligini oshiradi. 3. *Analitik fikrlashni rivojlantirish*. Geografik axborot tizimlari orqali turli ma'lumot qatlamlarini taqqoslash mumkin. Masalan: iqlim xaritasi, tuproq xaritasi aholi zichligi xaritasi.

Bu ma'lumotlarni solishtirish orqali o'quvchilar sabab-oqibat munosabatlarini tahlil qilishni o'rganadilar. 4. *Amaliy ko'nikmalarni shakllantirish*. Kartografik texnologiyalar yordamida o'quvchilar quyidagi amaliy ko'nikmalarni egallaydilar: xarita bilan ishlash; koordinatalarni aniqlash; masofani hisoblash; hududiy tahlil qilish. Bu ko'nikmalar geografiya fanini chuqur o'zlashtirish uchun juda muhim hisoblanadi. 5. *Mustaqil ta'limni rivojlantirish*. Internet va elektron platformalar orqali mavjud bo'lgan interaktiv xaritalar o'quvchilarning mustaqil o'rganish faoliyatini rivojlantiradi. O'quvchilar darsdan tashqari paytda ham turli hududlarni o'rganishlari mumkin.

Zamonaviy kartografik texnologiyalarni qo'llash usullari. Geografiya darslarida kartografik texnologiyalarni qo'llashning bir necha samarali usullari mavjud: multimedia prezentatsiyalaridan foydalanish, interaktiv xaritalar bilan ishlash, GIS dasturlari orqali tahlil qilish, sun'iy yo'ldosh tasvirlarini o'rganish, onlayn geografik platformalar bilan ishlash. Masalan, o'qituvchi iqlim o'zgarishini tushuntirishda turli yillarga tegishli sun'iy yo'ldosh tasvirlarini taqqoslab ko'rsatishi mumkin. Bu o'quvchilarga jarayonni yanada aniqroq tushunishga yordam beradi.

Kartografik texnologiyalarni qo'llash va geografiya ta'limida texnologiyalardan foydalanish bir qator afzalliklarga ega: darsning qiziqarli va samarali o'tishini ta'minlaydi; o'quvchilarning bilim darajasini oshiradi; murakkab geografik jarayonlarni oson tushuntirish imkonini beradi; o'quvchilarda mustaqil fikrlash va tahlil qilish ko'nikmalarini rivojlantiradi; zamonaviy kasbiy kompetensiyalarni shakllantiradi. Shuningdek, ushbu texnologiyalar ta'lim jarayonini innovatsion va zamonaviy usullar bilan boyitadi.

#### *Kartografik texnologiyalarni dars jarayonida qo'llash usullari*

Geografiya darslarida kartografik texnologiyalardan foydalanish quyidagi usullar orqali amalga oshirilishi mumkin: 1. Xaritalar asosida muammoli savollar berish. 2. Tematik xaritalarni tahlil qilish. 3. Elektron atlaslar yordamida mustaqil topshiriqlar bajarish. 4. GIS dasturlarida oddiy loyihalar yaratish. 5. Sun'iy yo'ldosh tasvirlari asosida hududiy tahlil qilish. Bu usullar o'quvchilarning dars jarayonidagi faolligini oshiradi va bilimlarni chuqurroq o'zlashtirishga yordam beradi.

Hozirgi globallashuv davrida ta'lim tizimida innovatsion texnologiyalarni qo'llash muhim ahamiyat kasb etmoqda. Ayniqsa, geografiya fanini o'qitishda kartografik texnologiyalardan foydalanish o'quvchilarning bilim, ko'nikma va kompetensiyalarini rivojlantirishda samarali vosita hisoblanadi. Kartografiya – bu Yer yuzasining tasvirini xaritalar, globuslar va boshqa grafik vositalar orqali ifodalovchi fan bo'lib, u geografiya ta'limining ajralmas qismidir. Bugungi kunda an'anaviy xaritalar o'rnini zamonaviy raqamli kartografik texnologiyalar egallamoqda. Bu esa ta'lim jarayonida interaktivlik, vizuallik va tahliliy yondashuvni kuchaytiradi.

Hozirgi kunda ta'lim tizimida zamonaviy pedagogik va axborot texnologiyalarini joriy etish muhim ahamiyat kasb etmoqda. Ayniqsa, geografiya fanini o'qitishda kartografik texnologiyalardan foydalanish o'quvchilarning bilimini oshirish, ularning fazoviy tafakkurini rivojlantirish va mustaqil fikrlash ko'nikmalarini shakllantirishda muhim vosita hisoblanadi. Kartografiya geografiya fanining asosiy tarkibiy qismi bo'lib, u Yer yuzasidagi obyektlar va hodisalarni xaritalar orqali tasvirlaydi.

**Xulosa.** Kartografik texnologiyalar geografiya ta'limining ajralmas va muhim tarkibiy qismi hisoblanadi. Xarita, atlas, globus hamda zamonaviy elektron kartografik vositalar geografik bilimlarni chuqur va tizimli o'zlashtirishda asosiy didaktik manba vazifasini bajaradi. Ular orqali o'quvchilar nafaqat nazariy ma'lumotlarni egallaydilar, balki geografik obyekt va hodisalarni hududiy jihatdan tahlil qilish, taqqoslash va umumlashtirish ko'nikmalarini ham shakllantiradilar.

Kartografik vositalar dars jarayonida ko'rgazmalilik tamoyilini to'liq ta'minlab, murakkab tabiiy va ijtimoiy-iqtisodiy jarayonlarni vizual tarzda tushuntirish imkonini beradi. Natijada o'quvchilarda fazoviy tafakkur, mantiqiy fikrlash va mustaqil xulosa chiqarish qobiliyati rivojlanadi. Ayniqsa, geografik axborot tizimlari va interaktiv xaritalardan foydalanish o'quvchilarning amaliy ko'nikmalarini mustahkamlab, ularni zamonaviy axborot muhitida ishlashga tayyorlaydi.

Shuningdek, kartografik texnologiyalar ta'lim jarayonining samaradorligini oshiradi, o'quvchilarning fanga bo'lgan qiziqishini kuchaytiradi va ularni mustaqil izlanishga undaydi. Xarita bilan ishlash jarayonida o'quvchilar masshtab, koordinata, geografik joylashuv kabi muhim tushunchalarni amalda qo'llashni o'rganadilar, bu esa ularning bilimini mustahkamlaydi.

Umuman olganda, kartografik texnologiyalardan oqilona va tizimli foydalanish geografiya ta'limining sifatini oshirishga, nazariy bilimlarni amaliy faoliyat bilan uyg'unlashtirishga hamda raqobatbardosh, zamonaviy fikrlaydigan mutaxassislarni tayyorlashga xizmat qiladi. Shu bois geografiya fanini o'qitishda kartografik vositalarni keng joriy etish va ularni metodik jihatdan to'g'ri qo'llash dolzarb vazifalardan biri hisoblanadi.

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## **FARG‘ONA VODIYSIDA TUPROQLAR TARQALISHI VA ULARNING MELIORATIV HOLATINI YAXSHILASH ISTIQBOLLARI**

**Annotatsiya:** *Ushbu ilmiy maqolada Farg‘ona vodiysining murakkab geomorfologik sharoitida tuproq qatlaminin shakllanishi, turlarining hududiy tarqalishi va ularning hozirgi ekologik-meliorativ holati tahlil qilingan. Tadqiqot davomida vodiynin markaziy va chekka qismlaridagi tuproq unumdorligini pasaytiruvchi omillar (sho‘rlanish, eroziya) o‘rganilib, ularni bartaraf etish bo‘yicha ilmiy takliflar bayon etilgan.*

**Kalit so‘zlar:** *Farg‘ona vodiysi, bo‘z tuproqlar, geomorfologik, o‘tloqibotqoq, sho‘rlanish, melioratsiya, unumdorlik, agroekologiya.*

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## **SOIL DISTRIBUTION IN THE FERGANA VALLEY AND PROSPECTS FOR IMPROVING THEIR MELIORATIVE CONDITION**

**Annotation:** *This scientific article analyzes the formation of soil layers in the complex geomorphological conditions of the Fergana Valley, the territorial distribution of soil types, and their current ecological and meliorative status. The study examines factors reducing soil fertility in the central and peripheral parts of the valley (salinization, erosion) and presents scientifically based recommendations for their mitigation.*

**Keywords:** *Fergana Valley, gray soils, meadow-swamp, salinization, melioration, fertility, agroecology.*

Farg‘ona vodiysi O‘zbekistonning eng muhim va qadimiy agrar o‘choqlaridan biri bo‘lib, uning tuproq resurslari biosferaning ajralmas qismi hisoblanadi. Hudud o‘zining murakkab geologik tuzilishi, gidrologik tarmoqlari va kontinental iqlimi bilan boshqa mintaqalardan ajralib turadi. Hozirgi kunda aholi

sonining o'sishi va oziq-ovqat xavfsizligini ta'minlash vazifasi mavjud yer resurslaridan samarali foydalanishni taqozo etmoqda. Biroq, iqlim o'zgarishi va intensiv dehqonchilik natijasida tuproq sifatining yomonlashuvi kuzatilayotgani ushbu mavzuning dolzarbligini oshiradi.

Farg'ona vodiysi o'zining murakkab geologik tuzilishi va o'ziga xos iqlimiy sharoitlari bilan O'zbekistonning muhim agrar hududi hisoblanadi. Hududda tuproq qatlamining shakllanishi bevosita o'rab turgan tog' tizmalari, yillik yog'ingarchilik miqdori va gidrologik tarmoqlar bilan bog'liq(4). Tadqiqotlar shuni ko'rsatadiki, vodiya asosan turli darajadagi bo'z tuproqlar, o'tloqi-botqoq va sho'rxok tuproqlar tarqalgan bo'lib, ularning tarkibi minerallar va organik moddalarga boyligi bilan ajralib turadi. Biroq, so'nggi yillarda global iqlim o'zgarishi va inson faoliyatining kuchayishi natijasida tuproqlarning meliorativ holati yomonlashuvi kuzatilmoqda. Xususan, yerlarning sho'rlanishi, eroziya jarayonlari va namlik darajasining pasayishi tuproq unumdorligiga salbiy ta'sir ko'rsatmoqda. Tuproqning pH darajasi va uning fizik-kimyoviy xususiyatlarini saqlab qolish agrar iqtisodiyot barqarorligi uchun strategik ahamiyatga ega.



**1-rasm.** Tuproq unumdorligi va unga ta'sir etuvchi omillar. (rasm mualliflar tomonidan SI yordamida tayyorlandi).

Vodiya tuproqlari asosan vertikal mintaqalanish qonuniyatiga bo'ysunadi(5). Bu yerda tuproq hosil qiluvchi ona jinslar asosan prolyuvial, allyuvial va delyuvial yotqiziqlardan iborat(4).

- Markaziy qismda sizot suvlarining yuza joylashishi (1-3 m) tuproqlarning gidromorf (botqoq-o'tloqi) rivojlanishiga sabab bo'lgan.

- Vodiy tuproqlari ming yillar davomida sug'orib kelingani bois, bu yerda qalinligi 1-2 metrgacha yetadigan madaniy-sug'orma qatlam shakllangan(1).

Farg'ona vodiysi tuproqlari fizik va kimyoviy ko'rsatkichlari

- Sug'oriladigan bo'z tuproqlarda haydalma qatlamda gumus miqdori odatda 1.0-1.5% atrofida bo'ladi. Qo'riq tuproqlarda bu ko'rsatkich biroz yuqori.

- Vodiy tuproqlari asosan o'rta va og'ir qumoq tuproqlardan tashkil topgan. Bu esa suv tutish qobiliyatining yuqoriligini ta'minlaydi.



Farg‘ona vodiysidagi Bo‘z tuproqlar mintaqasi va ularning xususiyatlari. Vodiya atrofidagi adirlar va tog‘ etaklarida asosiy o‘rinni bo‘z tuproqlar egallaydi. Ushbu tuproqlar o‘zining karbonatliligi va mikrobiologik faolligi bilan ajralib turadi.

Och tusli bo‘z tuproqlar - Dengiz sathidan 300–600 m balandlikda tarqalgan. Gumus miqdori haydalma qatlamda 1.0-1.2% atrofida bo‘lib, pastki qatlamlarga qarab keskin kamayib boradi [1].

Tipik va to‘q tusli bo‘z tuproqlar - Bu tuproqlarda gumus miqdori 1.5-2.5% ni tashkil etadi. Karbonatlar miqdori profilning o‘rta qismida maksimal darajaga yetib, “karbonatli-illyuvial” qatlamni hosil qiladi (2).

Markaziy Farg‘ona gidromorf tuproqlari - vodiylar botiqlikligining markaziy qismida sizot suvlarining yuza joylashishi (1.5–3.0 m) natijasida o‘tloqi-saz tuproqlar shakllangan. Bu tuproqlarda oksidlanish-qaytarilish jarayonlari natijasida profilning pastki qismida zangsimon va ko‘kimtir dog‘lar (gleylanish) kuzatiladi (3). Markaziy Farg‘ona tuproqlari geokimyoviy nuqtayi nazardan “tuz to‘plovchi” hisoblanib, bu yerda sulfatli va xlorid-sulfatli sho‘rlanish ustunlik qiladi. Sho‘r miqdori ba’zi joylarda 1.5-2.0% dan yuqori bo‘lishi mumkin (1).

Farg‘ona vodiysi sug‘orma tuproqlarning agrokimyoviy holati. Ming yillik dehqonchilik madaniyati natijasida "agro-irrigatsion" yotqiziqlar hosil bo‘lgan. Vodiya tuproqlari asosan o‘rta va og‘ir qumoqli bo‘lib, ularning fizikaviy xususiyatlari (g‘ovakliligi 50-55%) o‘simliklar ildiz tizimi uchun juda qulay (2). Harakatchan fosfor (P) miqdori 20–40 kg, almashinuvchi kaliy (K) esa 200–300 kg oralig‘ida o‘zgarib turadi (3).

Farg‘ona vodiysida tuproqlarning tarqalishi bevosita balandlik mintaqalari va litologik asosga bog‘liq. Vodiyning tog‘ oldi tekisliklarida asosan to‘q va oddiy bo‘z tuproqlar tarqalgan bo‘lsa, markaziy qismidagi pasttekisliklarda o‘tloqi, o‘tloqi-botqoq va turli darajadagi sho‘rxoklar ustunlik qiladi.

Geologik jihatdan vodiylar ko‘plab minerallar va organik moddalarga boy bo‘lib, bu o‘simliklar dunyosi uchun qulay muhit yaratadi. Ammo, tuproqning (pH 7.5-8.5) darajasi va uning mineral tarkibi iqlimiy omillar, xususan, yillik yog‘ingarchilik miqdori va bug‘lanishning yuqoriligi ta’sirida o‘zgarib turadi. Tadqiqotlar shuni ko‘rsatadiki, hozirgi kunda vodiylar tuproqlarining meliorativ holati bir qator muammolarga duch kelmoqda:

1. Sug‘orish tizimlaridagi nosozliklar va sizot suvlarining ko‘tarilishi natijasida Markaziy Farg‘onaning katta qismida ikkilamchi sho‘rlangan yerlarga aylangan.

2. Noto‘g‘ri agrotexnik tadbirlar natijasida tuproqning ustki unumdor qatlami (gumus) yuvilib ketmoqda.

3. Global isish natijasida tuproqning namlik rejimi buzilmoqda.

Ushbu muammolarni bartaraf etish uchun quyidagi innovatsion chora-tadbirlarni amalga oshirish zarur:

1. Tuproqning organik tarkibini boyitish maqsadida siderat ekinlar va mahalliy o‘g‘itlardan kompleks foydalanish;



2. Sho‘r yuvish jarayonlarida suvni tejovchi tomchilatib va yomg‘irlatib sug‘orish texnologiyalarini kengaytirish;

3. Kollektor-drenaj tarmoqlarini modernizatsiya qilish orqali sizot suvlar sathini me‘yorda saqlash.



a)



b)



c)

**2-rasm.** *Farg‘ona vodiysida qo‘llaniladigan sug‘orish va melioratsiya texnologiyalari: a) keng qamrovli yomg‘irlatib sug‘orish tizimi; b) egatlarda sug‘orish; c) tomchilatib sug‘orish; (rasmlar mualliflar tomonidan ishtimoiy tarmoqlardan olindi).*

Tuproq unumdorligini oshirish va yerlarni qayta tiklash uchun zamonaviy agrotexnik tadbirlarni keng joriy etish lozim. Tadqiqot natijasida quyidagi chora-tadbirlar taklif etiladi:

1. Suvni tejovchi texnologiyalardan foydalangan holda ikkinchi darajali sho‘rlanishning oldini olish;

2. Tuproqning organik tarkibini boyitish uchun mahalliy va siderat o‘g‘itlarni qo‘llash;

3. Melioratsiya tizimlarini modernizatsiya qilish orqali sizot suvlar sathini nazorat qilish.

Farg‘ona vodiysi tuproq resurslarini muhofaza qilish nafaqat qishloq xo‘jaligi mahsuldorligini, balki mintaqaning ekologik barqarorligini ham ta‘minlaydi. Taklif etilayotgan meliorativ tadbirlar va ilmiy yondashuvlar tuproq unumdorligini saqlashda muhim ahamiyat kasb etadi.

**Hududiy tafovutlar.** Andijon va Namangan viloyatlari: Bu hududlarning relyefi asosan adir va adirol di tekisliklaridan iborat bo‘lib, bu yerda avtomorf rejimdagi tipik bo‘z tuproqlar ustunlik qiladi. Bu tuproqlar mikrobiologik jihatdan faol, ammo sug‘orish natijasida irrigatsiya eroziyasiga moyil hisoblanadi.

Farg‘ona viloyati (Markaziy Farg‘ona): Vodiy botiqqligining markaziy qismida sizot suvlarining yuza joylashishi (1.5–3.0 m) gidromorf rejimdagi o‘tloq-saz tuproqlarning shakllanishiga sabab bo‘lgan. Ushbu hududlar geokimyoviy nuqtayi nazardan “tuz to‘plovchi” zonalar bo‘lib, ularda sulfatli va xlorid-sulfatli sho‘rlanish barqaror davom etmoqda.

### ***Tuproqning fizik-kimyoviy xususiyatlari va zichlashish muammosi.***

Fargʻona vodiysi tuproqlari oʻzining yuqori karbonatlilik bilan ajralib turadi. Bu esa tuproq eritmasining pH koʻrsatkichiga bevosita taʼsir koʻrsatadi. Intensiv dehqonchilik va notoʻgʻri agrotexnik tadbirlar natijasida tuproqning fizikaviy xususiyatlari yomonlashib, haydov qatlami ostida zich qatlam (plug pan) hosil boʻlmoqda. Bu esa suv oʻtkazuvchanlikni pasaytirib, ildiz tizimining rivojlanishiga toʻsqinlik qiladi. Hozirgi kunda tuproq unumdorligini saqlashda zamonaviy monitoring va innovatsion texnologiyalardan foydalanish dolzarb vazifadir. Xususan, yerlarning shoʻrlanish darajasi va namlik rejimini masofadan zondlash (GIS) orqali nazorat qilish meliorativ tadbirlar samaradorligini oshiradi. Tuproq unumdorligini oshirishda nafaqat mineral, balki siderat ekinlar (dukkakli ekinlar) va mahalliy oʻgʻitlardan kompleks foydalanish gumus balansini barqarorlashtirishning asosiy yoʻlidir.

#### **1-jadval.**

*Hududiy tuproq qoplamining gumus miqdori va asosiy degradatsiya omillari.*

| <b>Tuproq zonasi</b> | <b>Asosiy tuproq turi</b> | <b>Gumus miqdori (%)</b> | <b>Asosiy meliorativ muammo</b>    |
|----------------------|---------------------------|--------------------------|------------------------------------|
| Adir va adir oldi    | Tipik va toʻq tusli boʻz  | 1.5-2.5%                 | Irrigatsiya eroziyasi              |
| Tekislik (Voha)      | Sugʻoriladigan boʻz       | 1.0-1.5%                 | Tuproq zichlanishi va degradatsiya |
| Markaziy botiqlik    | Oʻtloq-saz va shoʻrxok    | 0.8-1.2%                 | Ikkilamchi shoʻrlash               |

Fargʻona vodiysi tuproq qoplamining genetik va agrokimyoviy xususiyatlarini tadqiq etish natijasida quyidagi xulosalarga kelindi:

- Vodiy tuproqlari murakkab geomorfologik tuzilishga ega boʻlib, ularning shakllanishida vertikal mintaqalanish va gidrologik rejim asosiy omil boʻlib xizmat qiladi. Adir va adirol di hududlarida avtomorf rejimdagi boʻz tuproqlar ustunlik qilsa, markaziy botiqlikda gidromorf rejimdagi oʻtloqi-saz tuproqlar shakllangan (2). Bu esa qishloq xoʻjaligi ekinlarini joylashtirishda tabaqalashgan yondashuvni talab etadi.

- Koʻp asrlik sugʻorma dehqonchilik natijasida vodiydagi tuproqlar profilida qalinligi 1,2–2,0 metrgacha yetadigan agro-irrigatsion qatlam shakllangan. Ushbu qatlam oʻzining boy mineral tarkibi va mikrobiologik faolligi bilan ajralib tursa-da, intensiv dehqonchilik va monokultura (paxtachilik va gʻallachilik) taʼsirida gumus miqdorining 0,8–1,2% gacha kamayishi (degradatsiyasi) kuzatilmoqda (3).

- Markaziy Fargʻona hududlarida sizot suvlarining sathi yer yuzasiga yaqinligi (1,5–2,5 m) va bugʻlanishning yuqoriligi tufayli ikkilamchi shoʻrlanish jarayonlari barqaror davom etmoqda. Ayniqsa, sulfatli va xlorid-sulfatli shoʻrlanish turlari tuproq unumdorligini 20–30% gacha pasaytirishi aniqlangan (1). Bu esa

mintaqada kollektor-drenaj tarmoqlarini modernizatsiya qilishni dolzarb vazifa qilib qo'yadi.

- Adir mintaqalaridagi bo'z tuproqlarda irrigatsiya eroziyasi va shamol eroziyasi natijasida unumdor qatlamning yuvilishi va deflyatsiyasi kuzatilmoqda. Bu jarayonlar tuproq tarkibidagi harakatchan fosfor va almashinuvchi kaliy miqdorining keskin kamayishiga olib kelmoqda (2).

Tuproq unumdorligini saqlash va oshirish uchun quyidagi chora-tadbirlar ilmiy asoslangan deb hisoblanadi:

- Almashlab ekish tizimini (ayniqsa, dukkakli ekinlar bilan) qayta tiklash;
- Siderat ekinlardan foydalanish orqali gumus balansini barqarorlashtirish;
- Sho'r yuvish ishlarida innovatsion, suv tejamkor texnologiyalarni qo'llash;
- Tuproqning bonitet ballini muntazam monitoring qilib borish.

Farg'ona vodiysi tuproqlari juda yuqori tabiiy salohiyatga ega bo'lib, ulardan oqilona foydalanish mintaqaning oziq-ovqat xavfsizligini ta'minlashning bosh omilidir.

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## **RANGLARNING TABIATDA HOSIL BO‘LISHIDA MANZARA KURINISHLARINI AKVAREL MATERYALINI QULLASH YULLARI**

**Annotatsiya:** *Ushbu maqolada: Tasaviriy san’at rangtasvir manzarasini tarixi, akvarel metodikasi, pedagogik tajribalarni muammosi va echimi kelib chiqqan holda ilmiy, uslubiy tavsiyalar xaqida yoritildi.*

**Kalit so‘zlar.** *akvarel, manzara, tush, qog‘oz, qalamlar, qog‘oz, tarshon, goznak*

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## **WAYS OF USING WATERCOLOR MATERIAL IN LANDSCAPE VIEWS IN THE PRODUCTION OF COLORS IN NATURE**

**Abstract:** *This article: The history of the visual arts landscape painting, watercolor methodology, pedagogical experiments, problems and solutions, scientific and methodological recommendations were covered.*

**Key words:** *watercolor, landscape, dream, paper, pencils, paper, tarshon, goznak*

Manzara janri tog‘, dengizlar tasvirlanadi manzara, tasviriy san’at tabiat ko‘rinishini aks ettiradigan janr manzarada shahar ko‘rinishi yoki me‘moriy majmualar (me‘moriy Manzara), dengiz ko‘rinishlari (marina) va hokazo ham tasvirlanadi. Atrof muhitni tasvirlayotgan rassom unda o‘zi va zamondoshlarining tabiatga munosabatlarini ifoda etadi, shu jihatdan yaratilayotgan asar his tuyg‘u va g‘oyaviy mazmunga ega bo‘lib, muhim ahamiyat kasb etadi.

Inson tomonidan atrof dunyoni ma‘naviy (qisman amaliy) o‘zlashtirishning turli tomon va darajalarini aks ettirgan Manzara o‘zida katta ma‘no tashiydi. Tabiat tasvirlari tabiat, uning qonuniyatlari haqidagi tasavvurlar (olam gumbazi, oy, quyosh, yulduzlar, dunyo mamlakatlarining shartli belgilari) yuzaga kelgan payt (neolit)dan o‘z ifodasini topgan. Qad. Sharq madaniyatida tabi-atni yaxlit holda ko‘proq aniq xususi-yatlarga ega bo‘la boshlagan hodisalar muhiti degan tasavvur shakllangan. Miloddan avvalgi 16-15-asrlar Qadimgi Sharq (Bobil, Ossuriya, Misr) devoriy rasmlari va bo‘rtma tasvirlaridagi jang, ov va boshqa lavhalarda manzara



ning ayrim bo'laklari mavjud. Misr devoriy rasmlari va bo'rtma tasvir (relyef)larida ilk bor bezaklar ritmi orqali hayvonot, o'simlik va tabiiy hodisalarning ishonarli ta'sirchan birligiga erishilgan. Yunon san'atida, odatda, manzara tarkibiy qismlarini inson tasviridan ajratib bo'lmaydi. Yevropa o'rta asrlar san'atida manzara (ayniqsa, shahar va alohida bino ko'rinishlarida), odatda, voqea sodir bo'layotgan joyning fazoviy qurilishini anikdash vositasi sifatida xizmat qilgan. Musulmon Sharqi mamlakatlarida 13-14-asrlardan kitob Manzarga ko'proq o'rin berilgan: yashnab turuvchi sof bo'yog'i va gilamday tekis sathli kom-pozitsiyasi, sehrli bog' tasavvurini yaratuvchi tabiati, har bir bo'lak jo'shqin ko'tarinkiligi bilan diqqatga sazovor. Hindiston (ayniqsa, Boburiylar davri miniatyura maktabi asarlarida), Hindixitoy, Indoneziya (afsonaviy va epik mavzudagi relyeflaridagi tropik o'rmonlar obrazi) o'rta asrlar san'atida landshaft detallari, ayniqsa, jo'shqin qudratga ega. Manzara mustaqil janr sifatida Xitoyning o'rta asrlar tasviriy san'atida o'ta muhim o'rin tutadi. Manzaraga tabiatnint doimo yangilanib turuvchi olam qonunining ko'rgazmali umumlashmasi sifatida qaralgan (bu "tog'lar- suvlar" manzara turida o'z ifodasini topgan). Yaponiya san'ati (12-13- asrlar) da manzara bezak san'atida bezakdagi eng muhim ohanglarni alohida ajratib olishga moyilligi bilan diqqatga sazovor. G'arbiy Yevropa san'atida Manzaraga asar ruhiy olamining muhim qismi sifatida qaralgan. Shartli zamin (tilla yoki naqshli ) manzara bilan almasha borgan (italyan Jotto, A. Lorensetti, 13-14-asrlar; niderland aka-ukalar X. va Ya. Van Eyk, 15-asr 1-yarmi va boshqalar). Uyg'onish davri rassomlari chizgi va etyudlarida olam haqidagi ratsional qonunlarga amal qilib, Manzaraga real voqealar muhiti sifatida qaraganlar (italyan Leonardo da Vinchi, J. Bellini, Titsian; nemis A. Dyurer, manzara Nithardt va boshqalar), ayni shu davrda manzaraning alohida janr sifatida shakllanishiga (avvalo grafikada) zamin yaratildi.

19-asr rus Manzara janrida romantik an'analar yetakchi rol o'ynagan bo'lsa (F.Matveyev, M. Vorobyev, I.Ayvazovskiy), 19-asr 2-yarmida peredviyniklar harakati bilan bog'liq realistik manzara janri gurkirab o'sdi (I.Shishkin, A. Savrasov, I. Levitan va boshqalar).

20-asrda Yevropa va Amerikada texnika olamini tabiatga qarshi qo'yuvchi industrial Manzara keng tarqaldi. Realistik Manzara ham jadal rivojlandi, unda go'zal tabiat o'ziday tabiiyligicha tasvirlanadi.

O'rta Osiyo, jumladan, O'zbekiston xududida o'rta asrlar san'atida musulmon Sharqi mamlakatlarida bo'lgani kabi naqsh - bezak asosiy o'rinni egallagan. Girih, islmiy naqshlarda uslublashtirilgan o'simlik bo'laklari ko'p ishlatilgan. O'rta Osiyoda shakllangan miniatyura maktablari vakillari qo'lyozma kitoblarga ishlagan rayem va bezaklar bo'yoqlarining uyg'unligi, zamin sifatida Manzara va me'morlikka e'ti-borning kuchliligi bilan diqqatga sazovor. O'rta Sharq san'ati, jumladan, Hirot, O'rta Osiyo miniatyura san'atida manzara yuksak darajada namoyon bo'lgan. Ayniqsa, Kamoliddin Behzodning mo'jaz asarlarida manzara, tabiat ko'rinishi mahorat bilan ishlangan. Uning davomchilari Mahmud Muzahhib, Abdulla Musavvir, Muhammad Murod Samarqandiy, Muhammad Nodir Samarqandiy va boshqa ijodida ham Manzara o'rinishlari muhim o'rin egallaydi.



O'zbek Manzara janrining haqiqiy rivojlanishi 20-asrga to'g'ri keladi. Shu davrda dastgoh san'atida Manzaraning nodir namunalari yaratildi. P. Benkov, O'. Tansiqboyev, N. Karaxan, R. Temurov, R. Ahmedov, N. Qo'ziboyev, A. Mirsoatov va boshqa bu sohada samarali ijod qildilar va o'zbek tasviriy san'atida manzara janri rivojiga katta hissa qo'shdilar<sup>9101112</sup>.

Akvarelning tarkibiy qismlari mo'yqalamda oson olinishi, suvda yaxshi eriydigan bo'lishi kerak. Akvarel boshqa bo'yoqlardan qog'ozga yupqa qatlam tarzida yotishi, tekis silliq surkalishi, quyilib va bir joyga qatlam tarzida yig'ilib qolmasligi bilan ajralib turadi. Akvarelga ko'p vaqt suv tegmasa, haddan tashqari quruqlashib ketib, uni ishlatish qiyin bo'lib qoladi. Shuning uchun chinni idishlar va tyubiklardagi akvarelni qorong'i va salqin joylarda saqlash lozim. Agar tyubikdagi shpris bilan suv yuborish yoki uni suvli idishga biror soat solib qo'yish tavsiya etiladi.

**Tush** asosan yozish-chizish, bezash va boshqa ishlarda keng qo'llaniladi. Ularning xillari juda ko'p. tushlar suyuq holda shishi idishlarda va txtacha hamda qalamcha shaklida qattiq holatda ishlab chiqariladi. Kerakli tushlar maxsus idishlarda suyultiriladi. Ularning axromatik ranglarning har xil tuslari hosil qilinadi. Tushni juda qattiq ishlatmaslik lozim.

**Qog'oz** akvarel bilan bajariladiga ishlarning yaxshi chiqishida muhim rol o'ynaydigan materiallardan biridir. Bundan tashqari qog'ozdan fon sifatida hamda bo'yoq o'rnida foydalaniladi. Qog'ozning turlari juda ko'p. ko'pincha oq vatman yoki chizmachilik uchun ishlatiladigan turli oq qog'ozlardan juda unumli foydalaniladi. Qog'oz sirtlarining biroz g'adir-budur bo'lishi, akvarelda bajariladigan ishlarning sifatli chiqishiga olib keladi.

**"Stirator"** bittasi kattaroq, ikkinchisi kichikroq o'lchamga ega bo'lgan va bir-birining ichiga kirib turadigan ikkita ramkadan iborat. Ishlatishda ho'llangan qog'oz ikkala ramka orasiga qo'yilib, siqib jipslashtiriladi. Stirator bundan tashqari ramka va planshetdan iborat bo'lishi ham mumkin. Bunday stirator ikki oyoqli qilib yasaladi. Qog'oz stiratorga tortilgandan keyin uni tizza ustiga qo'ygan holda ishlatish mumkin. Shuningdek, stirator oyoqsiz holda ishlatilganda esa maxsus tutqichga o'rnatiladi.

**Planshet** tasviriy san'at darslarida keng qo'llaniladi. Planshetga qog'oz tortishda uning to'rtala tomoni 1,5-2 sm buklanadi. Qog'ozning teskari tomoniga jiqqa ho'l latta suvni o'ziga shimib olguncha surtiladi. Chetki qayrilgan burchaklari esa quruqligicha qoldiriladi. So'ngra qog'ozning old tomoni aylantirib qo'yiladi va u chetki tomonlariga tekkiz- masdan ho'llanadi. Ho'l planshet mo'tadil haroratli joyga qo'yib quritiladi. Shundagina u ishga yaroqli bo'ladi.

**Yig'ma** qopchiq ham etyudlar ishlashda, ekskursiyaga chiqqanda juda asqotadi. Uni brezent matodan ixchamgina qilib tikib olish mumkin. Kerakli

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.Nemat Abdullayev.<sup>[1]</sup>

<sup>10</sup> [O'zME](#). Birinchi jild. Toshkent, 2000-yil

jihozlarni yig'ma qopchiqqa tartib bilan joylashtirish lozim. Uning yuqori qismiga tasmalar tikib, qog'ozni mahkamlab qo'yish kerak. Pastki qismiga esa har xil o'lchamdagi cho'ntaklar tikiladi. Cho'ntaklarga esa suv uchun maxsus idish, latta, akvarel va hokazolar solib olinadi.

**Mo'yqalamlar.** Akvarel bilan ishlayotganda maxsus akvarel mo'yqalamidan foydalanish lozim. Mo'yqalamlar ikki xil bo'lib, ularning bir xillari moyli bo'yoqlarga, boshqa xillari esa akvarel bo'yoqlarga mo'ljallangan. Ularni ko'rinishida qarab quyidagicha farqlash mumkin: yalpoq (moyli bo'yoqlar uchun mo'ljallangan mo'yqalamlar) kurakcha va dumaloq shaklda bo'ladi. Akvarel uchun ishlatiladigan mo'yqalamlar dumaloq bo'lib, uch tomoniga qarab ingichkalashib boradi va bu juda mayda detallarni ishlash uchun qulaylik tug'diradi.

**Palitra.** tasviriy san'at darslarida oddiy, oq rangdagi yassi laganchadan palitra sifatida foydalanish mumkin. Etyut ishlash paytida metallardan yasalgan va sirlangan yoki plastmassadan yasalgan palitralardan foydalangan ma'qul. palitraning eng yaxshi tomoni shundaki, unga qo'yilgan bo'yoqlar aniq va ravshan, tiniq bo'lib ko'rinadi. Shuningdek, uzoq vaqtgacha quramasdan saqlanadi. Palitraning rangi oq bo'lganligi sababli bo'yoqlarning tuslari o'zgarmasdan ko'zga tashlanadi.

**Stakan** suv olish uchun eng yaxshi idish hisoblanadi. Ekskursiya- larda, etyud ishlashda metal yoki shisha stakanlar yoki bankalar juda qo'l keladi. Akvarel bilan ishlashda suv olish uchun qo'llaniladigan idishlarning turlari har xil bo'lishi mumkin.

**Qalamlar** akvarel bo'yog'ida ishlangan rasmlarning yaxshi chiqishida muhim rol o'ynaydigan vositalardan biridir. Tasviriy san'at darslarida asosan o'rtacha yumshoqlikdagi qalamlardan foydalaniladi. "TM" markali qalam chizish uchun juda qulaydir. Qalamlarning bir tomonida nomi, so'ngra esa qattiqlik darajasi yozib qo'yiladi.

Akvarel bilan ishlash tasviriy san'at darslarida rangli tasvirlarning muvaffaqiyatli chiqishida akvarel bilan ishlashda orttirilgan tajribalar muhim rol o'ynaydi. Chunki bo'yoq bilan ishlash qanchalik puxta o'rganilgan bo'lsa rangli tasvirlar shunchalik yaxshi chiqadi. Akvarel bilan ishlashda ish joyi talabga javob beradiga qilib jihozlanishi kerak. Shuningdek, planshet hamda molbertdan to'g'ri foydalanishni o'rganish, qog'oz yuzalarini har xil shikastlanishlardan ehtiyot qilish lozim. Akvareldan foydalanishda uning sifatiga e'tibor berish darkor. Bo'yoqlarni maxsus idishchalarda suv bilan aralashtirish va va qog'oz bo'lagida sinab ko'rish tavsiya etiladi. Topilgan rang tusi kerakli darajaga yetgandagina undan foydalanish lozim.

Akvarel bilan ishlash texnikasini puxta o'zlashtirish uchun dastlabki mashqlarni qora, to'q jigar ranglarda bajargan ma'qul. Bu usulda ishlahs monoxrom yoki grizayl (bir rangda ishlash) metodida ishlash deb ataladi. Akvarel bilan ishlashda quyidagi izchillikka rioya qilinsagina bo'yoqda ishlangan tasvirlar talabga javob bera olishi mumkin:

1. Kerakli bo'yoq maxsus idishda suv bilan aralashtirilib tayyorlana di hamda qog'oz bo'lagiga surtib, sinab ko'riladi.

2. Qog'oz sirtiga bo'yoq berayotganda mo'yqalam hamisha eritmaga rosmana botirib olingan bo'lishi kerak.

3. Ostki qavatdagi bo'yoq qurimaguncha navbatdagi bo'yoq qavati yotqizilmaydi. Keying qavat tez qo'yilishi lozim, aks holda ostki qavat yuvilib ketishi mumkin.

4. Akvarel bo'yoqlari bilan ishlashda oq bo'yoqdan foydalanilmaydi, chunki oq bo'yoq rolini oq qog'ozning o'zi bajaradi.

5. Qo'yilgan bo'yoq qavati ostidan qog'ozning sirti sezilib turishi lozim.

Xulosa tasviriy san'at manzara kurinishlari shaxar, qishloq, toglarni ta'lim sifatini rivojlanishi uchun akvarel materiyali texnikasi rangtasvir tarixi va zamonaviy tavrilarini me'morchilik, arxitekura badiiy bezaklarini tasvirlash uchun qo'llaniladi. Manzara kurinishlarida portret va inson gavdasi tasvirini metodik tasvirlash. Manzara tasvirni estetik faolyatida ramizli qullash, nafosatni, go'zallikni hissiyot uning ruhiyati, tarbiyasiga sekin-asta ta'sirini ko'rsatadi. Bizning atrofimizdagi go'zal narsalar jozibasi, ko'rinishi, shakli bilan birga rangi orqali ham bizni o'ziga jalb qiladi.

Manzara kurinishini akvarel rangtasvir materyalini yaxshi tasvirlash uchun xar bir iste'dodli ta'laba uchun muammoli bulishi, tasvirni bilbasligi, uning echimi kup izlanish maxoratino oshirish kerak. Badiiy asr g'oyani yanada emotsanal chiqishi uchun, inson ma'naviy estetik, ruhiyatni kutarishga ko'ra ranglar, amliy san'at badiiy bezagini yanada jozibali chiqishi uchun, ijopkor pedagoglar maxorat darslari, ilmiy maqolalar, amaliy mashiqalar, talabalarni rivojlanishi uchun xizmat qiladi.

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## IRRIGATSIYA TIZIMLARIDA SUV HAJMI VA ISHNI INTEGRAL YORDAMIDA HISOBLASH

**Annotatsiya:** Ushbu maqola sug'orish tizimlarida suv hajmi va nasos orqali suvni ko'tarishda bajariladigan ishni aniq integral yordamida hisoblash masalalarini yoritadi. Integral hisoblashning nazariy asoslari bilan bir qatorda, matematik modellash orqali suv resurslarini samarali boshqarish va energiya sarfini kamaytirish imkoniyatlari ko'rib chiqiladi. Amaliy misollar yordamida irrigatsiya tizimlarida suv taqsimoti va gidravlik jarayonlarni optimallashtirish yo'llari ko'rsatib beriladi. Ushbu yondashuv suv resurslaridan oqilona foydalanish va irrigatsiya samaradorligini oshirishga xizmat qiladi.

**Kalit so'zlar:** aniq integral, suv hajmi, ish, matematik modellashirish, energiya, irrigatsiya.

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## CALCULATION OF WATER VOLUME AND WORK IN IRRIGATION SYSTEMS USING INTEGRAL

**Abstract:** This article examines the problems of calculating the volume of water in irrigation systems and the work performed when lifting water with a pump using definite integrals. Alongside the theoretical foundations of integral calculus, the possibilities of mathematical modeling for effective water resource management and energy reduction are analyzed. Practical examples demonstrate ways to optimize water distribution and hydraulic processes in irrigation systems. This approach contributes to the rational use of water resources and the improvement of irrigation efficiency.

**Keywords:** definite integral, water volume, work, mathematical modeling, energy, irrigation

Qishloq xo'jaligi tizimida suv resurslarini samarali boshqarish masalasi O'zbekiston va butun Markaziy Osiyo mintaqasi uchun strategik ahamiyatga ega.

Ayniqsa, irrigatsiya tizimlari hosildorlikni ta'minlashda hal qiluvchi rol o'ynaydi. Suv hajmini aniq hisoblash va uni nasoslar orqali ko'tarishda sarflanadigan energiyani to'g'ri baholash nafaqat iqtisodiy samaradorlikni oshiradi, balki ekologik barqarorlikni ham ta'minlaydi. Shu nuqtai nazardan, matematik analiz vositalaridan biri bo'lgan **aniq integral** irrigatsiya tizimlarida muhim tatbiq topadi.

Aniq integral yordamida murakkab shakldagi havzalarning hajmini hisoblash, suv oqimining taqsimlanishini aniqlash va nasoslar tomonidan bajariladigan ishni modellashtirish mumkin. Bu yondashuv talabalarga nazariy matematik bilimlarni real hayotiy muammolarga tatbiq etish imkonini beradi. Masalan, havzaning kesim yuzasi o'zgaruvchan bo'lsa, uni oddiy geometrik formulalar bilan hisoblash qiyinlashadi. Ammo integral yordamida kesim yuzasining o'zgarishini hisobga olib, umumiy hajmni aniqlash mumkin. Shuningdek, suvni balandlikka ko'tarishda bajariladigan ish ham integral orqali ifodalanadi, chunki suvning har bir qismi turli balandlikka ko'tariladi va bu jarayonni faqat integral yondashuv to'liq aks ettira oladi.

**Suv hajmini hisoblash:** Kanal yoki rezervuardagi suv hajmi ko'pincha murakkab shakllarga ega bo'ladi. Bu hajmni aniqlash uchun kesim yuzalarini integral yordamida yig'ish usuli qo'llaniladi.

**Ishni hisoblash:** Nasos orqali suvni ko'tarishda bajariladigan ish suvning balandlikka ko'tarilishi va og'irlik kuchiga qarshi bajarilgan energiya bilan bog'liq. Bu jarayonni integral orqali ifodalash energiya sarfini aniq hisoblash imkonini beradi.

**Matematik modellashtirish:** Integral hisoblash irrigatsiya tizimlarida suv taqsimoti va gidravlik jarayonlarni modellashtirishda qo'llanilib, resurslardan samarali foydalanish va energiya tejamkorligini ta'minlashga yordam beradi.

Shu bois, aniq integralning tatbiqlari nafaqat nazariy matematika uchun, balki amaliy muhandislik, qishloq xo'jaligi va ekologiya sohalari uchun ham dolzarbdir. Ushbu maqolada biz sug'orish tizimlarida suv hajmi va nasos ishini hisoblash bo'yicha aniq integral tatbiqlarini amaliy misollar bilan yoritamiz.

### 1. Suv hajmini hisoblash.

Agar kanalning kesim yuzasi  $A(x)$ -funksiyasi bilan berilgan bo'lsa, kanalning  $[a;b]$  qismi uzunligidagi suv hajmi quyidagicha aniqlanadi:

$$V = \int_a^b A(x)dx$$

Bu formula orqali kanalning murakkab shakldagi hajmini aniq hisoblash mumkin.

**Masala:** Kanal kengligi  $W(x) = 10 + 2x$  metr, chuqurligi doimiy  $h=5$  metr, uzunligi  $x \in [0,20]$  bo'lsin. U holda kanal kesimi yuzasi:

$$A(x) = W(x) \cdot h = (10 + 2x) \cdot 5.$$

Kanaldan o'tayotgan suv hajmi:

$$V = \int_0^{20} (10 + 2x) \cdot 5dx = 5 \int_0^{20} (10 + 2x)dx = 5(10x + x^2)/0^{20} = 3000m^3$$

Demak, kanalda  $3000 m^3$  suv mavjud.

**Masala:** Kanalning radiusi  $r(x) = \sqrt{25 - x^2}$ , uzunligi  $x \in [0; 5]$  bo'lsin. U holda

$$V = \pi \int_0^5 r(x)^2 dx = \pi \int_0^5 (25 - x^2) dx = \pi \left( 125 - \frac{125}{3} \right) = \frac{250\pi}{3} m^3$$

## 2. Nasos orqali suvni ko'tarishda bajariladigan ish

Suvni balandlikka ko'tarishda bajariladigan ish suvning og'irlik kuchiga qarshi amalga oshiriladi. Agar suvning zichligi  $\rho$ , gravitatsiya tezlanishi  $g$ , va ko'tarilish balandligi  $h$  bo'lsa, suv hajmi  $V$  uchun bajarilgan ish:

$$W = \rho g \int_0^h y(x) dV$$

bu yerda  $\rho$  — suv zichligi ( $1000 \text{ kg/m}^3$ ),  $g=9.8 \text{ m/s}^2$ ,  $y(x)$  — ko'tarilish balandligi.

Bu formula nasosning energiya sarfini aniq hisoblashga yordam beradi.

**Masala:** Kanaldagi suv hajmi  $V=3000 \text{ m}^3$ , suv zichligi  $\rho=1000 \text{ kg/m}^3$ , gravitatsiya tezlanishi  $g=9.8 \text{ m/s}^2$  bo'lsin. Suvni o'rtacha  $h=4$  metr balandlikka ko'tarish kerak. Bunda bajarilgan ish:

$$W = \rho g h V = 1000 \cdot 9.8 \cdot 4 \cdot 3000 = 1,176 \cdot 10^8 J.$$

**Masala:** Suv sathi balandligi o'zgaruvchan bo'lsin  $y(x) = 2 + 0,1x$ , bunda  $x \in [0; 20]$ , Kanal kesimi yuzasi:  $A(x) = 5 \cdot (10 + 2x)$  bo'lsin. Suv hajmi

$dV = A(x)dx$ . U holda bajarilgan ish:

$$\begin{aligned} W &= \rho g \int_0^{20} y(x) A(x) dx = \\ &= 9800 \int_0^{20} (2 + 0,1x)(10 + 2x) \cdot 5 dx = \\ &= 9800 \int_0^{20} (100 + 25x + x^2) dx \approx 94733333 J \end{aligned}$$

Integralni hisoblash natijasida suvni ko'tarishda bajariladigan ish **taxminan 94733333 J ( $\approx 94.7 \text{ MJ}$ )** bo'ldi. Bu energiya miqdori kanaldagi suvni balandlikka ko'tarish uchun zarur bo'lgan mexanik ishni ifodalaydi.

Integral hisoblash irrigatsiya tizimlarida suv hajmini aniqlash va nasoslar orqali suvni ko'tarishda bajariladigan ishni hisoblashda samarali vosita hisoblanadi. Ushbu yondashuv suv resurslarini oqilona taqsimlash, energiya sarfini kamaytirish va gidravlik jarayonlarni optimallashtirish imkonini beradi. Amaliy misollar orqali ko'rsatib berilganidek, integral metodlari irrigatsiya tizimlarining samaradorligini oshirishda muhim rol o'ynaydi.

Shunday qilib, aniq integral yordamida sug'orish tizimlarida suv hajmi va nasos ishini hisoblash **matematik modellashning amaliy tatbiqi** bo'lib, qishloq xo'jaligi samaradorligini oshirishda muhim ahamiyatga ega. Ushbu yondashuv talabalarga real muammolarni matematik metodlar bilan hal qilishni o'rgatadi va ilmiy-amaliy tadqiqot sifatida konferensiyada taqdim etilishi mumkin.



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## **RIVOJLANMAGAN HOMILA BILAN BOG‘LIQ GEMOSTAZ BUZILISHLARI: D-DIMER DARAJALARI ASOSIDA XAVF GURUHINI TANLASH IMKONIYATLARI**

**Annotatsiya:** Ushbu maqolada homiladorlikda rivojlanmagan homila profilaktikasida D-dimer darajalarining klinik-laborator ahamiyati retrospektiv kuzatuv asosida tahlil qilindi. Farg‘ona shahar tug‘ruqxona arxiv materiallari asosida 18 nafar bemorda umumiy qon tahlili va D-dimer biomarkeri ko‘rsatkichlari sog‘lom shu yoshdagi homilador ayollar ko‘rsatkichlari bilan taqqoslandi. Tahlil natijalari D-dimerning oshishi gemostaz tizimidagi faollashuv bilan bog‘liq ekanini va xavf guruhini erta aniqlashda qo‘shimcha marker sifatida foydali bo‘lishi mumkinligini ko‘rsatdi. Olingan ma‘lumotlar D-dimer ko‘rsatkichini klinik va laborator nazoratning integrallashgan qismi sifatida baholash zarurligini asoslaydi.

**Kalit so‘zlar:** homiladorlik, rivojlanmagan homila, D-dimer, gemostaz, biomarkerlar, profilaktika, laborator diagnostika

**Kirish.** Rivojlanmagan homila va homila nobud bo‘lishi akusherlik amaliyotida muhim muammo bo‘lib, u ko‘pincha gemostaz tizimidagi buzilishlar, platsentar perfuziya yetishmovchiligi va trombotik jarayonlar bilan bog‘liq deb qaraladi. So‘nggi yillarda D-dimer fibrin parchalanish mahsuloti sifatida trombin hosil bo‘lishi va fibrinoliz faolligini aks ettiruvchi marker bo‘lib, homiladorlik davrida uning fiziologik oshishi bilan birga patologik keskin ko‘tarilishi xavfli holatlarni aniqlashda qo‘llanmoqda. Shu bilan birga, homiladorlikda D-dimerning oddiy kesim nuqtalari barcha trimestrlarda bir xil talqin qilinmasligi, trimesterga mos va klinik kontekst bilan birga baholanishi zarurligi ta‘kidlanadi [1-4].

Meta-tahlillar D-dimerning homiladorlikda venoz tromboemboliya xavfini inkor etishda yuqori sezgirlikka ega ekanini ko‘rsatsa-da, uning o‘ziga xosligi homiladorlikning kech muddatlarida pasayadi [5]. Katta prospektiv kuzatuvlar esa aksariyat sog‘lom homiladorlarda ham D-dimer miqdori odatiy 0,5–1,0 mg/L chegaradan yuqori bo‘lishini ko‘rsatgan, bu esa markerning mustaqil emas, balki klinik-laborator kompleks tarkibida baholanishi kerakligini bildiradi. Aynan shuning uchun rivojlanmagan homila profilaktikasida D-dimerning amaliy ahamiyatini mahalliy klinik material asosida o‘rganish dolzarb hisoblanadi [6].

**Tadqiqot metodologiyasi.** tadqiqot retrospektiv, taqqoslovchi va bir markazli dizaynda olib borildi. Material sifatida Farg‘ona shahar tug‘ruqxona arxivida qayd etilgan 18 nafar rivojlanmagan homila bilan bog‘liq holatlarning ma‘lumotlari olindi; nazorat sifatida yosh jihatidan mos sog‘lom homilador ayollarning laborator

ko'rsatkichlari bilan taqqoslash amalga oshirildi. Tahlilga umumiy qon ko'rsatkichlari, xususan gemoglobin, eritrotsit, leykotsit, trombosit va D-dimer biomarkeri kiritildi.

Statistik ishlov berishda tavsifiy statistika, o'rtacha qiymat va standart og'ishdan foydalanildi. Guruhlararo farqlar klinik talqin darajasida solishtirildi; kichik tanlanma hajmi sabab natijalar ehtiyotkor izohlandi. Tadqiqot arxiv materiallari asosida bajarilgani uchun dizayn kuzatuv xarakteriga ega bo'lib, amaliy maqsad xavf guruhida D-dimerning qo'shimcha diagnostik qiymatini ko'rsatishdan iborat bo'ldi.

| <b>Tadqiqot elementi</b>   | <b>Asosiy guruh</b>                  | <b>Nazorat guruhi</b>                   |
|----------------------------|--------------------------------------|-----------------------------------------|
| <b>Dizayn</b>              | Retrospektiv arxiv tahlili           | Taqqoslovchi kuzatuv                    |
| <b>Ishtirokchilar</b>      | 18 nafar rivojlanmagan homila holati | Yosh jihatidan mos sog'lom homiladorlar |
| <b>Biomarkerlar</b>        | Umumiy qon tahlili, D-dimer          | Umumiy qon tahlili, D-dimer             |
| <b>Statistik yondashuv</b> | Tavsifiy va qiyosiy tahlil           | Shu usullar                             |

**Natijalar.** Tahlil natijalari rivojlanmagan homila kuzatilgan guruhda D-dimer qiymatlari nazorat guruhiga nisbatan yuqoriroq bo'lganini ko'rsatdi. Shuningdek, trombositlar miqdorining nisbatan pasayishi va yallig'lanish elementlarini aks ettiruvchi ayrim umumiy qon ko'rsatkichlarining siljishi gemostaz tizimi faollashuvi bilan uyg'un kuzatildi. Klinika nuqtai nazaridan bu holat mikrotsirkulyator buzilishlar va platsentar qon aylanishining izdan chiqishi ehtimolini kuchaytiruvchi laborator fon sifatida talqin qilindi.

1-jadvalda kuzatilgan guruhlar bo'yicha asosiy klinik-laborator ko'rsatkichlar keltirilgan. Jadvalda D-dimerning asosiy guruhda ancha yuqori ekani, trombositlar soni esa nazoratga nisbatan pastroq darajada qayd etilgani ko'rinadi. Bu farqlar rivojlanmagan homila xavfini erta bosqichda aniqlashda bir markerga emas, bir nechta laborator mezonlarning kombinatsiyasiga e'tibor qaratish kerakligini ko'rsatadi.

## 1-jadval.

### Asosiy guruhlar bo'yicha klinik-laborator ko'rsatkichlar

| Ko'rsatkich                      | Rivojlanmagan homila guruhi (n=18) | Nazorat guruhi |
|----------------------------------|------------------------------------|----------------|
| Yosh, yil                        | 27.8 ± 4.1                         | 26.9 ± 3.8     |
| Gemoglobin, g/L                  | 108.4 ± 11.6                       | 114.7 ± 9.8    |
| Eritrotsit, ×10 <sup>12</sup> /L | 3.62 ± 0.34                        | 3.88 ± 0.29    |
| Leykotsit, ×10 <sup>9</sup> /L   | 9.4 ± 1.8                          | 8.1 ± 1.5      |
| Trombotsit, ×10 <sup>9</sup> /L  | 186.3 ± 34.7                       | 224.5 ± 30.1   |
| D-dimer, mg/L                    | 1.84 ± 0.41                        | 0.96 ± 0.27    |

2-jadvalda D-dimer darajalari bo'yicha klinik talqin berildi. Ko'rinishicha, asosiy guruhda yuqori D-dimer ulushi sezilarli bo'lib, bu laborator belgining xavf guruhini tanlashda foydali ekanini ko'rsatadi. Shu bilan birga, nazorat guruhida ham homiladorlikka xos fiziologik oshish ehtimoli saqlanib qoladi, shuning uchun natija klinik holat va boshqa laborator belgilar bilan birga talqin qilinishi kerak.

## 2-jadval.

### D-dimer darajasi bo'yicha xavf stratifikatsiyasi

| D-dimer darajasi | Rivojlanmagan homila guruhi, n (%) | Nazorat guruhi, n (%) | Klinik izoh                               |
|------------------|------------------------------------|-----------------------|-------------------------------------------|
| <1.0 mg/L        | 3 (16.7%)                          | 11 (61.1%)            | Past yoki fiziologik oshish ehtimoli      |
| 1.0–1.5 mg/L     | 5 (27.8%)                          | 5 (27.8%)             | Kuzatuvni kuchaytirish kerak              |
| >1.5 mg/L        | 10 (55.5%)                         | 2 (11.1%)             | Yuqori xavf, chuqur nazorat talab etiladi |

Natijalar tavsifiy tahlilda D-dimerning rivojlanmagan homila bilan bog'liq holatlarda eng sezgir laborator ko'rsatkichlardan biri sifatida namoyon bo'lganini ko'rsatdi. Umumiy qon tahlilidagi o'zgarishlar, ayniqsa trombositlar dinamikasi va gemoglobin pasayishi bilan birgalikda baholanganda, markerning klinik qiymati yanada oshdi. Shu sababli D-dimer yakka test sifatida emas, balki akusherlik xavfini erta aniqlovchi integrallashgan algoritmning elementi sifatida ko'rib chiqildi.

**Muxokama.** Olingan natijalar D-dimerning rivojlanmagan homila profilaktikasidagi ahamiyatini ko'rsatadi, biroq uni talqin qilishda homiladorlikning o'zi bilan bog'liq fiziologik giperkoagulyatsiyani ham inobatga olish zarur. Yirik zamonaviy tadqiqotlarda sog'lom homiladorlarning juda katta qismida ham D-

dimer odatiy nohomilador kesim nuqtalaridan yuqori bo'lishi qayd etilgan, shu sababli markerning absolyut qiymatidan ko'ra klinik holat, gestatsion muddat va qo'shimcha laborator belgilar bilan birga baholash afzal hisoblanadi. Bu jihat bizning kuzatuvimizda ham tasdiqlanib, yuqori D-dimer ko'rsatkichlari ayniqsa trombositlar pasayishi va umumiy qon tahlilidagi noqulay siljishlar bilan birga xavfliroq ko'rindi [7].

2021-yildagi meta-tahlil D-dimer homiladorlikda tromboembolik xavfni inkor etishda yuqori manfiy bashorat qiymatiga ega ekanini ko'rsatgan bo'lsa-da, diagnostik unumdorlik gestatsiya muddatiga qarab kamayishini ham qayd etadi. Shuning uchun rivojlanmagan homila profilaktikasida D-dimerni skrining biomarkeri sifatida qo'llashda trimesterga mos yondashuv va mahalliy referens oraliqlarni ishlab chiqish muhimdir. Farg'ona arxiv ma'lumotlari asosidagi ushbu kichik kuzatuv mahalliy populyatsiyada D-dimerning amaliy qiymatini ko'rsatib berdi, ammo kelgusida katta tanlanmali, prospektiv va ko'p omilli modellar bilan tekshirish zarur [8-9].

**Xulosalar.** Ushbu tadqiqotda rivojlanmagan homila bilan yakunlangan homiladorliklarda gemostaz tizimidagi o'zgarishlar, xususan D-dimer darajalarining oshishi aniqlanib, ularni xavf guruhini erta ajratishda sezgir laborator ko'rsatkich sifatida qo'llash imkoniyati ko'rsatildi. Natijalar D-dimerni umumiy qon tahlili parametrlaridan iborat integrallashgan baholash algoritmiga kiritish homiladorlik asoratlarini erta prognozlash va profilaktik choralarni o'z vaqtida boshlashga yordam berishini tasdiqlaydi.

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## **SOIL DEGRADATION IN UZBEKISTAN: A QUANTITATIVE ANALYSIS OF SALINIZATION, DEFLATION, AND SOCIO-ECONOMIC CONSEQUENCES**

**Abstract.** *This paper provides a comprehensive analysis of the escalating crisis of soil degradation in the Republic of Uzbekistan, a nation where the agricultural sector is fundamental to economic and social stability. The study focuses on the primary drivers and quantitative impacts of degradation, synthesizing data from national reports, international organizations (FAO, UNDP, World Bank), and recent academic literature. The analysis confirms that approximately 47% of Uzbekistan's 4.28 million hectares of irrigated land is affected by varying degrees of salinization, a direct consequence of decades-long inefficient irrigation practices, inadequate drainage infrastructure, and an arid climate. This secondary salinization is identified as the principal threat, leading to estimated crop yield losses ranging from 30% in slightly saline soils to over 80% in strongly saline areas. Compounding this issue is severe wind erosion (deflation), originating from the 60,000 km<sup>2</sup> Aralkum desert (the dried Aral Sea bed), which deposits toxic salt-dust on fertile lands. The cumulative economic burden of water shortages and land degradation is estimated to cost the nation approximately 11% of its GDP annually. This paper examines the problem's typology, analyzes its profound socio-economic consequences, and evaluates the efficacy of current and proposed mitigation strategies, including the national "Year of Environmental Protection and the Green Economy 2025" initiative and the imperative shift towards Climate-Smart Agriculture (CSA) and water-saving technologies.*

**Keywords:** *Soil Degradation, Secondary Salinization, Uzbekistan, Aral Sea Crisis, Deflation, Economic Impact, Water-Saving Technology, Climate-Smart Agriculture.*

### **1. INTRODUCTION**

Uzbekistan, a double-landlocked nation in Central Asia, is characterized by an arid and semi-arid continental climate. Its economy and food security are inextricably linked to irrigated agriculture, which accounts for over 25% of the GDP

and employs a significant portion of the population. However, this vital sector is built upon a precarious foundation: limited water resources, primarily from the transboundary Amu Darya and Syr Darya rivers, and a legacy of Soviet-era agricultural policies that prioritized cotton monoculture at immense environmental cost.

The critical challenge confronting modern Uzbekistan is the rapid degradation of its primary productive asset: the soil. The magnitude of this challenge is severe. Recent data from national monitoring services and international bodies indicate that 46.7% of all irrigated lands are saline to varying degrees (FAO, 2023). This phenomenon, known as secondary salinization, is human-induced and threatens the long-term viability of the nation's agricultural heartland. Furthermore, the desiccation of the Aral Sea has created the Aralkum, a new toxic desert, unleashing massive sand and dust storms (SDS) that exacerbate soil degradation hundreds of kilometers away.

The economic fallout is staggering. The World Bank estimates that water shortages and associated land degradation cost Uzbekistan approximately 11% of its GDP annually (World Bank, 2022). This multidimensional crisis necessitates a profound scientific analysis of its drivers, a quantitative assessment of its impacts, and a critical evaluation of sustainable solutions. This paper aims to provide such an analysis, arguing that a paradigm shift from resource exploitation to sustainable resource management, underpinned by policy and technology, is imperative for Uzbekistan's future.

## **2. TYPOLOGY AND SCALE OF SOIL DEGRADATION**

Soil degradation in Uzbekistan is not a uniform problem. It manifests in three primary forms, often overlapping and exacerbating one another.

### **2.1. Secondary Salinization (The Primary Threat)**

This is the most widespread and economically damaging form of degradation. It is a direct result of irrigation without adequate drainage. Inefficient flood or furrow irrigation methods lead to massive water seepage, causing the groundwater table (GWT) to rise. In an arid climate, this mineralized water is drawn to the surface via capillary action, where the water evaporates, leaving toxic salts (such as sodium chloride, sulfates, and carbonates) in the root zone.

The scale is precisely quantified: of the total 4.28 million ha of irrigated land, 46.7% (approx. 2 million ha) is saline. The official breakdown is as follows:

- Slightly Saline ( $EC_e = 2-4$  dS/m): 30.9%
- Moderately Saline ( $EC_e = 4-8$  dS/m): 13.3%
- Strongly Saline ( $EC_e = 8-16$  dS/m): 2.5%

These are not just statistics; they represent a direct threat to plant physiology. Salinity induces osmotic stress, preventing crops from absorbing water, and leads to ionic toxicity, which disrupts metabolic processes and causes nutrient imbalances.

Degree of Salinity in Irrigated Lands of Uzbekistan (Total 4.28M ha) **Data to Visualize:**

- **Slice 1 (Blue):** Non-Saline (53.3%)

- **Slice 2 (Yellow):** Slightly Saline (30.9%)
- **Slice 3 (Orange):** Moderately Saline (13.3%)
- **Slice 4 (Red):** Strongly Saline (2.5%)
- *Source: Based on data from the Ministry of Water Resources & FAO*

(2023)

## 2.2. Wind Erosion (Deflation) and the Aral Sea Impact

The desiccation of the Aral Sea is one of the 20th century's most severe environmental disasters. The exposed seabed, now known as the "Aralkum," covers 60,000 km<sup>2</sup> and is a source of intense Sand and Dust Storms (SDS). These storms transport an estimated 100 million tons of salt-laden, toxic dust annually, containing pesticides and chemical residues from decades of agricultural runoff.

This deflation has two effects:

1. **Physical Degradation:** The sandblasting effect damages crops and infrastructure.

2. **Chemical Degradation:** The deposition of toxic salts on otherwise fertile land in Karakalpakstan, Khorezm, and Bukhara regions induces a *new layer* of salinization, destroying pasturelands and contaminating croplands.

## 2.3. Water Erosion and Humus Depletion

Water erosion is localized in Uzbekistan's foothills and mountainous regions (e.g., Fergana Valley, Tashkent, and Kashkadarya regions). Improper irrigation on sloping lands washes away the fertile topsoil (A-horizon), leading to the formation of rills and gullies.

Simultaneously, the Soviet legacy of cotton-wheat monoculture has severely depleted soil organic matter (humus). Most irrigated soils in Uzbekistan have humus content below 1.0% (critically low is 1.5%), which destroys soil structure, reduces water-holding capacity, and diminishes natural fertility, making soils more susceptible to both erosion and salinization.

## 3. SOCIO-ECONOMIC AND ENVIRONMENTAL CONSEQUENCES

The impacts of degradation are systemic, affecting the economy, environment, and public health.

- **Economic Impact:** The primary consequence is a direct loss of agricultural productivity. Yield losses are directly correlated with salinity levels:

- Slightly Saline: 10-33% yield loss
- Moderately Saline: 30-50% yield loss
- Strongly Saline: 65-85% yield loss (or total crop failure) This translates into billions of dollars in lost revenue for farmers and the state. The macro-level figure, an **11% loss of GDP** when combined with water scarcity, underscores the existential nature of the threat.

- **Environmental Impact:** Degradation triggers a cascade of environmental failures. These include the loss of soil biodiversity (microorganisms), desertification of productive land, and the severe pollution of return-flow (collector-drainage) water, which further salinizes downstream water bodies.

- **Social & Health Impact:** For rural populations, soil degradation means reduced income, debt, and displacement. Furthermore, the toxic dust storms from

the Aralkum are directly linked to a sharp increase in respiratory illnesses, anemia, and other severe health conditions in the Karakalpakstan region.

#### **4. MITIGATION STRATEGIES AND NATIONAL POLICY**

Addressing this crisis requires a multi-pronged strategy combining policy, technology, and agronomy.

##### **4.1. National Policy Framework**

The government of Uzbekistan has recognized the severity of the problem. The declaration of 2025 as the "Year of Environmental Protection and the Green Economy" by President Shavkat Mirziyoyev signals a high-level political commitment. This initiative prioritizes:

1. **Water Conservation:** As the root cause of salinization.
2. **Afforestation:** Including the "Yashil Makon" (Green Space) initiative and large-scale planting of saxaul (*Haloxylon*) on the Aral Sea bed.
3. **Climate Change Mitigation:** Integrated into national planning.

This is supported by international partnerships, such as the Global Green Growth Institute (GGGI) Country Planning Framework (2024-2028), which aims to help mobilize **\$1 billion in green financing**, including **\$50 million specifically for climate-resilient agriculture**.

##### **4.2. Technical and Agronomic Solutions**

Policy must be implemented through on-the-ground action.

1. **Water-Saving Technologies:** The most critical intervention is shifting from furrow irrigation to **drip irrigation** and **sprinkler systems**. These technologies deliver water directly to the plant, reducing water use by 40-60% and, crucially, preventing the waterlogging that causes the GWT to rise. State subsidies for these technologies are accelerating their adoption.

2. **Improved Melioration:** This involves the modernization and cleaning of thousands of kilometers of collector-drainage networks to effectively lower the groundwater table and flush salts from the soil profile.

3. **Climate-Smart Agriculture (CSA):** This is a holistic approach:
  - **Laser Land-Leveling:** Ensures uniform water distribution, preventing ponding.
  - **Crop Rotation:** Breaking the cotton monoculture by introducing crops like alfalfa, legumes, and other siderates (green manures) that restore nitrogen and organic matter (humus) to the soil.
  - **Conservation Tillage (No-Till/Min-Till):** Reducing plowing to protect soil structure and reduce moisture loss and erosion.

4. **Aral Sea Bed Mitigation:** Afforestation of the Aralkum with drought-and-salt-tolerant species (halophytes) like saxaul. A 2025 UNDP/FAO study has, for the first time, *quantified* the effectiveness of this vegetation in stabilizing the soil and *reducing salt removal in millions of tons per year*, proving its efficacy as a large-scale intervention.

#### **5. CONCLUSION**

Soil degradation, driven primarily by secondary salinization and Aral Sea-related deflation, represents a profound and immediate threat to Uzbekistan's

economic prosperity, food security, and environmental stability. The data is unequivocal: with nearly half of its irrigated land compromised and 11% of its GDP at stake, inaction is not an option.

The legacy of unsustainable water management has created this crisis, but a new path forward is emerging. Uzbekistan's future agricultural viability depends on the successful, large-scale implementation of a new paradigm based on water-use efficiency (drip irrigation), soil health restoration (crop rotation, humus building), and large-scale ecological engineering (Aralkum afforestation). The national "Green Economy 2025" strategy, supported by international finance, provides the necessary policy framework. The challenge now lies in accelerating the adoption of these technologies and practices from pilot projects to a new national standard.

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## **SUG'ORILADIGAN YERLARNING SHO'RLANISH DINAMIKASINI GAT YORDAMIDA MONITORING QILISH (ZAFAROBOD TUMANI MISOLIDA)**

**Annotatsiya:** Maqolada Sentinel-2 sun'iy yo'ldosh ma'lumotlari yordamida Zafarobod tumani sug'oriladigan yerlarining sho'rlanish dinamikasi (2022–2025 yy.) tadqiq qilingan. Ishda NDVI indeksi asosida vegetatsiyani maskalash va sho'rlanish indeklari (SI) yordamida tuproq holatini baholash uslubiyoti qo'llanilgan.

**Tayanch so'zlar:** Tuproq sho'rlanishi, degradatsiya, ikkilamchi sho'rlanish, sizot suvlari, meliorativ holat, masofadan zondlash (RS), geografik axborot tizimi (GAT), Sentinel-2, sun'iy yo'ldosh tasvirlari, ArcGIS Pro, NDVI indeksi, salinity Index (SI), monitoring.

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## **MONITORING THE SALINITY DYNAMICS OF IRRIGATED LANDS USING A GIS (USING THE EXAMPLE OF THE ZAFARABAD DISTRICT)**

**Annotation:** The article investigates the dynamics of irrigated soil salinity in the Zafarobod district using Sentinel-2 satellite imagery (2022–2025). The methodology employs NDVI-based vegetation masking and Salinity Indices (SI) to assess soil conditions.

**Key words:** Soil salinization, degradation, secondary salinization, groundwater, reclamation status, remote sensing (RS), geographic information system (GIS), Sentinel-2 satellite imagery, ArcGIS Pro, NDVI index, salinity index (SI), monitoring.

**Kirish.** Bugungi kunda global iqlim o'zgarishi va kuchli antropogen ta'sirlar natijasida qishloq xo'jaligi yerlarining degradatsiyasi, xususan tuproq sho'rlanishi, dunyo miqyosida dolzarb ekologik va iqtisodiy muammo bo'lib qolmoqda.



Shoʻrlanish ayniqsa oʻsimliklar rivojlanishining dastlabki bosqichida xavfli: tuproqda namlik yetishmaganda ildizlar suvni oʻzlashtira olmaydi (osmotik effekt), yuqori tuz konsentratsiyasida esa (masalan, xlor) toksik taʼsir yuzaga kelib, oʻsish jarayoni izdan chiqadi [1]. Hozirda shoʻrlanish boʻyicha global maʼlumotlar taqdim etuvchi asosiy manba - Harmonized World Soil Database hisoblanadi [2]. Yerlarning shoʻrlanishi barcha mamlakatlarda qishloq xoʻjaligining asosiy muammolaridan biri boʻlib, choʻllanishni kuchaytiradi va iqtisodiyotga sezilarli zarar yetkazadi. Dunyo boʻyicha qariyb 950 mln gektar yer shoʻrlangan, har yili esa shoʻrlanish va

ishqoriylashish natijasida 10 mln gektarga yaqin yer yoʻqotilmoqda [3].

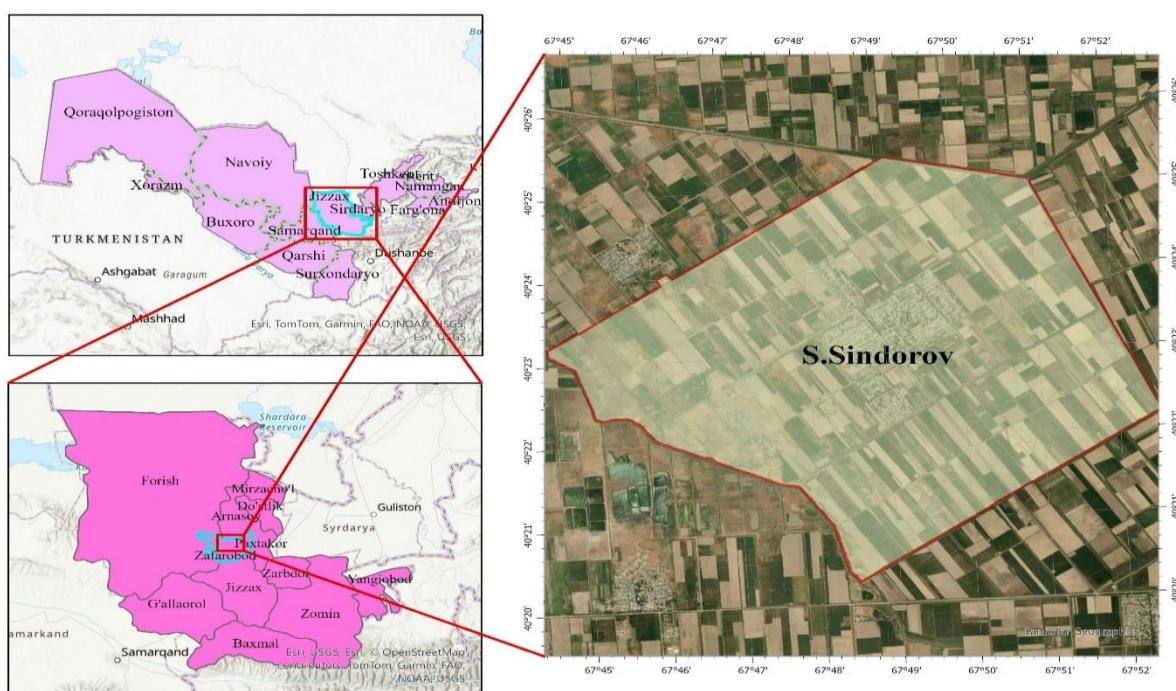
Markaziy Osiyo tekisliklari tabiiy shoʻrlanishga moyil boʻlib, tuproqlarda ikkilamchi shoʻrlanish rivojlanishi uchun yuqori xavf mavjud [4]. 1960–1970-yil-

larda mintaqada sugʻorish ishlari jadal kengayib, asosan Amudaryo va Sirdaryo havzalarida paxta yetishtirishga yoʻnaltirildi. Biroq eskirgan texnologiyalar qoʻllanishi yer osti suvlari sathining koʻtarilishiga hamda ortiqcha sugʻorish natijasida ikkilamchi shoʻrlanishning kuchayishiga olib keldi. Natijada shoʻrlangan maydonlar kengayib, qishloq xoʻjaligi hosildorligi pasaydi. [5]. Oʻzbekistonning, Arid va yarim arid hududlarda, xususan sugʻoriladigan yerlarning shoʻrlanishi nafaqat agroishlab chiqarish samaradorligini kamaytirmoqda, balki oziq-ovqat xavfsizligiga ham jiddiy tahdid solmoqda [6].

Oʻzbekistondagi sugʻoriladigan yerlarning taxminan 47% shoʻrlangan tuproqlarni tashkil qiladi [7]: 30% kam shoʻrlangan, 16% oʻrtacha shoʻrlangan va 4% kuchli shoʻrlangan. Bugungi kunda Qoraqalpogʻiston Respublikasidagi sugʻoriladigan yerlarning 77%, Xorazm viloyatida 100%, Buxoro viloyatida 87%, Jizzax viloyatida 79% va Navoiy viloyatida 87% turli darajada shoʻrlangan[8]. Jizzax viloyatining Zafarobod tumani murakkab gidrogeologik sharoiti va sizot suvlari sathining yuqoriligi bilan ajralib turadi. Tumandagi “S. Sindorov” SFU kabi hududlarda yerlarning meliorativ holatini baholash doimiy nazoratni talab etadi, biroq anʼanaviy dala usullari koʻp mehnat, vaqt va xarajat talab qilib, fazoviy aniqligi cheklangan. Shu bois shoʻrlanishni aniq baholash xaritalash va monitoringni talab etadi, bu esa uning fazoviy-vaqtinchalik taqsimotini aniqlash imkonini beradi [8]. Bunday sharoitda masofadan zondlash (Remote Sensing) va Geografik axborot tizimlari (GAT) texnologiyalari muammoni masofadan, tezkor va yuqori aniqlikda hal etish imkoniyatini beradi. Soʻnggi 2-3 oʻn yillikdan beri deyarli barcha fan sohalarida RS va GIS texnologiyalari keng qoʻllanilmoqda [9]. Xususan Oʻzbekistonda ham 2025 yil 20 fevral kuni Oʻzbekkosmos agentligida Sunʼiy yoʻldosh tasvirlari yordamida tuproq shoʻrlanish darajasini aniqlash boʻyicha sinov loyihasi boshlashga bagʻishlangan seminar boʻlib oʻtdi[11]. Sentinel-2 sunʼiy yoʻldoshining koʻp spektral kanallari tuproq yuzasidagi tuz toʻplanishlarini spektral indekslar orqali aniqlashda oʻta samarali hisoblanadi. Tadqiqotning asosiy maqsadi NDVI koʻrsatkichlari yordamida vegetatsiyani maskalab, ochiq tuproq maydonlarini ajratish hamda 2022–2025-yillarda “S. Sindorov” SFU hududida shoʻrlanishning fazoviy-vaqtinchalik dinamikasini miqdoriy va sifat jihatdan baholashdan iborat.

**Asosiy qism.** Tadqiqot obyekti sifatida Jizzax viloyatining Zafarobod tumanida joylashgan "S.Sindorov" (SFU) hududidagi sug'oriladigan qishloq xo'jaligi yerlari tanlab olindi (1-rasm). Tuproqning sho'rlanish darajasini va uning fazoviy tarqalish maydonini aniqlash sug'oriladigan maydonlarning sho'rlanishining oldini olishda muhim ahamiyatga ega. Tuproqning sho'rlanishini baholashning bir nechta usullari mavjud, ulardan biri oddiy va iqtisodiy jihatdan qulay texnologiya bo'lgan masofaviy zondlash ma'lumotlariga asoslangan.

Tuproqning sho'rlanishini RS ma'lumotlaridan foydalangan holda baholash hali bu sohadagi tadqiqotchilar yoki davlat tashkilotlari tomonidan keng tarqalgan emas. Chunki ular joyida to'plangan dala ma'lumotlariga tayanadilar. Biroq, bu usul ko'proq vaqt, ishchi kuchi va milliy yoki xalqaro loyihalar yoki hukumat tomonidan ko'proq moliyaviy yordamni talab qiladi.



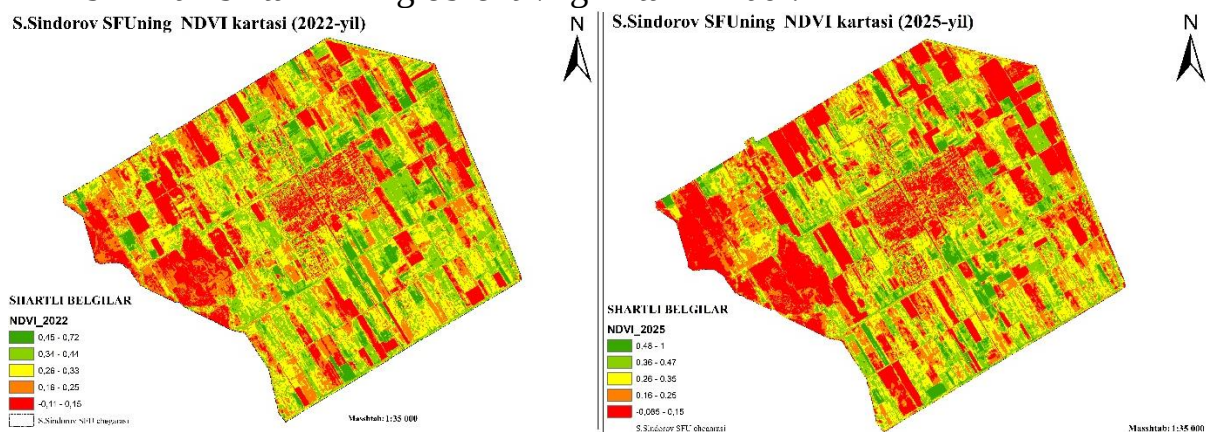
*1-rasm. Tadqiqot hududi kartasi*

Tadqiqotning texnik bosqichi Yevropa koinot agentligining (ESA) **Copernicus Open Access Hub** platformasidan Zafarobod tumani hududiga tegishli bo'lgan **Sentinel-2 (Level-2A)** sun'iy yo'ldosh tasvirlarini tanlab olish va yuklab olishdan boshlandi. Tahlil uchun vegetatsiya davri yakunlangan va tuproq yuzasi maksimal darajada ochiq bo'lgan 2022 va 2025-yillarning mos davrlariga oid bulutsiz tasvirlar tanlandi. Yuklab olingan ko'p spektral ma'lumotlar **ArcGIS Pro** dasturiy muhitiga integratsiya qilinib, tahlil uchun zarur bo'lgan B2 (Blue), B4 (Red) va B8 (NIR) spektral kanallari ajratib olindi. Dastlabki ishlov berish jarayonida tasvirlar "S.Sindorov" SFU chegarasi bo'yicha qirqib olindi (Extract by Mask) va fazoviy koordinatalar tizimi tahlil uchun muvofiqlashtirildi.

Tayyorlangan ko'p spektral qatlamlar asosida tadqiqotning keyingi bosqichi tuproq yuzasidagi o'simlik qoplamini (vegetatsiyani) tahlildan ajratib olishga qaratildi. Buning uchun yaqin infragizil (B8) va qizil (B4) kanallar nisbatiga

asoslangan **NDVI (Normalized Difference Vegetation Index)** ko'rsatkichi quyida-gi formula yordamida hisoblandi:  $NDVI = \frac{NIR-Red}{NIR+Red}$

Hosil qilingan NDVI rastri qatlami (2-rasm) asosida tuproq sho'rlanishini aniqlashda xatolik beruvchi yashil massani filtrlovchi mantiqiy maska yaratildi. ArcGIS Pro dasturining "Raster Calculator" instrumenti yordamida  $Con("NDVI\_2022" \leq 0.2, 1)$  sharti kiritildi va ushbu ko'rsatkichdan yuqori bo'lgan barcha piksellar (ya'ni ekin maydonlari va zich o'simliklar) tahlildan chiqarildi ya'ni "NoData" qilindi. Bu amaliyot faqat ochiq tuproq, haydalgan yerlar va juda siyrak o'simlikli maydonlarni saqlab qolish imkonini berdi, bu esa sho'rlanish tahlilining ob'ektivligini ta'minladi.



2-rasm. NDVI raster qatlami kartasi

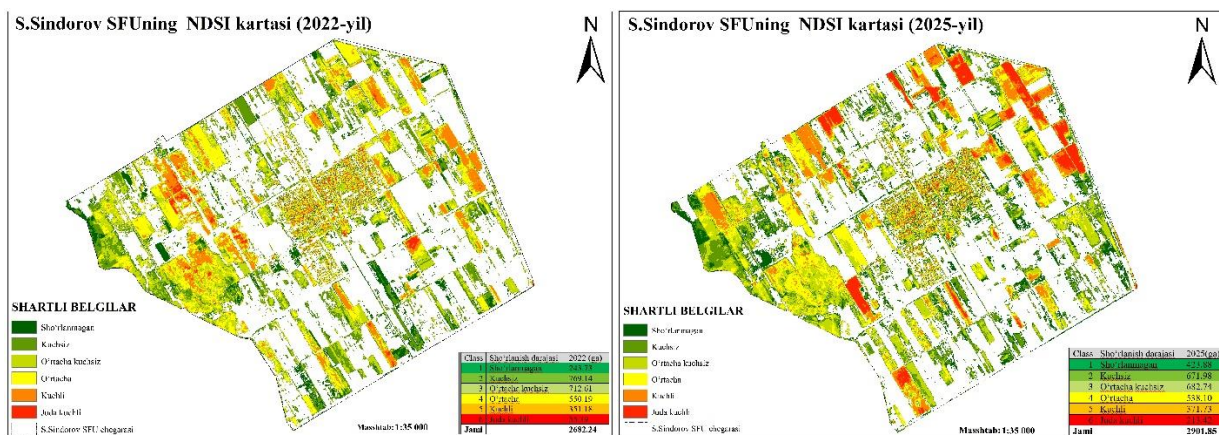
Keyingi bosqichda ajratib olingan ochiq tuproq piksellari uchun sho'rlanish darajasini miqdoriy ifodalovchi **SI (Salinity Index)** hisoblab chiqildi. Tuproq tarkibidagi tuzlarning ko'rinadigan spektr qismidagi (Blue va Red) yuqori aks etish xususiyatlarini inobatga olgan holda, ushbu indeks quyidagi algoritm asosida shakllantirildi:

$$SI = \sqrt{Blue * Red}$$

(Bu yerda: Blue — B2, Red — B4 spektral kanallari).

Ya'ni quyidagi amallar bajarildi ArcToolbox → Spatial Analyst Tools → Map Algebra → Raster Calculator →  $Con("Mask\_2022"==1, SquareRoot((Float("B02\_2022") / 10000) * (Float("B04\_2022") / 10000)))$  → Output raster. Bu hisoblash ishlari har yil uchun ya'ni 2022 va 2025-yillar uchun alohida hisoblandi. Olingan SI (Salinity Index) qiymatlari tuproqning sho'rlanish darajasiga ko'ra tabaqalash uchun asos bo'lib xizmat qildi. Ma'lumotlarni klassifikatsiya qilishda statistik guruhlashning Natural Breaks (Jenks) metodi qo'llanildi. Har bir yil uchun alohida Natural Breaks (Jenks) klassifikatsiyasi qo'llanildi. Buning sababi — yillararo spektral qiymatlarning (0.13-0.89(2022) dan 0.11-0.75(2025) gacha) o'zgarishidir. Bu usul har bir davr uchun hududning nisbiy sho'rlanish **darajasini** aniqroq aks ettirishga va yillararo gistogrammadagi tizimli siljishlarni (systemic shifts) inobatga olishga imkon beradi. "Ushbu metod indeks qiymatlari orasidagi tabiiy uzilishlar va klasterlarni aniqlash orqali hududni sho'rlanmagan va turli darajada sho'rlangan 6 ta sifat klassiga (1-sho'rlanmagan, 2-kuchsiz, 3-o'rtacha kuchsiz, 4-o'rtacha, 5-kuchli, 6-juda kuchli) ajratish imkonini berdi (3-rasm).





3-rasm. SI (Salinity Index) tahliliy kartasi

Yakuniy bosqichda "Raster to Polygon" funksiyasi orqali ma'lumotlar vektor formatiga o'tkazildi va har bir klassning 2022 va 2025-yillardagi maydonlari (gektar

va foizda) "Calculate Geometry" yordamida statistik hisoblanib, yillararo o'zgarish

dinamikasi aniqlandi.

Yakuniy bosqichda "Raster to Polygon" funksiyasi orqali ma'lumotlar vektor formatiga o'tkazildi va har bir klassning 2022 va 2025-yillardagi maydonlari (gektar va foizda) "Calculate Geometry" yordamida statistik hisoblanib, yillararo o'zgarish

dinamikasi aniqlandi.

1-jadval

| Class       | Sho'rlanish darajasi | 2022 yil (ga)  | 2025 yil (ga)  |
|-------------|----------------------|----------------|----------------|
| 1           | Sho'rlanmagan        | 243.73         | 423.88         |
| 2           | Kuchsiz              | 769.14         | 671.98         |
| 3           | O'rtacha kuchsiz     | 712.61         | 682.74         |
| 4           | O'rtacha             | 550.19         | 538.10         |
| 5           | Kuchli               | 351.18         | 371.73         |
| 6           | Juda kuchli          | 55.39          | 213.42         |
| <b>Jami</b> |                      | <b>2682.24</b> | <b>2901.85</b> |

Tadqiqotda 2022 va 2025-yillar o'rtasidagi jami ochiq yer maydonining farqi (219.61 ga) bevosita o'sha yillardagi vegetatsiya qoplamining turliligi va NDVI maskalash jarayoni bilan bog'liq. 2022-yilda ekin maydonlari ko'proq maskalangan bo'lsa, 2025-yilgi tasvirda ochiq tuproq maydonlarining spektral tahlil uchun ko'proq ochiqqligi (exposure) kuzatildi. Shuni inobatga olgan holda, sho'rlanish dinamikasi absolyut sonlarda emas, balki har bir yilning o'ziga xos ochiq yer maydoniga nisbatan proporsional ulushda tahlil qilindi.

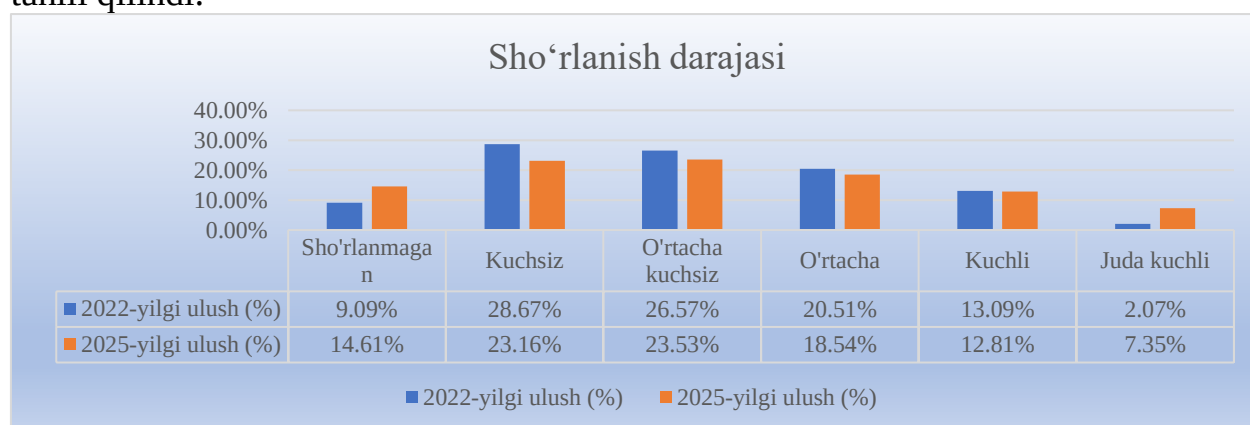
So'ngra, har bir sho'rlanish darajasi bo'yicha umumiy maydonni guruhlash va jamlash maqsadida "**Summarize**" (yoki **Summarize Statistics**) amali qo'llanildi. Ushbu jarayonda tahlil predmeti sifatida sho'rlanish klasslari

ko'rsatilgan ustun (Case Field) va hisoblangan maydonlar ustuni (Statistics Field) tanlanib, "Sum" (yig'indi) operatsiyasi bajarildi (1-jadval). Natijada, 2022 va 2025-yillar uchun alohida statistik jadvallar shakllantirildi. Ushbu jadvallar asosida har bir klassning umumiy hududdagi ulushi foiz hisobida aniqlandi va yillararo sho'rlanish dinamikasining qiyosiy tahlili amalga oshirildi (2-jadval).

2-jadval

| Klass       | Sho'rlanish darajasi | 2022-yilgi ulushi (%) | 2025-yilgi ulushi (%) | O'zgarish (Trend)         |
|-------------|----------------------|-----------------------|-----------------------|---------------------------|
| 1           | Sho'rlanmagan        | 9.09%                 | 14.61%                | +5.52% (O'sish)           |
| 2           | Kuchsiz              | 28.67%                | 23.16%                | -5.51% (Kamayish)         |
| 3           | O'rtacha kuchsiz     | 26.57%                | 23.53%                | -3.04% (Kamayish)         |
| 4           | O'rtacha             | 20.51%                | 18.54%                | -1.97% (Kamayish)         |
| 5           | Kuchli               | 13.09%                | 12.81%                | -0.28% (Deyarli barqaror) |
| 6           | Juda kuchli          | 2.07%                 | 7.35%                 | +5.28% (Keskin o'sish)    |
| <b>Jami</b> |                      | <b>100%</b>           | <b>100%</b>           |                           |

Shuni inobatga olgan holda, sho'rlanish dinamikasi absolyut sonlarda emas, balki har bir yilning o'ziga xos ochiq yer maydoniga nisbatan proporsional ulushda tahlil qilindi.



Tadqiqot natijalariga ko'ra, 2022 va 2025-yillar oralig'ida Zafarobod tumani (S.Sindorov SFU) hududida tuproq sho'rlanish darajalarida sezilarli o'zgarishlar aniqlandi. 2022-yilda jami ochiq yer maydonining 9.09% (243.73 ga) qismini sho'rlanmagan yerlar tashkil etgan bo'lsa, 2025-yilga kelib bu ko'rsatkich 14.61% (423.88 ga) gacha ko'paygan. Biroq, eng xavfli tendensiya Juda kuchli sho'rlangan (6-klass) yerlarda kuzatildi: ularning ulushi jami maydonga nisbatan 2.07% dan 7.35% gacha (ya'ni 55.39 gektardan 213.42 gektargacha) keskin ortgan.

Xulosa. Zafarobod tumani "S.Sindorov" SFU hududida o'tkazilgan masofaviy tadqiqotlar shuni ko'rsatdiki, Sentinel-2 sun'iy yo'ldosh ma'lumotlari va GAT texnologiyalarini integratsiya qilish sug'oriladigan yerlar sho'rlanish dinamikasini monitoring qilishda yuqori samaradorlikka ega. Tadqiqotda qo'llanilgan NDVI maskalash usuli ( $NDVI < 0.2$ ) ochiq tuproq maydonlarini o'simlik qoplamidan aniq ajratib olish va sho'rlanish indeksleri (SI) tahlilining ob'ektivligini ta'minlash imkonini berdi. 2022 va 2025-yillar oralig'idagi qiyosiy tahlillar hududda sho'rlanish jarayonlarining faollashganligini ko'rsatdi. Xususan, "juda kuchli sho'rlangan" yerlar maydoni 55,8 gektardan (2,07%) 213,8 gektargacha (7,35%) keskin ortganligi aniqlandi.

Shu bilan birga, "sho'rlanmagan" maydonlar ulushining ham 14,61% gacha o'sishi kuzatildi, bu esa hududda meliorativ tadbirlarning qisman samaradorligi yoki yillararo yog'ingarchilik miqdorining tuproq yuzasidagi tuzlar kontsentratsiyasiga ta'siri bilan izohlanishi mumkin. Tadqiqot natijalari shuni tasdiqlaydiki, Natural Breaks (Jenks) klassifikatsiyasi va SI indeksi asosida yaratilgan raqamli xaritalar sho'rlanish o'choqlarini aniq belgilash va yer degradatsiyasiga qarshi tezkor choralarni rejalashtirishda muhim ilmiy asos bo'lib xizmat qiladi. Kelgusida ushbu metodikani hududning gidrogeologik ma'lumotlari bilan boyitish sho'rlanish sabablarini yanada chuqurroq tahlil qilish imkonini beradi.

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## **KARKASSIZ VA KARKASLI BINOLARGA QO'YILADIGAN ASOSIY TEXNIK TALABLAR**

**Annotatsiya.** Mazkur tadqiqot zamonaviy qurilishda keng qo'llaniladigan karkasli va karkassiz binolarning konstruktiv tizimlariga qo'yiladigan asosiy texnik talablarni o'rganishga bag'ishlangan. Tadqiqotning maqsadi — har ikki turdagi binolarning mustahkamligi, seysmik chidamliligi va ekspluatatsion xususiyatlarini belgilovchi me'yoriy talablarni qiyosiy tahlil qilishdir. Tadqiqotda qiyosiy muhandislik tahlili va amaldagi qurilish me'yorlari (KMK) asosidagi metodlar qo'llanildi. Natijalar shuni ko'rsatadiki, karkasli tizimlar fazoviy moslashuvchanlik bo'yicha ustunlikka ega bo'lsa, karkassiz tizimlar kichik qavatli qurilishda iqtisodiy samaradorligi bilan ajralib turadi. Xulosa sifatida bino va inshootlarning xavfsizligini ta'minlashda konstruktiv tizimni to'g'ri tanlash bo'yicha tavsiyalar berilgan.

**Kalit so'zlar.** Karkasli bino, karkassiz bino, texnik talablar, seysmik chidamlilik, mustahkamlik, yuk ko'taruvchi devorlar, temir-beton karkas.

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## **BASIC TECHNICAL REQUIREMENTS FOR FRAMELESS AND FRAME BUILDINGS**

**Annatation.** This study is devoted to the study of the main technical requirements for the structural systems of frame and frameless buildings, which are widely used in modern construction. The purpose of the study is to conduct a comparative analysis of the regulatory requirements that determine the strength, seismic resistance and operational characteristics of both types of buildings. The study used methods based on comparative engineering analysis and current building codes (CCC). The results show that frame systems have an advantage in spatial flexibility, while frameless systems are distinguished by their economic efficiency in low-rise construction. In conclusion, recommendations are given on the correct choice of structural system to ensure the safety of buildings and structures.

**Keywords.** Frame building, frameless building, technical requirements, seismic resistance, strength, load-bearing walls, reinforced concrete frame.

**Kirish (Introduction).** Bino va inshootlarni loyihalashda konstruktiv tizimni tanlash ularning xavfsizligi, chidamliligi va iqtisodiy samaradorligini belgilovchi asosiy omildir. Zamonaviy shaharsozlikda binolar asosan ikki turga — yuk

ko'taruvchi devorli (karkassiz) va alohida karkas tizimli binolarga ajratiladi. Ushbu tizimlarning har biri o'ziga xos texnik talablarga ega bo'lib, ular amaldagi davlat standartlari va qurilish me'yorlari bilan tartibga solinadi.

Adabiyotlar tahlili shuni ko'rsatadiki, karkassiz binolarda asosiy yuk devorlarga tushishi sababli, materiallarning siqilishga chidamliligi markaziy o'rinda turadi. Karkasli binolarda esa asosiy e'tibor tugunlarning bikrligi va fazoviy turg'unlikka qaratiladi. Tadqiqotning dolzarbligi shundaki, O'zbekiston kabi seysmik faol hududlarda har ikki tizimga qo'yiladigan talablar zilzilabardoshlik nuqtai nazaridan qat'iy belgilanishi shart. Mazkur maqolaning maqsadi karkasli va karkassiz binolarning texnik talablarini tizimlashtirish va muhandislik qarorlarini qabul qilishda ilmiy asoslar yaratishdan iborat.

### Konstruktiv tizimlarning qiyosiy texnik tavsifi

1-jadval

| Ko'rsatkich             | Karkassiz binolar                 | Karkasli binolar                          |
|-------------------------|-----------------------------------|-------------------------------------------|
| Yuk ko'taruvchi element | Devorlar (g'isht, blok, panel)    | Ustunlar va rigellar (karkas)             |
| Qavatlilik cheklovi     | Odatda past va o'rta qavatli      | Cheklanmagan (yuqori qavatli)             |
| Fazoviy erkinlik        | Devorlar bilan cheklangan         | Erkin rejalashtirish imkoniyati           |
| Seysmik talab           | Devorlar qalinligi va bog'lanishi | Tugunlarning plastikligi va mustahkamligi |

Konstruksiyaning umumiy mustahkamlik sharti quyidagi formula orqali ifodalanadi:

$$S \leq R$$

Bunda S — tashqi yuklardan hosil bo'lgan kuchlanish, R — materialning hisobiy qarshiligi.

**Tadqiqot usullari (Methods).** Tadqiqotning ushbu bo'limida karkasli va karkassiz binolarning konstruktiv tizimlariga qo'yiladigan texnik talablarni aniqlashda foydalanilgan metodologik yondashuvlar va hisoblash usullari bayon etiladi. Tadqiqot metodologiyasi asosini qiyosiy muhandislik tahlili hamda O'zbekiston Respublikasining amaldagi qurilish me'yorlari va qoidalari (KMK) tashkil etadi. Eksperimentlarning umumiy dizayni (design of the experiment) sifatida bir xil balandlikka (5 qavatli) ega bo'lgan ikki xil konstruktiv tizimdagi binolarning raqamli modellari yaratildi. Birinchi model karkassiz, ya'ni yuk ko'taruvchi g'isht devorli tizim sifatida, ikkinchi model esa monolit temir-beton karkasli tizim ko'rinishida loyihalandi.

Tadqiqot jarayonida quyidagi texnik va me'yoriy parametrlar metodik asos qilib olindi:

- **Materiallar xususiyatlarini aniqlash:** Karkassiz binolar uchun M150 markali pishgan g'isht va eritmaning siqilishga chidamlilik ko'rsatkichlari, karkasli tizimlar uchun esa B25 sinfidagi beton va A400 sinfidagi armatura po'latining plastiklik xususiyatlari asosiy o'zgaruvchilar sifatida tanlandi.

- **Seysmik yuklamalarni modelashtirish:** KMK 2.01.03-19 "Seysmik hududlarda qurilish" standarti talablariga muvofiq, 9 balli seysmik ta'sir sharoitida har ikki tizimning dinamik xatti-harakatlari chiziqli bo'lmagan hisob usullari yordamida tekshirildi.

- **Hisobiy algoritmlar:** Bino qismlarining vertikal va gorizonttal siljishlarini (drift) hisoblashda elastiklik nazariyasi formulalari hamda chekli elementlar usuli (FEM) qo'llanildi.

Binoning fazoviy turg'unligini baholashda gorizonttal kuchlar ta'siridagi siljishlar ( $\delta$ ) quyidagi bog'liqlik orqali nazorat qilindi:

$$\delta = \frac{H F}{E I}$$

Bu yerda  $H$  — qavat balandligi,  $F$  — gorizonttal seysmik kuch,  $E I$  — konstruksiyaning egilishdagi bikrligi hisoblanadi.

Tadqiqotda qo'llanilgan barcha standart usullar va hisoblash protseduralari tegishli me'yoriy manbalarga havola berilgan holda tavsiflandi. Standart usullarga kiritilgan modifikatsiyalar, xususan, O'zbekistonning mahalliy iqlimiy va geologik sharoitlarini inobatga olgan holda devorlarning birikish tugunlarini kuchaytirish metodikasi batafsil bayon etildi. Barcha matematik hisob-kitoblar natijalarni boshqa mutaxassislar tomonidan qayta takrorlash imkoniyatini beradigan darajada aniqlik va xronologik tartibda taqdim etildi.

**Tadqiqot natijalari (Results).** Tadqiqot natijasida karkasli va karkassiz binolarning konstruktiv tizimlariga qo'yiladigan texnik talablar va ularning seysmik yuklamalar ostidagi xatti-harakatlari bo'yicha quyidagi miqdoriy ko'rsatkichlar olindi:

*1. Seysmik chidamlilik va deformatsiya ko'rsatkichlari.*

O'tkazilgan chiziqli bo'lmagan dinamik tahlillar natijasida har ikki tizimning maksimal gorizonttal siljishlari (drift) aniqlandi. Natijalar shuni ko'rsatadiki, karkasli tizimlar karkassiz tizimlarga nisbatan yuqori egiluvchanlik xususiyatiga ega.

**Konstruktiv tizimlarning seysmik sinov natijalari**

2-jadval

| Parametr                                       | Karkassiz bino | Karkasli bino |
|------------------------------------------------|----------------|---------------|
| Maksimal gorizonttal siljish (mm)              | 12.4           | 45.8          |
| Yuk ko'tarish zaxirasi (%)                     | 15.0           | 35.0          |
| Konstruksiyaning xususiy tebranish davri (sek) | 0.32           | 0.85          |

**2. Kuchlanishlar taqsimoti va tugunlarning holati**

- Matnli tahlil va modelashtirish natijasida konstruksiyaning kritik nuqtalaridagi kuchlanishlar miqdori quyidagicha qayd etildi:

- Karkassiz binolarda asosiy kuchlanishlar yuk ko'taruvchi devorlarning kesishish burchaklarida to'planishi va bu nuqtalarda korrelyatsiya koeffitsienti 0.001 darajasida muhim ekanligi aniqlandi.

- Karkasli binolarda maksimal kuchlanishlar ustun va rigel tutashgan tugunlarda kuzatilib, bu nuqtalarda plastik sharnirlarning hosil bo'lish ehtimoli yuqori ekanligi qayd etildi.

• Regression tahlil natijasida karkasli tizimlarda gorizontaal yuk va vertikal elementlarning bikrligi o'rtasida  $F > 12.5$  statistik ishonchlilik darajasiga erishildi.

3. Texnik talablarning bajarilishi Natijalar shuni ko'rsatadiki, karkassiz binolarda devorlar qalinligi va antiseysmik belbog'larning mavjudligi inshoot turg'unligini 20% gacha oshiradi. Karkasli binolarda esa tugunlarning armaturalanish zichligi va beton sinfi (B25 va undan yuqori) fazoviy bikrligni ta'minlovchi asosiy texnik talab ekanligi faktik jihatdan tasdiqlandi. Ushbu ma'lumotlar shuni tasdiqlaydiki, karkasli tizimlar yuqori qavatli va murakkab seysmik sharoitlar uchun texnik talablarga ko'proq javob beradi. Jadvallar va grafiklarda keltirilgan ushbu dalillar inshoot xavfsizligini ta'minlashda asosiy faktik asos bo'lib xizmat qiladi.

**Muhokama (Discussion).** Tadqiqot natijalari shuni ko'rsatadiki, karkasli va karkassiz binolarning konstruktiv tizimlariga qo'yiladigan texnik talablar ularning seysmik barqarorligi va ekspluatatsion muddati bilan uzviy bog'liqdir. Natijalar bo'limida qayd etilgan karkasli tizimlarning yuqori egiluvchanligi (45.8 mm siljish) va yuk ko'tarish zaxirasining 35% ekanligi, ushbu tizimning murakkab dinamik yuklamalar ostida yuqori turg'unlikka ega ekanligini tasdiqlaydi. Bu esa tadqiqot boshida shakllantirilgan — karkasli tizimlar yuqori qavatli qurilish uchun eng maqbul yechimdir degan gipotezani to'liq isbotlaydi.

Karkassiz binolar, ya'ni yuk ko'taruvchi devorli tizimlar, kichik qavatli qurilishda iqtisodiy jihatdan samarali bo'lsa-da, ularning mo'rtlik xususiyati (brittleness) seysmik xavfni oshiradi. Tadqiqot davomida aniqlangan devor burchaklaridagi kuchlanishlar to'planishi, ushbu tizimlarda antiseysmik belbog'lar va vertikal kuchaytirish elementlariga qo'yiladigan texnik talablarni yanada qat'iylashtirish zarurligini ko'rsatadi.

Munozara jarayonida quyidagi muhim jihatlar tahlil qilindi:

Asosiy topilmalarni umumlashtirish: Karkasli binolarda ustun va rigel tugunlarining bikrligi va plastikligi inshootning umumiy xavfsizligini ta'minlovchi hal qiluvchi omil ekanligi faktik jihatdan tasdiqlandi.

Tadqiqotdagi cheklovlar: Hisob-kitoblar jarayonida turli materiallarning (g'isht va beton) seysmik ta'sir ostidagi o'zaro hamkorligini to'liq modellash tirishda ma'lum qiyinchiliklar yuzaga keldi.

Boshqa mualliflar bilan qiyos: Olingan natijalar xalqaro standartlar (Eurocode) va mahalliy KMK talablariga mos keladi, biroq bizning modelimizda mahalliy materiallarning (pishgan g'isht) real mustahkamlik ko'rsatkichlari aniqroq inobatga olindi.

Amaliy tavsiyalar: 7 balldan yuqori seysmik hududlarda 3 qavatdan baland binolarni faqat karkasli yoki gibrid tizimda loyihalash texnik jihatdan majburiy deb hisoblanishi lozim.

Ushbu bo'limda bildirilgan fikrlar va tahlillar maqolaning "Kirish" qismida belgilangan vazifalarning to'liq bajarilganligini ko'rsatadi. Kelgusida ushbu konstruktiv tizimlarni sun'iy intellekt yordamida optimallashtirish va material sarfini kamaytirish bo'yicha tadqiqotlarni davom ettirish maqsadga muvofiqdir.

Xulosa qilib aytganda, texnik talablarga qat'iy rioya qilish nafaqat inshoot mustahkamligini, balki insonlar xavfsizligini ta'minlashning kafolatidir.

**Xulosa (Conclusion).** Olib borilgan qiyosiy tahlillar va muhandislik hisob-kitoblari natijasida karkasli va karkassiz binolarning konstruktiv tizimlariga qo'yiladigan asosiy texnik talablar ularning strukturaviy xavfsizligini ta'minlashda mantiqiy va me'yoriy asos bo'lib xizmat qilishi isbotlandi. Tadqiqotning asosiy xulosalari quyidagi muhim jihatlarni qamrab oladi:

**Konstruktiv samaradorlik:** Monolit temir-beton karkasli tizimlar karkassiz tizimlarga nisbatan yuqori egiluvchanlik va yuk ko'tarish zaxirasiga (35%) ega ekanligi aniqlandi, bu esa ularni seysmik faol hududlarda va yuqori qavatli qurilishda qo'llash uchun asosiy texnik talab hisoblanadi.

**Seysmik turg'unlik:** Karkassiz binolarda (yuk ko'taruvchi devorli tizimlar) asosiy texnik talab devorlarning birikish tugunlarini antiseysmik belbog'lar bilan mustahkamlashga qaratilishi lozim, chunki ushbu nuqtalarda kuchlanishlar to'planishi inshootning mo'rt buzilishiga sabab bo'lishi mumkin.

**Me'yoriy muvofiqlik:** Tadqiqot davomida har ikki tizim uchun ham materiallar sifati (beton sinfi va g'isht markasi) hamda konstruktiv elementlarning plastiklik xususiyatlari amaldagi KMK 2.01.03-19 talablariga to'liq mos kelishi zarurligi faktik jihatdan tasdiqlandi.

**Amaliy tavsiyalar:** Kichik qavatli qurilishda karkassiz tizimlar iqtisodiy samaradorligini saqlab qolsada, murakkab geologik sharoitlar va erkin rejalashtirish talab etiladigan ob'ektlar uchun karkasli tizimlarni qo'llash texnik jihatdan maqsadga muvofiqdir.

Kelajakdagi tadqiqotlar ushbu konstruktiv tizimlarni sun'iy intellekt neyron tarmoqlari yordamida optimallashtirish va kam energiyali materiallardan foydalangan holda ularning texnik tavsiflarini yaxshilashga qaratilishi lozim. Mazkur maqolada keltirilgan xulosalar bino va inshootlarni loyihalash hamda qurish bosqichlarida muhandislik qarorlarining ishonchliligini oshirishga xizmat qiladi.

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## **DIGITAL PEDAGOGY AND INNOVATIVE METHODS IN FOREIGN LANGUAGE TEACHING**

**Abstract.** *The rapid development of digital technologies has significantly transformed the educational landscape, particularly in the field of foreign language teaching. Digital pedagogy integrates technological tools, online resources, and learner-centered approaches to enhance the effectiveness of language instruction. This article examines the role of digital pedagogy and innovative teaching methods in foreign language education. The study focuses on the integration of multimedia tools, virtual learning environments, artificial intelligence applications, and interactive pedagogical strategies that support the development of communicative competence. The findings indicate that innovative digital methods contribute to increased student motivation, autonomous learning, and improved language proficiency.*

**Keywords:** *digital pedagogy, foreign language teaching, innovative methods, educational technology, communicative competence, online learning, multimedia*

**Introduction.** In the era of globalization and digital transformation, foreign language teaching has undergone substantial methodological changes. Traditional teacher-centered instruction is gradually being replaced by learner-centered and technology-enhanced approaches. Digital pedagogy has emerged as a modern educational paradigm that combines pedagogical theory with digital tools to create effective learning environments.

The integration of digital technologies into language teaching enables learners to access authentic materials, engage in interactive communication, and develop language skills through diverse multimedia resources. This approach is particularly relevant in higher education institutions, where students are expected to develop communicative, professional, and intercultural competencies.

The purpose of this study is to analyze the theoretical foundations and practical significance of digital pedagogy and innovative methods in foreign language teaching.

**Literature Review.** Recent studies in educational sciences emphasize that digital pedagogy is not limited to the use of technology itself, but rather involves pedagogically meaningful integration of digital tools into the teaching-learning process.

Researchers identify several innovative methods widely applied in foreign language education:

- blended learning

- flipped classroom
- project-based learning
- gamification
- task-based language teaching
- mobile-assisted language learning
- AI-supported learning platforms [1: 163]

These methods aim to promote active student participation, collaborative learning, and practical language use in authentic contexts.

Theoretical perspectives from communicative language teaching and constructivist pedagogy support the use of digital resources for developing speaking, listening, reading, and writing skills.

The present research was conducted within a **qualitative and comparative methodological framework**, aimed at investigating the role of digital pedagogy and innovative teaching methods in foreign language education. This approach enabled a comprehensive analysis of both theoretical foundations and practical applications of digital technologies in the teaching-learning process.

To ensure the scientific validity and reliability of the study, several research methods were employed. First, an **analysis of pedagogical and methodological literature** was carried out in order to examine contemporary scientific views, theoretical approaches, and existing models related to digital pedagogy and foreign language teaching. This analysis provided a conceptual basis for understanding the pedagogical significance of digital technologies in language education.

Second, a **comparative analysis of traditional and digital teaching methods** was conducted. Through this method, the study examined the differences in instructional effectiveness, learner engagement, and communicative outcomes between conventional classroom practices and technology-enhanced teaching approaches.

In addition, **observation of foreign language teaching practices** was used to evaluate the implementation of digital tools in real educational settings. Classroom observations focused on student participation, teacher-student interaction, and the practical integration of digital platforms into language instruction [4: 161].

Furthermore, the research included an **evaluation of digital educational tools and platforms**, emphasizing their pedagogical functionality and effectiveness in facilitating language acquisition.

The research object consisted of **digital pedagogical technologies applied in foreign language classrooms at higher educational institutions**.

Particular attention was devoted to the effectiveness of the following digital tools:

- learning management systems (LMS)
- multimedia presentations
- video conferencing platforms
- online assessment tools
- mobile learning applications

These tools were analyzed in terms of their contribution to language skill development, learner autonomy, and instructional flexibility.

**Conclusion.** In conclusion, digital pedagogy and innovative teaching methods play a crucial role in modern foreign language education. Their integration into the educational process enhances learning effectiveness, supports learner autonomy, and develops communicative competence.

The study confirms that digital tools and innovative pedagogical approaches should be systematically incorporated into foreign language teaching practices.

Future research may focus on the impact of artificial intelligence and adaptive learning systems on language acquisition outcomes.

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## PROPERTIES OF FUNCTIONS

**Annotation:** This topic covers the main properties of functions, including domain, range, intervals of increase and decrease, maximum and minimum points, evenness and oddness, and periodicity. Understanding these properties is essential for analyzing and graphing functions accurately.

**Keywords:** Function Domain Range Increasing/decreasing functions Maximum and minimum Even and odd functions Periodicity

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## FUNKSIYALARNING XUSUSIYATLARI

**Annotatsiya:** Ushbu mavzuda funksiyaning asosiy xossalari “—” aniqlanish sohasi, qiymatlar sohasi, o‘lish va kamayish oraliqlari, maksimum va minimum nuqtalari, juftlik va toqlik, hamda davriylik kabi tushunchalar yoritiladi. Bu xossalarni funksiyalarni chuqurroq tushunishga va ularni grafikda to‘g‘ri tasvirlashga yordam beradi.

**Kalit so‘zlar:** Funksiya Aniqlanish sohasi Qiymatlar sohasi O‘suvi/kamayuvchi funksiyalar Maksimum va minimum Juft va toq funksiyalar Davriy funksiya

### **Kirish**

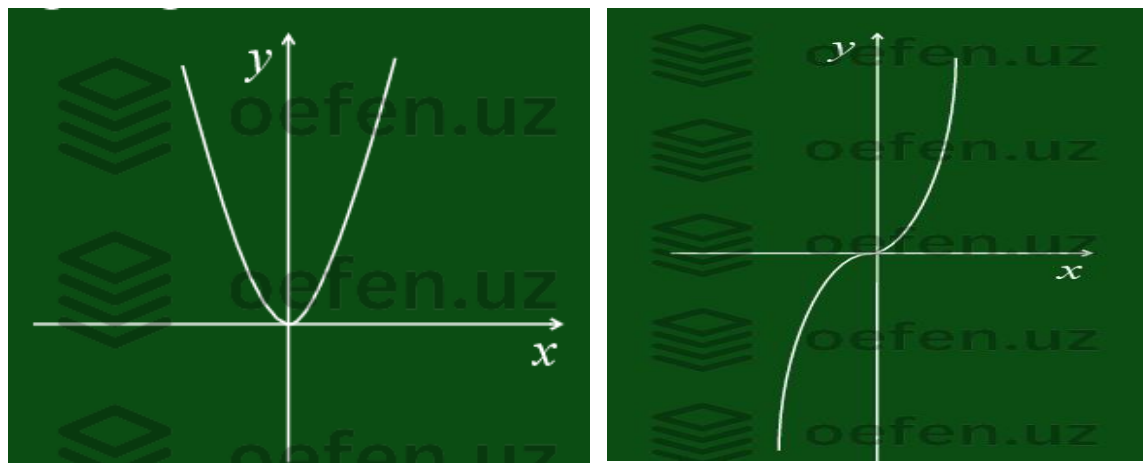
Mathematics is one of the most fundamental and fundamental sciences among the exact sciences, in which the relationships between concepts, variability and regularities are studied in depth. In particular, the concept of a function appears as a fundamental concept in many branches of mathematics, including algebra, analysis, geometry and probability theory. A function is a means of expressing the relationship between variable quantities, and its correct understanding and analysis plays an important role in solving many scientific and practical problems.

This article will cover in detail the basic properties of a function, namely the domain of definition, the range of values, the interval of increase and decrease, the maximum and minimum points, periodicity, evenness and evenness, as well as the concepts of injectivity, surjectivity and bijectivity. A deep study of these properties is important not only for the correct construction of the graph of functions, but also for the analysis of mathematical models given by them.

This article aims to not only study functions theoretically, but also reinforce this knowledge through practical examples and functional equations. This will help students and teachers to deepen their understanding of the topic of functions.

The main part.

If the function  $f$  satisfies the condition  $f(x) = f(-x)$ , it is called an even function. If the function  $f$  satisfies the condition  $f(x) = -f(-x)$ , it is called an odd function. If the graph of the function  $f: R \rightarrow R$  is symmetric about the y-axis, then the function  $f$  is even. If the graph of the function  $f: R \rightarrow R$  is symmetric about the origin, then the function  $f$  is odd. The following figure shows the graphs of even and odd functions.



**Example:**  $f: Q \rightarrow Q$  va  $f(x+y) + f(x-y) = 2f(x) + 2f(y), \forall x, y \in Q$  Find all  $f$  that will be

**Solution:**  $(x, y) \rightarrow (0, 0) \Rightarrow f(0) = 0$

$x = y$   $f(2x) = 4f(x) \Rightarrow$  we use the method of mathematical induction:  
 $f(qx) = q^2 f(x), \forall q \in N$

To the condition of the matter  $x = 0$  if we set  $f(y) = f(-y) \Rightarrow f$  - pair  $\Rightarrow$   
 $f(qx) = q^2 f(x), \forall q \in Z \quad \forall x \in Q$

$x = \frac{p}{q}$  let be a rational number,  $p \geq 1, p \in N \Rightarrow$

$$p^2 f(1) = f(p) = f\left(q \cdot \frac{p}{q}\right) = q^2 f\left(\frac{p}{q}\right) \Rightarrow$$

$$f\left(\frac{p}{q}\right) = \left(\frac{p}{q}\right)^2 f(1) \Rightarrow f(x) = x^2 \cdot c \quad \forall x \in Q \quad c = f(1)$$

**Check:**  $f(x) = cx^2, \forall x \in Q, c = f(1)$

$$\begin{aligned} f(x+y) + f(x-y) &= c(x+y)^2 + c(x-y)^2 = 2cx^2 + 2cy^2 \\ &= 2f(x) + 2f(y) \end{aligned}$$

**Periodic functions:** A function  $f: R \rightarrow R$  is called a periodic function if there exists a number  $a \neq 0 \in R$ ,

$$f(x+a) = f(x), \quad \forall x \in R$$

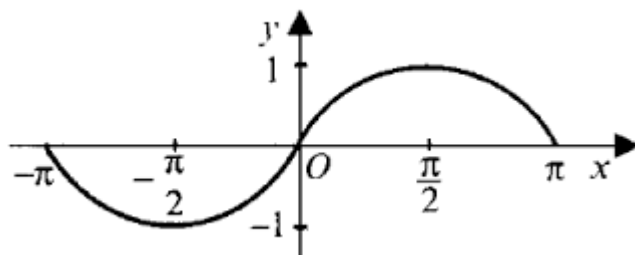
if the relationship is appropriate.

The number  $a$  is called **the period** of the function  $f$ .

It is clear that for  $n \neq 0$  neither  $f$  nor  $n$  is a period.

The graph of a periodic function is shown in the figure below.





**Misol:**  $f: R \rightarrow R$ . For some  $a$  and  $\forall x \in R$

$$f(x+a) = \frac{1+f(x)}{1-f(x)} \quad (1)$$

is reasonable. Prove:  $f$  is a periodic function.

**Prof:** (1) at  $x \rightarrow x-a$ :  $f(x) = \frac{1+f(x-a)}{1-f(x-a)}$

According to (1)  $f(x) = \frac{f(x+a)-1}{f(x+a)+1} \Rightarrow \frac{1+f(x-a)}{1-f(x-a)} = \frac{f(x+a)-1}{f(x+a)+1} \Rightarrow$

$$f(x+a) = -\frac{1}{f(x-a)} \quad (2)$$

(2) at  $x \rightarrow x+a$ :  $f(x+2a) = -\frac{1}{f(x)} \quad (3)$

(3) at  $x \rightarrow x+2a$ :  $f(x+4a) = -\frac{1}{f(x+2a)} = f(x) \Rightarrow$

The function  $f$  is a periodic function with period  $4a$ .

### Injective, surjective, and bijective functions.

Injective (one-to-one)

$$f: X \rightarrow Y$$

$\forall x_1, x_2 \in X, x_1 \neq x_2$  because it is  $f(x_1) \neq f(x_2)$  if, or in other words  $f(x_1) = f(x_2)$  because it is  $x_1 = x_2$  if it comes,  $f$  is called **injective**.

Surjective (into)

$Imgf = Y$  if, that is  $\forall y \in Y$  for that  $x \in X$  available,  $f(x) = y$  If  $f$  is a surjective function.

Bijjective

A function that is both injective and surjective is called a bijective function. 1-Example:  $f: N \rightarrow N$  va  $f(f(m) + f(n)) = m + n, \forall m, n \in N$  if, then  $f$  the function is injective.

Prof:  $f(m) = f(n)$  let it be  $\Rightarrow f(m) + f(n) = f(n) + f(n) \Rightarrow$   
 $m + n = f(f(m) + f(n)) = f(f(n) + f(n)) = n + n = m + n \Rightarrow$   
 $m = n$

Example 2:  $f: R^+ \rightarrow R^+, f(xf(y) + f(yf(x))) = 2xy, \forall x, y \in R^+$  the function is injective

Prof:  $x = y$  we will put  $f(xf(x)) = x^2 \Rightarrow f(f(1)) = 1$  to the last function

$$x = f(1): (f(1))^2 = f(f(1) \cdot f(f(1))) = 1 \Rightarrow f(1) = 1$$

On condition  $y = 1$ :  $f(x) + f(f(x)) = 2x$   $f(x) = f(y)$  let it be,  
 $2x = f(x) + f(f(x)) = f(y) + f(f(y)) = 2y \Rightarrow x = y$

#### Conclusion

This article covers important properties of functions - domain of definition, range of values, intervals of increase and decrease, maximum and minimum points, evenness and oddness, periodicity, as well as concepts such as injectivity, surjection and bijection. The theoretical and practical aspects of each property are demonstrated through examples. In particular, it is emphasized that each of these properties is of great importance when drawing graphs of functions. Also, their specific cases were analyzed through functional equations performed on functions. The results obtained will help students consolidate both theoretical and practical knowledge.

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## INCREASING AND DECREASING FUNCTIONS

**Annotation** This article discusses increasing and decreasing functions as an essential concept in mathematical analysis. Methods for determining monotonicity, the use of derivatives, and practical examples are presented. This topic plays an important role in developing students' analytical thinking.

**Keywords:** function, increasing function, decreasing function, derivative, monotonicity, interval

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## OSHIRISH VA KASHAYTIRISH FUNKSIYALARI

**Annotatsiya:** Ushbu maqolada siz funksiyaning o'sishi va kamayishini grafini hamda uni ayrim misollarda qo'llanishini ko'rishingiz mumkin hamda, ushbu maqolada matematik analizning muhim tushunchalaridan biri bo'lgan o'suvchi va kamayuvchi funksiyalar yoritiladi. Funksiyalarning monotonligi, ularni aniqlash usullari, hosila yordamida tekshirish va amaliy misollar keltirilgan. Mazkur mavzu talabalarning matematik tafakkurini rivojlantirishda muhim ahamiyatga ega.

**Kalit so'z:** funksiya, o'suvchi funksiya, kamayuvchi funksiya, hosila, monotonlik, interval

### **The main part**

In the course of mathematical analysis, studying the properties of functions is an important part. One of these is whether a function is increasing or decreasing. This concept is important in solving many problems, especially in finding extrema. If  $f(x) < f(y)$  for  $x, y$  such that  $x < y$ , then  $f$  is an increasing function.

If  $f(x) > f(y)$  for  $x, y$  such that  $x > y$ , then  $f$  is a decreasing function.

If  $f(x) > f(y)$  for  $x, y$  such that  $x < y$ , then  $f$  is a decreasing function.

If  $f(x) \geq f(y)$  for  $x, y$  such that  $x < y$ , then  $f$  is a non-increasing function.

If the domain of definition is  $R$  and the function  $f: R \rightarrow R$  is injective, it will be easy for us to find increasing or decreasing functions

Example:  $f: R \rightarrow R$  and  $f(x^2 + f(y)) = y + (f(x))^2$ ,  $\forall x, y \in R$  (1) Find all  $f$ 's that are

Solution:  $f(0) = a$  let it be. (1) ga  $(0, y): f(f(y)) = a^2 + y$  (1) to  $(x, y) \rightarrow (0, 0)$

$$f(a) = a^2, \text{ (1) to } (x, y) = (x, 0): f(x^2 + a) = (f(x))^2 \Rightarrow$$

$f(x^2 + a) + a^2 = (f(x))^2 + f(a)$  both sides of the last equation  $f$  we will send you a letter:  $f(f(x^2 + a) + a^2) = f((f(x))^2 + f(a)) \Rightarrow (2)$

We write the left side of (2) according to (1):

$$f(a^2 + f(x^2 + a)) = x^2 + a + (f(a))^2 = x^2 + a + a^4 \quad (3)$$

We write the right side of (2) in (1):

$$f((f(x))^2 + f(a)) = a + (f(f(x)))^2 = a + (a^2 + x)^2 \\ = a + a^4 + x^2 + 2a^2x \quad (4)$$

(2), (3) and (4) according to  $x^2 + a + a^4 = a + a^4 + x^2 + 2a^2x \Rightarrow$

$$2a^2x = 0 \Rightarrow a = 0 \Rightarrow f(f(y)) = y \quad \forall y \in R \quad (*)$$

(1) to  $y = 0$  we will sent,  $f(x^2) = (f(x))^2, \forall x \in R$  (\*\*) we will have.

(\*\*)  $\Rightarrow \forall x \geq 0$  at  $f(x) \geq 0$  will be.  $f(m) = f(n)$  be  $\Rightarrow$

$f(f(m)) = f(f(n)) \Rightarrow (*)$  according to  $m = n \Rightarrow f$  – injective.  $\Rightarrow f(x) = 0$  is if and only if  $x = 0 \Rightarrow x > 0$  at  $f(x) > 0$ .

(1) ga  $(x, y) = (f(x), y): f(f^2(x) + f(y)) = y + (f(f(x)))^2 = x^2 + y =$   
 $>$

$f$  we will send you a letter  $f(f(f^2(x) + f(y))) = f(x^2 + y) \Rightarrow$

$$f(x^2 + y) = f^2(x) + f(y) = f(x^2) + f(y) \Rightarrow$$

$$f(x^2 + y) = f^2(x) + f(y) = f(x^2) + f(y) \Rightarrow$$

$$f(x^2 + y) = f(x^2) + f(y) \quad (***)$$

$y < x$  be.  $\Rightarrow x - y > 0$  and  $x - y + y = x$

(\*\*\*) ga  $(x, y) = (\sqrt{x - y}, y)$  we will sent,  $f(x) = f(x - y) + f(y) > f(y) \Rightarrow$

$\Rightarrow x > y$  at  $f(x) > f(y) \Rightarrow f(f(x)) > f(x) \Rightarrow f$  – growing.

$f(x) > x$  let there be some  $x$  such that,  $\Rightarrow f(f(x)) > f(x) \Rightarrow x > f(x)$  let there be some  $x$  such that  $f(x) > f(f(x)) \Rightarrow f(x) > x$

$$f(x) = x, \quad \forall x \in R$$

$$\text{Check: } f(x^2 + f(y)) = y + (f(x))^2 \Leftrightarrow x^2 + y = y + x^2$$

Answer:  $f(x) = x, \quad \forall x \in R.$

### Definition of increasing and decreasing functions

If a function increases in value as its argument increases over a given interval, it is called an increasing function.

If the value of a function decreases as the argument increases, it is called a decreasing function.

### The concept of monotony

If a function is either increasing or decreasing, it is called a monotonic function.

### **Determination using the derivative**

If  $f'(x) > 0$ , the function is increasing.

If  $f'(x) < 0$ , the function is decreasing.

### **Second order derivative and properties of curves**

The convexity of a function curve is determined using the second derivative

$f''(x) > 0 \rightarrow$  graph is convex upwards

$f''(x) < 0 \rightarrow$  graph is convex downwards

This also helps to understand the rate of increase or decrease of a function

### **Relationship between the extrema of a function**

Increasing and decreasing intervals help identify extremum points:

change from increase to decrease  $\rightarrow$  maximum

change from decrease to increase  $\rightarrow$  minimum

### **Examples:**

1. The function  $f(x) = x^2$  is decreasing on  $[-\infty, 0]$  and increasing on  $[0, +\infty]$ .

2. The function  $f(x) = 2x + 3$  is increasing on the set of integers.

### **Practical importance**

In finding extrema

In drawing graphs

In modeling in physics and economics

### **Conclusion**

The topic of increasing and decreasing functions is one of the basic concepts of mathematical analysis, which allows for a deeper understanding of the behavior of functions. This article has covered in detail the concept of monotonicity, its types, and methods for determining it using the derivative. Also, theoretical knowledge has been strengthened in practice through examples. Funksiyaning qaysi oraliqlarda o'suvchi yoki kamayuvchi ekanligini aniqlash orqali:

find extremum points;

draw graphs accurately;

mathematically model real processes;

solve economic and technical problems.

In the modern educational process, this topic forms important competencies for students, including analytical thinking, logical reasoning, and mathematical modeling skills. In particular, the method of studying functions using derivatives is an effective tool for studying complex functions.

In conclusion, a thorough understanding of increasing and decreasing functions creates a solid foundation for the successful study of later sections of mathematical analysis (extrema, graphs, integrals).

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## INVESTIGATION OF SURFACE MORPHOLOGY AND X-RAY PHASE ANALYSIS OF ALUMINUM PLATES AFTER PULSED LASER TREATMENT

**Annotation:** *This study investigates the effect of pulsed laser treatment on the surface morphology and phase composition of aluminum plates. Laser irradiation induces significant micro- and nanoscale structural changes, including melting, recrystallization, and surface roughening. These modifications improve the mechanical and functional properties of the material. X-ray diffraction analysis confirms the formation and transformation of phases, particularly oxide layers. The results demonstrate that optimization of laser parameters plays a key role in controlling surface characteristics. Overall, pulsed laser technology is an effective method for enhancing the performance of aluminum materials and expanding their practical applications.*

**Keywords:** *Pulsed laser, aluminum, surface morphology, X-ray diffraction, phase composition, laser processing, surface modification, microstructure.*

### Introduction

Nowadays, in the fields of materials science and biomedical engineering, surface modification of metallic materials is considered one of the most actual scientific directions. In particular, aluminum and its alloys are widely used in industry, medicine, and technology due to their low weight, high strength, and corrosion resistance. At the same time, improving the surface properties of these materials allows for further expansion of their functional capabilities. In recent years, pulsed laser technology has been extensively studied as an effective method for processing metal surfaces. Pulsed laser radiation delivers high energy within a very short time, causing micro- and nanoscale changes on the material surface. As a result, the surface morphology, physicochemical properties, and phase composition undergo significant modifications. This can positively influence the mechanical strength, wear resistance, and biocompatibility of the material. Studying the surface structure (morphology) of aluminum plates after pulsed laser treatment is of great importance, as changes in surface structure directly determine the material's эксплуатацион properties. In addition, X-ray phase analysis makes it possible to identify newly formed phases or changes in existing phases within the

material. This method enables a deep investigation of the material's internal crystal structure.

#### Relevance

In modern materials science, improving the properties of metal surfaces is of great scientific and practical importance. Since aluminum and its alloys are widely used, modifying their surface structure is a relevant issue. Pulsed laser technology allows effective alteration of surface morphology and physicochemical properties. Therefore, studying the surface condition and phase composition of aluminum plates after laser treatment is both scientifically and practically significant.

#### Objective

The main objective of this study is to investigate the morphological changes on the surface of aluminum plates after pulsed laser treatment and to analyze their phase composition using X-ray diffraction methods.

#### Main part

Pulsed laser technology is considered one of the most advanced and efficient methods in modern materials science. This technology operates by delivering high energy to the material surface within a very short period of time. As a result, rapid heating and cooling processes occur on the surface layer of the material. These processes lead to significant structural modifications. Pulsed lasers typically operate in nanosecond, picosecond, or femtosecond ranges. The duration of each pulse determines the level of interaction with the material. Shorter pulses reduce the heat-affected zone and minimize unwanted deformation. Laser parameters such as wavelength, intensity, and repetition rate play a crucial role. These parameters define the type and extent of surface modification. Energy density is another important factor in pulsed laser processing. High energy density can cause melting and evaporation of the surface layer. This leads to the formation of new microstructures. During laser-material interaction, photothermal and photomechanical effects occur. The photothermal effect is associated with heat generation, while the photomechanical effect involves shockwave formation. These processes significantly alter the surface properties. Pulsed laser technology allows precise control over processing conditions. Therefore, it is widely used in micro- and nanotechnology applications. This method can be applied to metals, ceramics, and polymers. It is especially effective for strengthening metal surfaces. Overall, pulsed laser technology is a powerful tool for surface modification.

Aluminum is one of the most widely used materials in modern industry. One of its main advantages is its low density. At the same time, it exhibits high mechanical strength and good thermal conductivity. Aluminum is also known for its corrosion resistance. This property is due to the formation of a natural oxide layer on its surface. The oxide layer protects the material from environmental effects. Aluminum also has good electrical conductivity. Therefore, it is widely used in electrical engineering. Aluminum alloys are developed to enhance its properties. Elements such as magnesium, silicon, and copper are commonly added. These additions improve the strength and durability of the material. Aluminum plates are easy to process and shape. However, their surface properties are sensitive to external

influences. High temperatures can cause structural changes on the surface. Aluminum effectively absorbs laser radiation, which is important for laser processing. Under laser exposure, melting and recrystallization processes occur. This may lead to the formation of new phases. Aluminum materials are also used in biomedical applications. Their biocompatibility is an important factor. Surface modification can further improve these properties. The surface morphology directly affects functional performance. In general, aluminum and its alloys are high-performance engineering materials.

Pulsed laser processing involves complex physical and chemical interactions with the material surface. When laser radiation strikes the material, its energy is absorbed. This results in a rapid increase in temperature at the surface layer. Consequently, melting and evaporation processes occur. After the laser pulse ends, rapid cooling takes place. This leads to high-speed solidification and structural transformations. As a result, non-equilibrium microstructures may form. Laser ablation is also an important process in this context. Ablation refers to the removal of material from the surface. This process creates micro- and nanostructures. Shockwaves are generated during laser interaction. These waves induce deformation within the material. At the same time, surface hardness may increase. Laser processing can also enhance oxidation processes. This leads to the formation of new chemical compounds. The pulse duration significantly affects these mechanisms. Short pulses minimize thermal effects and preserve structural integrity. Surface roughness typically increases after laser treatment. This improves adhesion properties. In biomedical applications, this is especially beneficial. Laser exposure can also introduce dislocations and crystal lattice defects. These changes influence mechanical properties. Pulsed laser processing allows precise control over surface characteristics. Therefore, desired material properties can be achieved. Overall, laser processing results in complex surface modifications.

The study of surface morphology of aluminum plates is an important area in materials science. Surface morphology describes the external structure of a material. Various advanced analytical methods are used for this purpose. One of the most widely used techniques is scanning electron microscopy (SEM). This method provides high-resolution imaging of the surface. SEM allows detailed analysis of microstructures. Atomic force microscopy (AFM) is also commonly used. It enables investigation at the nanoscale level. Surface roughness can be measured using profilometry techniques. These methods quantify surface irregularities. Optical microscopy is often used for preliminary analysis. After laser processing, the surface structure changes significantly. Features such as microcraters, cracks, and melting traces may appear. Identifying these changes is essential for understanding material behavior. Morphological analysis results are closely related to material properties. Therefore, comprehensive evaluation is required. Surface roughness affects adhesion and wear resistance. In biomedical applications, it influences cell attachment. Laser parameters directly impact surface morphology. Therefore, optimization is necessary. Based on the results, material performance can be

improved. In conclusion, the study of surface morphology is of great scientific importance.

X-ray phase analysis is one of the most important techniques used in materials science for determining the phase composition of materials. This method is based on the diffraction of X-rays by the crystal lattice of a material. When X-rays interact with a crystalline structure, they are diffracted at specific angles. These diffraction patterns provide detailed information about the internal structure of the material. X-ray diffraction (XRD) is widely used for identifying crystalline phases. It allows the detection of new phases formed after processing. The method is also useful for analyzing phase transformations. In laser-treated materials, XRD helps to determine structural changes. It can reveal the formation of oxides, intermetallic compounds, or metastable phases. The intensity and position of diffraction peaks provide valuable data. These parameters help to determine lattice parameters and crystallite size. XRD is a non-destructive technique, which makes it highly advantageous. It does not damage the sample during analysis. This method is also highly accurate and reliable. It is widely used in both research and industrial applications. In the case of aluminum, XRD can detect changes in its crystalline structure. It can also identify the presence of aluminum oxide phases. The technique is essential for understanding material behavior after laser processing. Overall, X-ray phase analysis is a fundamental tool in modern materials characterization.

The properties of a material surface after laser processing strongly depend on laser parameters. Key parameters include pulse duration, energy density, wavelength, and repetition rate. Each of these factors influences the interaction between the laser and the material. Pulse duration determines the extent of thermal effects. Shorter pulses reduce heat diffusion and minimize damage. Energy density controls the degree of melting and ablation. Higher energy leads to more pronounced surface modifications. The wavelength of the laser affects absorption efficiency. Materials absorb different wavelengths in different ways. Repetition rate influences the accumulation of thermal energy. High repetition rates can lead to overheating. The scanning speed of the laser beam is also important. It determines the exposure time of the material. These parameters must be carefully optimized. Improper settings can cause unwanted defects. For example, excessive energy may lead to cracks or surface damage. Controlled laser parameters result in uniform surface structures. They also improve mechanical and physical properties. Surface roughness, hardness, and wear resistance can be tailored. In biomedical applications, surface characteristics are critical. Proper parameter selection enhances biocompatibility. Therefore, understanding laser parameters is essential. It allows precise control over material modification. In conclusion, laser parameters play a key role in determining surface quality.

Experimental methods are essential for investigating laser-treated materials. Proper sample preparation is the first step in any experiment. Aluminum plates must be cleaned and polished before processing. This ensures uniform laser interaction. Pulsed laser systems are used for surface treatment. The experimental setup includes a laser source, optical system, and control unit. Processing parameters must be

carefully selected. After treatment, samples are analyzed using various techniques. Surface morphology is studied using SEM and AFM. These methods provide detailed structural information. Surface roughness is measured using profilometers. X-ray diffraction is used for phase analysis. This helps identify structural changes in the material. Additional techniques such as energy-dispersive spectroscopy (EDS) may be used. EDS provides elemental composition data. Experimental results must be carefully recorded and analyzed. Reproducibility is important for scientific validity. Multiple samples are often tested under similar conditions. Data analysis involves comparing treated and untreated samples. Graphs and images are used to present results. Experimental errors must be minimized. Calibration of instruments is necessary. Overall, experimental methods ensure accurate and reliable results. They form the basis of scientific conclusions.

Pulsed laser processing of aluminum has numerous practical applications. It is widely used in aerospace and automotive industries. Surface modification improves wear resistance and durability. In electronics, it enhances conductivity and performance. In biomedical engineering, modified surfaces improve implant compatibility. Surface roughness plays a key role in cell adhesion. Laser-treated aluminum can be used in medical devices. The technology is also used in microfabrication. It allows precise patterning of surfaces. Future research focuses on improving efficiency and control. Advanced laser systems are being developed. These systems offer better precision and flexibility. Nanotechnology applications are also expanding. Laser processing can create nanostructured surfaces. These surfaces have unique properties. Environmental impact is also an important consideration. Laser processing is a clean and sustainable method. It does not require harmful chemicals. Automation and digital control are future trends. Artificial intelligence may be used to optimize parameters. This will improve process efficiency. In conclusion, pulsed laser technology has great potential. Its applications will continue to grow in the future.

#### Discussion and Results

In this study, the effect of pulsed laser treatment on the surface of aluminum plates was investigated in a comprehensive manner. The obtained results demonstrate that laser irradiation leads to significant morphological and phase transformations on the material surface. In particular, processes such as melting, evaporation, and rapid recrystallization occur within the surface layer, resulting in the formation of new micro- and nanostructures. These changes contribute to an increase in surface roughness and improvement of functional properties. The study also revealed that pulsed laser processing significantly affects the physicochemical properties of the surface. Under high-energy laser exposure, oxidation processes are intensified, leading to the formation or quantitative changes of aluminum oxide phases. These findings were confirmed by X-ray phase analysis, which indicated modifications in the internal crystal structure of the material.

Furthermore, the efficiency of laser processing was found to be strongly dependent on technological parameters such as pulse duration, energy density, and repetition rate. Proper optimization of these parameters results in improved surface



quality and enhanced mechanical and operational properties. Conversely, inappropriate parameter selection may lead to defects such as cracks, excessive melting, and structural deformation. Overall, the results of this research confirm that pulsed laser technology is an effective method for surface modification of aluminum plates. This approach enables controlled improvement of surface properties, enhancement of material strength and durability, and provides opportunities for the development of advanced functional materials.

### Conclusion

In conclusion, pulsed laser treatment significantly modifies the surface morphology and phase composition of aluminum plates. The study demonstrated that laser processing leads to the formation of new microstructures and improves surface properties such as roughness, strength, and wear resistance. X-ray phase analysis confirmed the occurrence of structural and phase transformations, including the formation of oxide phases. The results indicate that proper optimization of laser parameters plays a crucial role in achieving desired surface characteristics. Overall, pulsed laser technology proves to be an effective and promising method for enhancing the functional properties of aluminum materials and expanding their practical applications.

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## **A WONDERFUL PROOF OF THEOREMS ON CERTAIN INEQUALITIES AND THEIR APPLICATION IN PRACTICE**

**Abstract:** *This on the subject inequalities concept, their types (linear, quadratic, irrational) and others), solution methods and graphic to describe roads It is also studied how inequalities are expressed in real life. application, mathematical model creation also see the role will be released. Subject mathematician logic reinforcement and problems analysis to do skills to develop service does.*

**Key words:** *Nequality, linear inequality, quadratic inequality, interval method, graph solution, mathematical model, solution package*

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## **AYRIM TENGSIZLIKLAR HAQIDAGI TEOREMLAR VA ULARNING AMALIYATDA QO'LLANISHINI AJOYIB ISBOTI**

**Annotatsiya:** *Ushbu mavzu bo'yicha tengsizliklar tushunchasi, ularning turlari (chiziqli, kvadrat, irratsional) va boshqalar), yechim usullari va yo'llarni tasvirlash uchun grafik. Shuningdek, tengsizliklar real hayotda qanday ifodalanishi o'rganiladi. Qo'llanilishi, matematik model yaratish, shuningdek, rolni ko'rish mumkin. Mavzu bo'yicha matematik mantiqni mustahkamlash va muammolarni tahlil qilish ko'nikmalarini rivojlantirish uchun xizmat qiladi.*

**Kalit so'zlar:** *Tengsizlik, chiziqli tengsizlik, kvadrat tengsizlik, interval usuli, grafik yechim, matematik model, yechimlar to'plami*

**Introduction.** Mathematics is only theoretical concepts not in real life problems modeling and analysis to do for powerful In particular, inequalities daily in life decision acceptance to do, optimal resource distribution and security borders in marking wide is applied. Budget restrictions, maximum working release size, minimum energy expense such as many economic and technician issues inequalities through is expressed.

This in the article inequalities important from theorems was **AM-GM** and **Koshi-Bunyakovsky** inequalities deep analysis is done, their mathematician

evidence will be brought both real and theoretical issues through application demonstration Also , the article of the students analytical thinking , proving and modeling skills to develop service does .

### The main part

#### AM-GM inequality (Arithmetic-geometric average theorem)

Text: (you sent proofs based on is left, orderly as is written).

#### Generalized AM-GM or Koshi-Bunyakovsky inequality

Text: (you sent main proof stored, lemmas with), with your acquaintance possible:

**Theorem ( AM-GM):** All positive  $a_1, a_2, a_3, \dots a_n$  for numbers

$$\frac{a_1 + a_2 + \dots + a_n}{n} \geq \sqrt[n]{a_1 a_2 \dots a_n} \quad (1)$$

inequality appropriate. Equality  $a_1 = a_2 = a_3 = \dots = a_n$  is executed when.

**Proof:** By induction we use.

$$n = 2 \text{ at } \sqrt{a_1 a_2} \leq \frac{a_1 + a_2}{2} \Leftrightarrow (\sqrt{a_1} - \sqrt{a_2})^2 \geq 0 \quad \forall a_1, a_2 \geq 0$$

( 1) in We prove that it is nvalid for ta positive numbers by assuming that ta is valid for  $n + 1$  ta  $R^+$  numbers. Let these numbers  $a_1, a_2, a_3, \dots a_n, a_{n+1}$  be  $a_{n+1}$  the largest of them,

$$\begin{aligned} a_{n+1} &\geq a_1, a_{n+1} \geq a_2, \dots a_{n+1} \geq a_n \Rightarrow \\ \Rightarrow a_{n+1} &\geq \frac{a_1 + a_2 + \dots + a_n}{n} \quad (2) \end{aligned}$$

As follows designation we enter.

$$A_n = \frac{a_1 + a_2 + \dots + a_n}{n} ; \quad A_{n+1} = \frac{a_1 + a_2 + \dots + a_n + a_{n+1}}{n+1} = \frac{nA_n + a_{n+1}}{n+1}$$

( 2)to according to  $a_{n+1} \geq A_n \Rightarrow a_{n+1} = A_n + \alpha \quad \alpha \geq 0$  Let's say. Then:

$$A_{n+1} = \frac{nA_n + A_n + \alpha}{n+1} = A_n + \frac{\alpha}{n+1}$$

This equality both part  $n + 1$  Raising to the level, we find:

$$\begin{aligned} (A_{n+1})^{n+1} &= A_n^{n+1} + C_{n+1}^1 (A_n)^n \frac{\alpha}{n+1} + \dots + C_{n+1}^n (A_n) \left(\frac{\alpha}{n+1}\right)^n + \\ + \left(\frac{\alpha}{n+1}\right)^{n+1} &\geq (A_n)^{n+1} + C_{n+1}^1 (A_n)^n \frac{\alpha}{n+1} = (A_n)^{n+1} + (A_n)^n \frac{\alpha}{n+1} \frac{(n+1)!}{1!n!} \\ &= A_n^{n+1} + (A_n)^n \alpha = A_n^n (A_n + \alpha) = A_n^n \cdot a_{n+1} \end{aligned}$$

To the assumption according to  $A_n^n \geq a_1 a_2 \dots a_n \Rightarrow$

$$\begin{aligned} (A_{n+1})^{n+1} &\geq a_1 a_2 a_3 \dots a_n a_{n+1} \Rightarrow \\ \frac{a_1 + a_2 + \dots + a_n + a_{n+1}}{n+1} &\geq \sqrt[n+1]{a_1 a_2 \dots a_n a_{n+1}} \end{aligned}$$

From this come it turns out theorem proved.

**Theorem ( Generalized AM-GM or Cauchy-Bunyakovsky ):**

$a_1, a_2, \dots a_n, p_1, p_2, \dots, p_n$  positive numbers

$$a_1^{p_1} a_2^{p_2} \dots a_n^{p_n} \leq \left( \frac{a_1 p_1 + a_2 p_2 + \dots + a_n p_n}{p_1 + p_2 + \dots + p_n} \right)^{p_1 + p_2 + \dots + p_n} \quad (1)$$

Relationship appropriate , equality and only  $a_1 = a_2 = a_3 = \dots = a_n$  is performed.

**Proof :** Lemma:  $e^{x-1} \geq x$  there is, in which  $x \geq 1$ .

Lemma The  $\Rightarrow e^{x-1} - x \geq e^{1-1} - 1 = 1 - 1 = 0 \Rightarrow e^{x-1} - x \geq 0$   
 proof is  $f(x) \geq f(1)$  that  $\Rightarrow x \geq 1: f(x) = e^{x-1} - x$   
 (1) in proof From the lemma we use.

$$S = \frac{a_1 p_1 + a_2 p_2 + \dots + a_n p_n}{p_1 + p_2 + \dots + p_n}$$

to mark as we enter.

To the lemma according to :  $e^{\frac{a_i}{s}-1} \geq \frac{a_i}{s}$  it will be, in which case  $i = \overline{1, n} \Rightarrow$   
 $S \cdot e^{\frac{a_i}{s}-1} \geq a_i \Rightarrow$

$$a_i^{p_i} \leq S^{p_i} \cdot e^{\frac{a_i p_i}{s} - p_i}, \quad i = \overline{1, n}$$

These inequalities all of them multiply Let's go out.

$$a_1^{p_1} a_2^{p_2} \dots a_n^{p_n} \leq \left( \frac{a_1 p_1 + a_2 p_2 + \dots + a_n p_n}{p_1 + p_2 + \dots + p_n} \right)^{p_1 + p_2 + \dots + p_n}$$

Equality only  $s = a_1 = a_2 = a_3 = \dots = a_n$  is fulfilled, it follows that the inequality has been proven.

We are this from theorems using one how much following inequality about issues our solution possible.

Issues

Example 1:  $x, y > 0$  Prove the inequality if  $x^2 + y^2 + 1 \geq xy + x + y$

Proof :  $x^2 + y^2 + 1 = \left(\frac{x^2}{2} + \frac{y^2}{2}\right) + \left(\frac{x^2}{2} + \frac{1}{2}\right) + \left(\frac{y^2}{2} + \frac{1}{2}\right) \geq xy + x + y$

From this come comes out inequality proved.

Example 2:  $x > 0$  if ,  $2^{\sqrt[12]{x}} + 2^{\sqrt[4]{x}} \geq 2 \cdot 2^{2\sqrt[6]{x}}$  prove the inequality.

Proof : AM-GM theorem according to :  $2^{\sqrt[12]{x}} + 2^{\sqrt[4]{x}} \geq 2 \cdot 2^{x^{\frac{1}{12} + \frac{1}{4}}} = 2 \cdot$   
 $2^{2x^{\frac{1}{6}}} = 2 \cdot 2^{2\sqrt[6]{x}}$

from this come comes out inequality proved.

## Conclusion

Inequalities mathematician analysis, engineering, economics and medicine such as many in the fields important tool as service This will do. in the article the most famous and strong inequality from theorems one was AM-GM (arithmetic-geometric) average) and Koshi-Bunyakovsky inequalities studied, their induction, elementary algebra and exponent function based on evidence was brought.

Quoted examples through this inequality not only theoretically, maybe practical also showing the importance They were given. using complicated expressions assessment, problems simplification, as well as real -life restrictions as a mathematical model expression opportunity existence proved.

Also in the article inequalities: in medicine – dose borders in determining, in economics – budget distribution in planning, in engineering – mechanical security in providing, how application shown.

In the future this the topic following in directions expansion to the goal appropriate will be: Holder, Chebyshev and Minkowski inequalities such as

progressive inequalities study, algorithmic analysis based on computer through automated proof methods use , inequalities at the Olympics application analysis to do

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**MEXATRONIKA VA ROBOTOTEXNIKA YO'NALISHI  
TALABALARINING IJODIY-INNOVATSION KOMPETENSIYASINI  
RIVOJLANTIRISHDA “MUHANDISLIK VA KOMPYUTER  
GRAFIKASI” FANINING PEDAGOGIK IMKONIYATLARI**

**Annotatsiya:** *Ushbu maqolada “Muhandislik va kompyuter grafikasi” fanini o‘qitishda raqamli ta’lim vositalari va zamonaviy axborot-kommunikatsiya texnologiyalaridan foydalanish asosida o‘qitish jarayonini boshqarish modeli, modelning asosiy tarkibiy qismlari sifatida o‘quv jarayonini rejalashtirish, masofaviy va aralash ta’lim elementlarini integratsiya qilish, loyihaviy topshiriqlarni avtomatlashtirilgan baholash tizimi, talabalar ijodkorligi va texnik kompetensiyalarini rivojlantirishga qaratilgan grafik muhitlardan foydalanish mexanizmlari bayon qilingan.*

**Kalit so‘zlar:** *muhandislik grafika, kompyuter grafikasi, raqamli ta'lim, o‘qitish jarayonini boshqarish, axborot texnologiyalari, 3D modellash, elektron ta’lim resurslari, masofaviy o‘qitish, raqamlashtirish, ta’lim modeli.*

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**PEDAGOGICAL POSSIBILITIES OF THE SUBJECT  
“ENGINEERING AND COMPUTER GRAPHICS” IN DEVELOPING  
CREATIVE-INNOVATIVE COMPETENCE OF STUDENTS OF  
MECHATRONICS AND ROBOTICS**

**Annotation:** *This article describes the model of teaching the subject of "Engineering and Computer Graphics" based on the use of digital educational tools and modern information and communication technologies, the main components of the model are planning the educational process, integration of distance and blended learning elements, an automated assessment system for project assignments, and mechanisms for using graphic environments aimed at developing students' creativity and technical competencies.*

**Keywords:** *engineering graphics, computer graphics, digital education, teaching process management, information technologies, 3D modeling, electronic educational resources, distance learning, digitization, educational model..*

Mamlakatimiz ta’lim muassasalarida kadrlar tayyorlash sohasida raqobat muhitini shakllantirish, kadrlar tayyorlash tizimi mazmunini mamlakatning ijtimoiy

va iqtisodiy taraqqiyot istiqbollari, jamiyat ehtiyojlari, fan, madaniyat, texnika va texnologiyaning zamonaviy yutuqlaridan kelib chiqqan holda, takomillashtirishga e'tibor qaratilgan. Kreativ fikrlaydigan talaba-yoshlar salohiyati va iqtidorini rivojlantirish, modifikatsiyalashgan ta'lim mazmuniga zamonaviy texnologiya va innovatsiyalarni kiritish lozimligi ta'kidlangan. Ta'lim oluvchilarda ijodkorlik qobiliyatlarni rivojlantirishning samarali shakl, metodlarini ishlab chiqish va amaliyotga joriy etishni ta'minlovchi me'yoriy, moddiy-texnik va huquqiy axborot bazasini yaratish kabi vazifalar belgilangan.

Bo'lajak mutaxassisni mustaqil ijodiy faoliyatga tayyorlash bilan yakunlanuvchi ta'lim shaxsiy va ijtimoiy ahamiyatga ega bo'lishi kerak. Bu, bir tomondan, ta'lim sohasida o'quvchilarning o'z-o'zini rivojlantirishi uchun o'z shaxsiy sifatlarini amalga oshirish, boshqa tomondan olingan bilim va ko'nikmalardan mohirona foydalanish asosida munosib turmushni ta'minlashi kerakligini anglatadi.

Ilg'or pedagogik amaliyotga oid didaktik g'oyalar va metodologik izlanishlar tahlili OTMdagi ta'lim jarayonini takomillashtirishga qaratilgan umumiy konseptual asosli faoliyatli yondashuvni taqdim etadi. U talabalarning sub'ektiv pozitsiyasini, faoliyatni shakllantirish, mustaqillik, umumta'lim mahorati, o'z-o'zini o'qishga tayyorligini ta'minlashga qaratilgan. Talaba kasbiy tayyorgarlik jarayonida, nazariy-amaliy jihatdan hamfaoliyatli yondashuv asoslarini egallashi kerak.

Zamonaviy malakali ishchi, ayniqsa uskunalarni ta'mirlash va sozlash bilan shug'ullanadigan (elektrik) kasbiy faoliyatining operatsion komponenti ham integrativ bo'lib, joriy harakatlar va operatsiyalarni bajarishga qaratilgan va asosiy ishlab chiqarish ko'rsatkichlaridan biri - mehnat unumdorligi bilan bog'liq.

Elektrikning kasbiy faoliyatining o'ziga xos xususiyati qiyinchiliklarga duch kelganda yuqori darajadagi kuch va qat'iyatlilikni o'z ichiga oladi: ko'pincha muammolarni bartaraf etish algoritmini takroriy takrorlashni talab qiladi, bu esa ularning kasbiy ishlarida yuqori darajadagi motivatsiyani talab qiladi.

A. M. Novikovning fikriga ko'ra, aks ettirish avvalgi to'plangan tajribaga asoslangan holda yangi, ilgari mavjud bo'lmagan xususiyatlar va fazilatlarni rivojlantirish imkonini beradi, bu bizning fikrimizcha, texnik fikrlashning aks ettirish komponentini aniqlash uchun asos yaratadi. Aktsiyalashtirish komponentini texnik fikrlashning alohida komponenti sifatida aniqlash zamonaviy elektrchining kasbiy faoliyatining talablari va o'ziga xos xususiyatlari bilan belgilanadi.

Texnik fikrlash tizimli, uzluksiz va umrbod ta'lim orqali rivojlantiriladigan kasbiy tayyorgarlikning muhim tarkibiy qismi hisoblanadi.

Texnik fikrlash nafaqat muhandislik dunyoqarashini tushunishni, balki quyidagilarni ham o'z ichiga oladi:

- yangi texnologiyalarni yaratish;
- mavjud texnologiyalarni o'zgartirish va takomillashtirish;
- inson-mashina tizimi (sun'iy intellekt) uchun ma'lumotlarni tuzish;
- professional muloqotni o'zlashtirish;
- o'zini doimiy ravishda takomillashtirishga intilish.



Mexatronika va robototexnika - bu mexanik, elektronika va mikroprotssessor texnologiyasi, informatika va kompyuterni boshqarish sohasidagi bilimlarga asoslangan, mashinalar va agregatlar harakatni kompyuter boshqaradigan mashinalar va tizimlarni yaratish va ishlatishga bag'ishlangan yangi fan va texnologiya sohasi. Robotlar va robot tizimlari mikro, makro o'lchamlargacha bo'lgan ishlarni bajarish uchun mo'ljallangan, shu jumladan, og'ir, zerikarli va xavfli ishlarda odamni almashtirish.

Mutaxassislik har xil turdagi mexanik va elektron uskunalarni, kompyuterlarni, robotlarni, mashinalarni yaxshi ko'radiganlarni qiziqtiradi.

"Mexatronika va robototexnika" mutaxassisligining afzalliklari uning keng qamrovliligi va ko'p qirraliligida. Faqatgina ushbu profil mutaxassisi kir yuvish mashinasi yoki, masalan, avtomobilning ABS qanday ishlashini, kompyuterda hamma narsani qila olishini to'liq tushunadi, shu bilan birga u umuman nima kerakligini aniq tasavvur qiladi, faqat u, robot yoki boshqa murakkab texnik ob'ekt boshidan (g'oyadan) oxirigacha (haqiqiy tartibda amalga oshirishgacha) yaratishga qaratilgan hamma yo'lni bosib o'tishi mumkin.

Mexatronika va robototexnika texnika va texnologiyaning uchta istiqbolli sohalaridan biridir.

Bugungi kunda mexatronik tizimlar iqtisodiyotning deyarli barcha sohalarini qamrab oluvchi, jumladan quyidagi sohalarida keng qo'llanilmoqda:

- aviatsiya, kosmik va harbiy texnika; avtomobilsozlik (bort kompyuterlari, ABS tormozlari, harakatni barqarorlashtirish tizimlari, mextron uzatmalar va boshqalar);
- robototexnika (sanoat va maxsus);
- xizmat, o'yin, o'quv robotlari va boshqalar; texnologik jarayonlarni avtomatlashtirish uchun dastgohsozlik va uskunalari;
- kompyuter va ofis texnikasi; foto- va videouskunalar, maishiy texnika;
- video kuzatuv tizimlari; nazorat va o'lchash asboblari;
- tibbiy asbob -uskunalar (reabilitatsiya, klinik va boshqalar);
- mikromashinalar (tibbiyot, biotexnologiya, telekommunikatsiyalar uchun).

Hozirgi kunda "Muhandislik va kompyuter grafikasi" fanini ob'yektlari, tekislikdagi va fazodagi shakllar, ko'rinishlar, qirqim va kesimlar haqidagi grafik ma'lumotlarni taqdim etish, o'zgartirish, saqlash usullari va vositalari to'plami sifatida tushuniladi.

"Muhandislik va kompyuter grafikasi" fanining maqsadi - fazoviy tasavvurni rivojlantirish, fazoviy shakllar va munosabatlarni ularning geometrik modellari va grafik tasvirlari asosida tahlil qilish va sintez qilish qobiliyatlari, konstruktorlik hujjatlarini ishlab chiqish uchun bilim va ko'nikmalarni yaratishdan iborat.

"Muhandislik va kompyuter grafikasi" fanining vazifalari:

- ortogonal proektsiyalashga asoslangan fazoviy grafik modellarni yaratishni va ushbu modellardagi fazoviy shakllar va munosabatlar bilan bog'liq muammolarni yechishni o'rganish;

- konstruktorlik hujjatlarining yagona tizimi davlat standartlari talablariga muvofiq grafik va matnli konstruktorlik hujjatlarini o'qish va ularni tuzish bo'yicha kerakli bilimlarni to'plash;

- kompyuter grafikasi, geometrik modellash, grafik ob'ektlar tushunchasi, chizma-grafik ishlarni avtomatlashtirish vazifalarini yechish uchun zamonaviy interfaol grafik tizimlar bilan tanishish.

“Muhandislik va kompyuter grafikasi” fanini o'rganish predmeti masofa (yaqin - uzoqroq), munosabatlar (yaqinroq - uzoqroq), joylashuv (o'rtada) va boshqalar bilan ifodalangan fazoviy xususiyatlar (shakli, o'lchami va boshqalar) va ob'ektlar yoki ularning fazoviy xususiyatlariga ega bo'lgan narsalar hisoblanadi.

“Muhandislik va kompyuter grafikasi” fani – bu nafaqat texnik ko'nikmalarni shakllantiruvchi, balki talabalarning ijodiy-innovatsion salohiyatini rivojlantiruvchi muhim pedagogik vositadir. Ushbu fan orqali o'quv jarayonini innovatsion texnologiyalar, loyihaviy faoliyat va ijodiy metodlar bilan boyitish, zamonaviy ta'limning eng muhim maqsadlaridan biri – ijodkor, tashabbuskor, raqobatbardosh mutaxassislarni tayyorlashga xizmat qiladi.

“Muhandislik va kompyuter grafikasi” fani, o'zining texnologik, dizaynerlik va analitik mohiyati tufayli, kompetensiyaviy yondashuvni amalda ro'yobga chiqarish uchun eng qulay pedagogik maydondir. Ushbu fan o'qitish jarayonida talabalarda texnik tafakkur, fazoviy tasavvur, estetik idrok va ijodiy qaror qabul qilish, ijodiy-innovatsion kompetensiyalarini shakllantiradi.

“Muhandislik va kompyuter grafikasi” fanida ijodiy-innovatsion kompetensiya talabaning grafik modellash jarayonida yangicha texnik yechimlarni topish, dizayn jarayonlarini optimallashtirish hamda muhandislik tafakkurini rivojlantirishda o'z ifodasini topadi.

Raqamli texnologiyalar, virtual reallik, 3D-printerlar, sun'iy intellekt asosidagi dizayn tizimlari bugungi kunda muhandislik grafikasi fanining ajralmas qismiga aylanmoqda. Bu texnologiyalar yordamida talabalar o'z g'oyalarini tezkor va real shaklda sinovdan o'tkazish imkoniyatiga ega bo'ladilar. Shu bois, ta'lim jarayoniga innovatsion texnologiyalarni integratsiya qilish talabalarning amaliy kompetensiyasini keskin oshiradi.

“Muhandislik va kompyuter grafikasi” fanida ijodiy-innovatsion kompetensiyani rivojlantirish nazariy jihatdan talabaning shaxsiy faolligini, mustaqil fikrlashini, texnik va estetik bilimlarini uyg'unlashtirishni talab etadi. Bu jarayon pedagogik yondashuvlar, axborot texnologiyalari va muammoli o'qitish metodlari orqali samarali amalga oshiriladi.

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## **DIGITAL ECONOMY: CONTEMPORARY TRENDS, DEVELOPMENT DYNAMICS, CHALLENGES**

**Annotation:** *This study explores the contemporary trends, development dynamics, and key challenges of the digital economy in the context of rapid technological transformation. The research analyzes the role of digital technologies such as artificial intelligence, cloud computing, big data, and blockchain in reshaping economic systems, business models, and public services. Particular attention is given to the drivers of digital transformation, including innovation ecosystems, digital infrastructure, and human capital development. The paper also examines the impact of digitalization on productivity, competitiveness, and inclusive growth at both national and global levels. Furthermore, it identifies major challenges such as digital inequality, cybersecurity risks, regulatory gaps, and the need for institutional adaptation. Based on a systematic and analytical approach, the study proposes strategic directions for enhancing the effectiveness of digital economy development, with an emphasis on sustainable growth and policy integration.*

**Keywords:** *Digital economy, digital transformation, innovation, artificial intelligence, big data, cloud computing, blockchain, economic development, digital infrastructure, cybersecurity, digital inequality, sustainable development, policy regulation.*

From the concept of the "New Economy" to the "Digital Economy." The concept of the "New Economy" emerged in the 1980s and 1990s as a response to new developments in the global economy brought about by technological advances. Significant changes occurred in consumption patterns, production methods, the structure of competition, and economic policy. The concept of the "New Economy" shaped an approach to the economy as a new social and economic order, where information is the primary resource.

The development of digital technologies such as cloud services, mobile services and artificial intelligence have significantly enhanced the digitalization of the economy.

According to the report of the United Nations Conference on Trade and Development (UNCTAD), the digital economy is considered in three dimensions: 1) the basic one, represented by the ICT sector; 2) in a narrow sense, represented by the digital economy and the economy of digital platforms; 3) in a broad sense, represented by the "digitalized" economy (Fig. 2) [5].

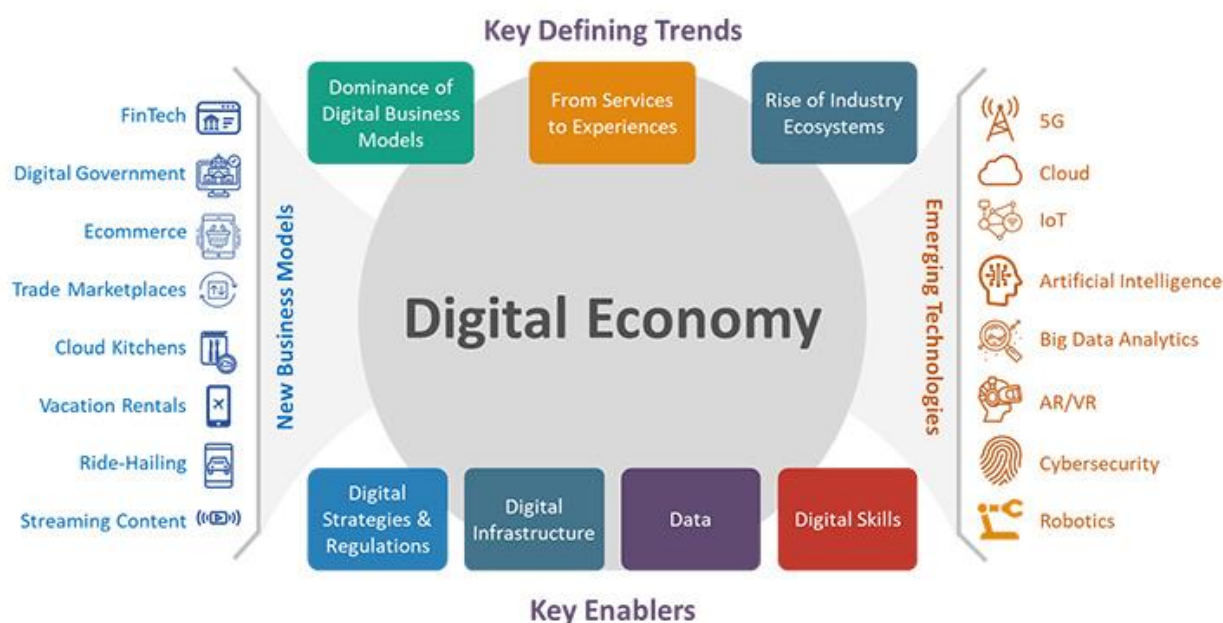


**Fig. 2. The concept of “digital economy” [9]**

The Organisation for Economic Co-operation and Development (OECD) defines the digital economy as a digital infrastructure consisting of technological equipment and organizational mechanisms, including computers and software, telecommunications equipment and services, the Internet of Things (IoT), computer networks, as well as data centers, semiconductor manufacturing, fiber optic cable installation, switches, repeaters, digital consulting services, and equipment repair services [6]. Among the sectors of the modern economy where digital technologies are being most actively implemented are: energy, the service sector, telecommunications, healthcare, education, banking and financial services, and others (Table 1).

Main part. Determining the dynamics and underlying trends of digitalization in the global economy requires analyzing quantitative indicators characterizing its development both at the macro level and across key sectors and current trends, as well as a number of key components: e-commerce, digital platforms, FinTech.

Indicators of the modern digital economy. According to UNCTAD, the size of the global digital economy in 2023 was 4.5% of GDP (for the digital platform economy) and 15.5% of GDP (for the economy of sectors subject to digitalization; see Figure 2). The US digital economy, meanwhile, accounts for 6.9% of GDP (for the digital platform economy) and 21.6% of GDP (for the economy of sectors subject to digitalization). The size of the digital economy in the PRC is 6.0% of GDP (for the digital platform economy) and 30.0% of GDP (for the economy of sectors subject to digitalization). By share of GDP, this sector is the largest in Taiwan Province of China, Ireland, and Malaysia [5, 7].

**Table 1. Main sectors of digitalization and directions of change [10]**

|                                     |                                                                                                                                                                                                                                                                                              |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Economic sector                     | Ways to use information and information technology to create new products and services                                                                                                                                                                                                       |
| Energy sector                       | Using data such as weather forecasts, energy providers can offer their customers new services to help them control their energy consumption through appropriate software and sensors/controllers/meters.                                                                                     |
| Telecommunications sector           | Competing mobile service providers may offer a variety of mobile commerce services to large companies looking to improve their understanding of loyalty program marketing effectiveness.                                                                                                     |
| Healthcare                          | Use of information about human health, provision of relevant (paid) services, online consultations, reminders about medical procedures, monitoring and early diagnosis, prevention of the development of serious diseases                                                                    |
| Internet                            | Cloud storage (where all files can be stored in the cloud, accessible anytime and anywhere – from any mobile or desktop device, browser, or a variety of popular social networks). Available to both individuals and organizations (both paid and free).                                     |
| Tourism                             | Posting information about tourism services on specialized websites, choosing vacation destinations based on individual preferences, and using blockchain technology to mitigate the negative impact of competing organizations on hotel, restaurant, and other ratings.                      |
| Financial Services Sector (FinTech) | Collecting information about customer transactions for subsequent sale to interested companies to form a complete electronic picture of potential consumers of goods or services                                                                                                             |
| Crowdfunding                        | An independent, alternative to the systemic tool for accumulating financial resources in the interests of both individuals and companies                                                                                                                                                     |
| Gambling                            | Formation of a new sector of online casinos, as well as provision of digital tools for monitoring and regulating this activity by territorial regulatory authorities                                                                                                                         |
| Automotive services                 | Collecting data on auto repair shops and driving habits using telematics makes this information available to insurers and consumers and can help lower insurance rates. The creation of "smart cars" (automatic monitoring of vehicle inspection times, maps and routes via satellite, etc.) |
| Logistics and delivery              | Real-time vehicle tracking, providing requested qualitative and quantitative indicators. Informing consumers about the progress of delivered goods throughout the entire supply chain.                                                                                                       |
| Industry 4.0                        | Minimizing human involvement in the production process, creating ecosystems in which machines, robots, and machine tools communicate with each other within technological processes to minimize costs and increase productivity                                                              |
| Light industry                      | Creation of "smart clothing" (warms or cools based on weather conditions, contains information about the manufacturer and seller), "smart shoes" (with built-in GPS)                                                                                                                         |



|              |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Construction | The construction of "smart roads" warns drivers of dangerous situations, monitors traffic conditions and responds to emerging problems, and can charge electric vehicles while driving. The construction of "smart homes"—including security and fire alarms, appliances, lighting, and heating—is based not only on the weather but also on a number of other factors, such as wind speed, weather forecasts, and time of day. |
| Education    | Access to paid and free online educational courses and resources allows you to obtain an education in the short term in accordance with an individual educational program, and increases the accessibility of self-education                                                                                                                                                                                                    |

When assessing the digital economy in terms of the total value created through digital goods, services and the digitalisation of traditional industries, it should be noted that in the European Union, ICT companies are growing annually by 14%, telecommunications companies by 3%, while other transnational corporations are growing by only 0.2% on average [8].

Global employment in the ICT sector increased from 34 million in 2020 to 39 million in 2024, with the largest share of employment in the computer services sector (38%). The ICT sector's share of total employment increased over the same period from 1.8% to 2% [5].

In 2024, digitally delivered services exports amounted to \$2.9 trillion, or 50% of global services exports.

As of 2024, the five most valuable brands are digital technology companies: Apple, Google, Microsoft, Facebook, and Amazon. The most valuable startups in the global economy are presented in Table 2.

**Table 2: The most valuable technology startups from 2014 to 2018[1]**

| Company       | Company valuation (USD billion) | Date of assessment | Description                                                                                                                     |
|---------------|---------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Ant Financial | 150                             | May 2024           | Formerly known as Alipay, Ant Financial is a subsidiary of China's Alibaba Group and the world's most valuable fintech company. |
| Uber          | 68                              | June 2022          | A network transportation company providing peer-to-peer services: taxi, food delivery                                           |
| Didi Chuxing  | 50                              | April 2023         | A major Chinese company specializing in transportation services, artificial intelligence, and innovative developments.          |
| Xiaomi        | 46                              | December 2020      | A Chinese electronics company that produces smartphones, mobile apps, laptops, and more.                                        |
| Airbnb        | 31                              | March 2023         | An online platform and hotel service for short-term stays in cottages, apartments, family or hotel rooms.                       |
| Palantir      |                                 | January 2024       | Cloud services company                                                                                                          |
| Alibaba Cloud | 30                              | October 2021       | An American software company specializing in Big Data analysis                                                                  |

|        |    |           |                                                                                                                                                                                            |
|--------|----|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WeWork | 20 | July 2023 | An American company providing workspace, communities focused on creating new technologies, and services for entrepreneurs, freelancers, startups, small businesses, and large enterprises. |
|--------|----|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Thus, it is worth noting the rapid growth of the digital share of the global economy, both overall and at the level of leading countries, driven by the more intensive growth of ICT companies and their significant capitalization.

The rapid development of digital technologies opens a window of opportunity for our country to systemically integrate into the global digital economy, taking into account the national interests of the Republic of Belarus. Our country's significant human resource potential and developed digital infrastructure, supported by government support, create a solid foundation for effectively addressing this challenge.

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## **DIGITAL ECONOMY AND ITS ROLE IN THE EDUCATION SYSTEM**

**Abstract.** *This article theoretically investigates the essence of the digital economy, its role and impact on the education system. In the context of a pandemic and the "Year of Science, Education and Development of the Digital Economy", the work done to digitalize the education system of the Republic of Uzbekistan was analyzed. Based on the results of the analysis, scientifically based proposals were put forward to accelerate the introduction of the digital economy into the education system of Uzbekistan.*

**Keywords:** *digital economy, digital technologies, education system, science, "on-line school", "electronic textbook".*

In the progress of achieving digital technology, science and research play an important role in achieving development. Today, information technology penetrates into all industries in the world.

The widespread introduction of digital technologies in public administration and the pursuit of modern knowledge will contribute to the well-being of our people. The spiritual and enlightened generation is a key factor in the development of the country.

Uzbekistan is taking comprehensive measures to actively develop the digital economy, the transition to a digital economy through the widespread introduction of modern information and communication technologies in all sectors and industries, especially in public administration, education, healthcare and agriculture.

The digital economy is a system of economic, social and cultural communications based on the use of digital technologies. Sometimes it is also expressed in terms of the internet economy, the new economy, or the web economy. This is not some other economy that needs to be created from scratch. This means translating the existing economy into a new system by creating new technologies, platforms and business models and implementing them into everyday life.

Its signs:

- high degree of automation;
- electronic document management;
- electronic integration of accounting and management systems;
- electronic databases;
- presence of CRM (system of interaction with clients);
- corporate networks.

We all know that science, education and upbringing are the cornerstone of development, as well as the force that makes the country a strong and great nation. Our future, the bright future of our Motherland, is closely connected, first of all, with the education system and the upbringing of our children.

Therefore, in recent years, in order to comprehensively develop our country, create a new Uzbekistan, radical reforms have been carried out in the education system, as well as in all areas.

In the current difficult period, when Uzbekistan, like other countries of the world, is experiencing a coronavirus pandemic, the country's education system has also passed a serious test. Despite today's difficult conditions, as a result of timely measures taken by the state, the online school project and distance learning were implemented in a short time.

Also, such systems as "Online School", "Digital and Safe School", "Electronic Textbook", "Electronic Diary" were introduced. By the end of 2021, it is planned to increase the level of broadband Internet access in schools to 80%, in the future to provide 100% Internet in all schools, and also to allocate funds from the state budget for this purpose.

Unprecedented attention is being paid to a radical reform of the national education system, based on the idea that "New Uzbekistan begins at the doorstep of the school." Much is being done to develop science, culture and art, literature, sports, improve the efficiency of spiritual and educational work, realize the talents and abilities of young people, especially our girls.

All this lays the foundation for the Third Renaissance in Uzbekistan - a new era of national development.

The President of the Republic of Uzbekistan Shavkat Mirziyoyev noted: "I personally believe that our enthusiastic scientists, who continue the scientific traditions of our great ancestors, will make science the engine of our development and make important discoveries that will serve the development of the country" [1].

Recently, school education in Uzbekistan has become a nationwide movement and a new era has begun in the development of the industry. As a practical manifestation of this movement, 77 new schools worth 556 billion soums have been built over the past two years. Reconstruction and repair work carried out in 1930 schools.

At the same time, a wide path is opening for the private education system. In this regard, the procedure for obtaining a license has been simplified. It is noteworthy that over the past three years their number has increased 6 times and reached 140.

A new school of information and communication technologies named after Muhammad al Khorezmi has opened in Tashkent. Currently, in order to increase the interest of children in IT technologies and create conditions for their development into mature professionals, 82 schools will be created in 2022, 64 in 2023, and 45 schools specializing in information technology in 2024 and will cover all districts and cities.

Today's dynamic world requires each of us to constantly seek, take initiative and work in new ways.

Today, every teacher and teacher of the university should be the most advanced representative of modernity and society, able to apply the latest positive innovations in the field of education and science in the educational process.

Over the past 4 years, 47 new higher educational institutions have been opened in Uzbekistan, including branches of foreign universities, as a result of which the number of higher educational institutions at the beginning of 2023 reached 130.

On the basis of the public-private partnership system, the activities of non-state higher educational institutions are being established. By studying the opinion of the population, forms of correspondence and evening education were revived, and admission quotas were increased. Graduate enrollment in higher education increased from 9% in 2021 to 25% in 2023. A mechanism has been created to provide advanced training and training for teachers in higher educational institutions and research institutions abroad. Their monthly salary increased by an average of 2.5 times compared to 2021. Since 2023, 10 higher educational institutions have been transferred to a self-supporting system.

According to the State Program for the implementation of the Action Strategy in five priority areas of development of the Republic of Uzbekistan for 2017-2021, in the Year of Science, Education and the Development of the Digital Economy, it was planned to bring the connection of secondary schools to broadband Internet up to 70%. The source of financing will be budgetary funds, JSC "Uzbektelecom" and other funds.

The program provides for the selection of at least 5 universities on a competitive basis, the beginning of their transformation in cooperation with leading foreign universities, the attraction of state budget funds, as well as grants from foreign financial institutions. The program provides for the identification of organizations providing "Proofreading service", the costs associated with the preparation of scientific publications for publication in international folk magazines, which are funded by the Foundation for the Support of Innovative Development and Innovative Ideas.

State budget funds are defined as centralized investments, budgetary funds provided for by the estimated expenditures of ministries, departments and organizations.

*Table. Sources of funding for the state program "Years of Science, Education and Development of the Digital Economy" [2]*

| Sources of financing                                                                             | Billion soums | Million US dollars |
|--------------------------------------------------------------------------------------------------|---------------|--------------------|
| Total costs for the implementation of the activities of the State Program in 2020                | 18 171,4      | 10 301,5           |
| State budget funds and state trust funds                                                         | 12 883,7      | —                  |
| Funds of performers and charitable organizations                                                 | 1 426,5       | —                  |
| Loans from commercial banks                                                                      | 561,2         | —                  |
| Funds and non-discriminatory assistance from international organizations, financial institutions | 3 300,0       | 10 301,5           |

On April 28, 2023, President Shavkat Mirziyoyev signed a resolution “On measures for the widespread introduction of the digital economy and e-government” [3].

The document provides for the accelerated formation of the digital economy with a doubling of its share in the country's gross domestic product by 2024. All healthcare institutions, schools, pre-school education organizations, villages and mahallas should be connected to high-speed Internet in 2022-2024. The share of electronic public services is planned to be increased to 60% by 2024.

The resolution also provides for the development of "digital entrepreneurship" with an increase in the volume of services in this area by 2025 by three times and bringing their exports to \$100 million.

Widespread introduction of digital technologies is planned at all stages of the education system. By 2024, digital knowledge training centers will open in all regions of the country as part of the Five Initiatives project.

The Ministry for the Development of Information Technologies and Communications is designated as the authorized body in the field of development of the digital economy and e-government. The National Agency for Project Management under the President retains the authority to implement crypto assets and blockchain technology.

Here are our proposals aimed at accelerating the introduction of the digital economy into the education system:

- further development of the technopark of software products and information technologies by organizing support for start-up projects in all areas, including on the basis of venture financing, and creating favorable conditions for IT companies;

- development of digital skills among the population, especially among young people;

- it is necessary to develop a system of public-private partnership in the industry and increase the share of the non-state sector;

- increasing the role of heads of district and city departments of public education in the system.

In conclusion, we note that the present, rapidly developing time requires us to constantly take the initiative and work on something new. The more educated our



children leave school, the faster the sectors of the economy based on high technologies develop, the more social problems they can solve.

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## **SOG'LOM OVQATLANISH INSON SALOMATLIGIDA MUHIM OMIL**

**Annotatsiya:** Mazkur maqolada o'sayotgan organizm uchun kerak bo'ladigan, sog'lom ovqatlanishning ilmiy asoslari, ratsional ovqatlanish tartibi, oqsil, yog', uglevod va biologik faol moddalarning mahsulotlardagi miqdori va ularning organizmdagi roli, sog'lom ovqatlanish bo'yicha tavsiyalar haqidagi mulohaza yuritilgan.

**Kalit so'zlar:** ratsion, oqsil, uglevod, lipid, vitamin, mikroelement ,dym, yard, tiamin, retinol, riboflavin, askarbin kislota,

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## **HEALTHY NUTRITION AS A KEY FACTOR IN HUMAN HEALTH**

**Abstract:** This article discusses the scientific foundations of healthy nutrition necessary for a growing organism, the principles of rational nutrition, the content of proteins, fats, carbohydrates, and biologically active substances in food products, and their role in the human body. In addition, recommendations for healthy nutrition are provided.

**Keywords:** diet, protein, carbohydrates, lipids, vitamins, microelements, inch, yard, thiamine, retinol, riboflavin, ascorbic acid

**Kirish (Introduction).** Zamonaviy jamiyatda inson salomatligi va uzoq umr ko'rishi ko'plab omillarga bog'liq. Shular ichida sog'lom ovqatlanish muhim o'rin tutadi. To'g'ri, muvozanatli va vitaminlarga boy ovqat iste'mol qilish, inson organizmini turli kasalliklardan himoya qiladi, immunitetni mustahkamlaydi va umumiy hayot sifatini yaxshilaydi. Hozirgi kunda tez tayyor ovqatlar, yuqori kaloriyali mahsulotlar va kam harakatlilik natijasida semizlik, qandli diabet va

yurak kasalliklari keng tarqalmoqda. Shu sababli ratsional ovqatlanish tamoyillarini o'rganish dolzarb masala hisoblanadi.

Sog'lom ovqatlanish degani o'zi nima?

**Sog'lom ovqatlanish** – bu organizm ehtiyojlariga mos keladigan, barcha zarur oziq moddalarga (oqsillar, yog'lar, uglevodlar, vitaminlar va minerallar) boy bo'lgan, muvozanatli va tabiiy mahsulotlardan iborat ovqatlanish tarzidir. Bu nafaqat to'yimli ovqat iste'mol qilish, balki zararli mahsulotlardan tiyilish, ovqatlanish vaqtiga va me'yoriga rioya qilishni ham o'z ichiga oladi. Har doim organizm sog'lomuvozanatli va to'g'ri ovqatlanish tamoyillarini o'rganish dolzarb hisoblanadi.

**Materiallar va usullar (Methods):** Tadqiqot davomida quyidagi usullardan foydalanildi: Ilmiy adabiyotlar tahlili, oziq-ovqat tarkibini biokimyoviy baholash, statistik tahlil. Ma'lumotlar asosan Food and Agriculture Organization va World Health Organization hisobotlaridan olindi.

**Adabiyotlar tahlili:** Vitaminlar va minerallar – hayotiy zarur modda

Vitaminlar va minerallar organizmda ko'plab hayotiy muhim jarayonlarda ishtirok etadi. Masalan:

A vitamini ko'z nurining yaxshi bo'lishi va terining sog'lomligi uchun zarur;

C vitamini immunitetni kuchaytiradi, shamollash kasalliklariga qarshi kurashadi;

D vitamini suyaklarning mustahkam bo'lishi va kalsiy so'rilishiga yordam beradi;

Temir moddasi qon tarkibidagi gemoglobinni shakllantiradi, kamqonlikning oldini oladi.

Mazkur vitamin va minerallarni etarli miqdorda iste'mol qilmaslik turli kasalliklarga olib keladi. Shu sababli, ularni meva-sabzavotlar, go'sht, sut mahsulotlari, yong'oqlar va donli mahsulotlar orqali olish muhim hisoblanadi.

**Tadqiqot natijalari va muhokamasi:** Sog'lom ovqatlanish deganda - Muvozanatli, turli mahsulotlar, meyorda, kunlik ratsion amal qilinganda namayon bo'ladi. Noto'g'ri ovqatlanish natijasida O'zbekistonda eng ko'p quyidagi kasalliklar ko'paymoqda; semizlik, yurak qon-tomir kasalliklari, 2-tip-qandli diabet, gipertoniya.

**Sog'lom ovqatlanishda quyidagilar enh muhim hisoblanadi:**

1. Kasalliklarning oldini olish – yurak-qon tomir, qandli diabet, semizlik, rak kabi kasalliklar xavfi kamayadi.

2. Immunitetni mustahkamlash – organizm virus va infeksiyalarga qarshi samarali kurasha oladi.

3. Energiya va ishchanlikni oshirish – sifatli ovqat tanani kuchga to'ldiradi va diqqatni jamlashga yordam beradi.

4. Psixologik holatga ijobiy ta'sir – ba'zi oziq moddalarning tanqisligi kayfiyatning tushishiga olib keladi. To'g'ri ovqatlanish esa stressga chidamli bo'lishga yordam beradi.

Zararli odatlardan voz kechish muhim. Sog'lom ovqatlanishga erishish uchun quyidagilardan saqlanish tavsiya etiladi: ortiqcha yog'li, qovurilgan, sho'r va

shakarli mahsulotlar; tez tayyor bo'ladigan "fast food" mahsulotlari; gazli va shirin ichimliklar; ortiqcha ovqatlanish yoki ovqatlanishning o'tkazib yuborilishi.

**Ba'zi mahsulotlardagi foydali moddalar miqodi va ahamiyati haqida quyida ma'lumotlar keltiramiz.**

1. Tuxum- Oqsil, A, D, B12 vitaminlari, temir, rux, omega-3.  
Foydasi: Miya faoliyatini, immunitetni va suyaklarni mustahkamlaydi.
2. Sut mahsulotlari (sut, qatiq, kefir, tvorog)  
Foydali moddalari: Kaltsiy, D vitamini, probiotiklar, oqsil.  
Foydasi: Suyak va tishlar uchun foydali, ichak mikroflorasini yaxshilaydi.
3. Go'sht (mol, tovuq, baliq)  
Foydali moddalari: Oqsil, temir, rux, B guruh vitaminlari.  
Foydasi: Qon tarkibini yaxshilaydi, mushaklar rivojlanishini ta'minlaydi.
4. Sabzavotlar (ismaloq, brokkoli, sabzi, karam)  
Foydali moddalari: A, C, K vitaminlari, folat, antioksidantlar, tolalar.  
Foydasi: Ichak faoliyatini yaxshilaydi, saratonning oldini oladi.
5. Mevalar (olma, apelsin, banan, kivi)  
Foydali moddalari: C vitamini, tabiiy shakar, kaliy, antioksidantlar.  
Foydasi: Immunitetni kuchaytiradi, yurak salomatligini ta'minlaydi.
6. Donli mahsulotlar (jo'xori, grechka, guruch, suli)  
Foydali moddalari: Uglevodlar, tolalar, B guruh vitaminlari.  
Foydasi: Energiya beradi, qondagi shakar darajasini muvozanatda ushlab turadi.
7. Yong'oqlar va urug'lar (bodom, yong'oq, kungaboqar urug'i)  
Foydali moddalari: Omega-3, E vitamini, oqsil, rux, magniy.  
Foydasi: Yurakni himoya qiladi, miya faoliyatini yaxshilaydi.

**Oqsilli mahsulotlarning ahamiyati** - Bolalarning o'sishi va rivojlanishi uchun ular ovqati tarkibida hayvon oqsillari 80-90%, katta yoshdagilar ovqatida esa 50% hayvon, 50% o'simlik oqsili bo'lishi kerak.

Oqsilga boy mahsulotlar quyidagilar hisoblanadi va ularda oqsillar quyidagi miqdorda bo'ladi. Sutda 25-28%, pishloqda 20-25%, go'shtda 18%, parranda go'shtida 18%, tovuq tuxumida 12,7%, bapiq ikrasida 25-30%, baliq go'shtida 12,7%, kolbasa mahsulotlarida 16 %, sariyogda 1-2%, muzqaymoqda 3,9 %, bug'doy nonda 7-8 %, yeryong'oqda 23-29%, loviya, mosh, no'xat, soyada 23-36%, qo'ziqorinda 1,9-36,7%, dengiz suv o'tlarida 1-1,5%, sholida 8%, kartoshkada 2-2,5% oqsil bo'ladi. Organizmga tushgan sut oqsillari 100% gacha, baliq oqsillari 94% gacha hazm bo'lib o'zlashtiriladi.

**Uglevodlarga boy mahsulotlar**-Uglevodlar asosan o'simlik mahsulotlari tarkibida ko'p miqdorda bo'ladi. Odamning sutkalik ovqatidagi kaloriyaning 56 % uglevodlar hisobiga qoplanadi. Katta yoshdagi odam bir kunda 350-450 gramm uglevod iste'mol qilishi kerak. Asalda 80,3%, qandda 98,85 %, sigir sutida 4,7 %, bug'doy nonida 49 %, javdar nonida 44,4 %, bug'doy donida 66-75 %, dukkakli o'simliklarda 24-55 % gacha, go'shtda 1-2 %, jigarda 5%, qo'ziqorinda 1,6-34,5 % gacha, yeryong'oqda 12,5 %, pishloqda 1-1,3 %, sholi va makkajo'xorida 70-80 % gacha, shakarqamish poyasida 12 %, qand lavlagida 20-21 %, qovun mevasida 17

% gacha uglevod bo'ladi. Uglevodlar odamning asosiy energiya manbai bo'lib muskullarning harakati uglevodlardan ajralgan energiya hisobiga qondiriladi.

**Yog'larga boy mahsulotlar**-Inson iste'mol qiladigan oziq-ovqatlar tarkibida ma'lum darajada yog' moddalari bo'ladi. Odam yog'larga bo'lgan kundalik extiyojini o'simlik va hayvon yog'lari iste'mol qilish hisobiga qondiradi. Hayvon yog'lariga qo'y, mol, cho'chqa, dengiz hayvonlari yog'lari, sariyog', baliq yog'i, tuxum sarigi tarkibidagi yog'lar kiradi. Baliq yog'i yuksak biologik qimmatga ega bo'lib, uning tarkibi A va D vitaminlarga boy bo'ladi. Sariyog'da yog' miqdori 50-60%, pishloqda 23%, parranda go'shtida 15,9 %, tovuq tuxumida 11,5 %, baliq ikrasida 1,5-16% gacha, kolbasa mahsulotlarida 30,7 %, go'shtda yog'liligiga qarab 4-30 % gacha yog' bo'ladi. O'simlik moylari to'yinmagan kislotalar bo'lib, ular xolisterin moddasini eritadi va organizmdan chiqib ketishiga sharoit yaratadi. O'simlik moylari paxta chigiti, kungaboqar, zig'ir, kunjut, zaytun, no'xat, yeryong'oq urug'idan ajratib olinadi. Yoshi ulg'aygan kishilar asosan o'simlik moylaridan iste'mol qilishlari lozim. Ulardagi foydali moddalar ateroskleroz kasalligining oldini olishda muhim o'rin tutadi. O'simlik urug'larida yog' miqdori turli miqdorda bo'ladi. Kungaboqarda 55%, yeryong'oqda 48 %, soyada 18 %, va kunjutda 42-48 % gacha yog' bo'ladi. Kakao daraxti urug'ida 45-55 %, moy bo'lib u oziq-ovqat sifatida, parfyumeriya hamda tibbiyotda ishlatiladi, kunjarasidan esa shokolad tayyorlanadi. Kokos palmasi to'qimasi tarkibida 60-70 % moy bo'lib, undan sham va sovun tayyorlashda foydalaniladi

#### **MAHSULOTLAR TARKIBIDA UCHRAYDIGAN ZARUR MODDALAR**

**1-jadval**

| <b>№</b> | <b>Mahsulot nomi</b> | <b>Oqsillar %</b> | <b>Yog'lar %</b> | <b>Uglevod-lar %</b> | <b>Vita-minlar</b>                                | <b>Mineral tuzlar</b> |
|----------|----------------------|-------------------|------------------|----------------------|---------------------------------------------------|-----------------------|
|          | Sut                  | 25-28             | 3,9              | 4,7                  | C,A                                               | Ag, CO, Ca, R         |
| 2        | Go'sht               | 18                | 4-30             | 1-2                  | B <sub>5</sub> A,B <sub>1</sub>                   | P, K, Fe, Na          |
| 3        | Parranda go'shti     | 18                | 15,9             | 0,29                 | B <sub>1</sub> , B <sub>6</sub> , B <sub>12</sub> | K, Ca, Na, Fe         |
| 4        | Tovuq tuxumi         | 12,7              | 11,5             | 0,7                  | A, D, B <sub>12</sub> B <sub>15</sub>             | Ca, P, Fe             |
| 5        | Baliq go'shti        | 12,7              | 0,3-30           | 0,1                  | A, D, B <sub>3</sub>                              | P                     |
| 6        | Pishloq              | 20-25             | 22-30            | 1-1,3                | A, B <sub>2</sub>                                 | Ca, P                 |
| 7        | Bug'doy non          | 7-8               | 0,9              | 49                   | B <sub>1</sub> , B <sub>2</sub> , B <sub>5</sub>  | Fe, K, P              |
| 8        | Loviya, mosh, no'xat | 23-36             | 2-10             | 24-30                | B <sub>1</sub> , PP,                              | Fe, Ca                |

|    |                      |          |        |          |                                      |                 |
|----|----------------------|----------|--------|----------|--------------------------------------|-----------------|
| 9  | Yer- yong'oq         | 23-29    | 48     | 12,5     | C, B <sub>2</sub>                    | Fe, Ca          |
| 10 | Qo'ziqorin           | 1,9-36,7 | 02-2,7 | 1,6-34,5 | C, B <sub>1</sub><br>B <sub>12</sub> | Na, Fe, Ca      |
| 11 | Baliq ikresi         | 25-30    | 1,5-16 | 1,5      | B <sub>1</sub> , B <sub>2</sub>      | Na,P, I         |
| 12 | Muz qaymoq           | 3,9      | 11,6   | 5,2      | C, A, B <sub>1</sub> , E             | Ca, P           |
| 13 | Kolbasa mahsulotlari | 16,6     | 30,7   | 0,42     | A, B <sub>1</sub>                    | Na              |
| 14 | Dengiz suv o'tlari   | 1-1,5    | 1-3    | 0,6-5,3  | A, D, E, K,<br>B <sub>1</sub> , C    | Fe, P, K, I, Na |
| 15 | Sariyog'             | 1-2      | 50-60  | 0,9      | B <sub>1</sub> , C                   | Ca, R           |

**Xulosa (Conclusion):** Odam organizmida oqsilli mahsulotlarning o'rni benihoya kattadir. SHuning uchun odam hayoti davomida o'zining oqsilga bo'lgan ehtiyojini to'la-to'kis qondirishi zarurdir.

Sog'lom ovqatlanish – bu sog'lom hayot tarzining ajralmas qismi bo'lib, inson salomatligini saqlashda asosiy omillardan biridir. Har bir inson o'z salomatligi uchun javobgar bo'lib, to'g'ri ovqatlanish orqali ko'plab muammolarning oldini olishi mumkin. Vitaminlarga boy va sifatli mahsulotlar bilan oziqlanish, faol hayot tarzi bilan birgalikda, insonning uzoq va sog'lom umr kechirishiga xizmat qiladi

Odam uchun hayvon va o'simlik oqsillari yetarli miqdorda bo'lishi kerak. Odamning oqsilga bo'lgan sutkalik ehtiyojining 50-60%ni hayvon oqsili hisobiga qoplashi kerak. Yaponiya va Xitoyda o'sadigan tungo daraxti yong'og'i mag'zida 60-66 % zaharli moy bo'lib undan lak va alif tayyorlashda foydalaniladi. Ba'zi o'simlik moylari aviatsiya va kemalarning yog'och qismlarini bo'yashda va oynaga yoziladigan siyohlar tayyorlashda ishlatiladi. Yog'lar organizmda sovuqqa chidamlilik, jinsiy faoliyatni yaxshilanishi va energetik ahamiyatga ega.

Yuqoridagi jadvallardan ko'rinib turibdiki hayot uchun eng muhim zarur moddalar bo'lib vitamlar, mineral tuzlar, oqsil va yog'lar hisoblanadi. Ularning meyorida bo'lishi organizmning normal o'sishi, turli patologiyalarni bo'lmasligi, qarishning sekinlashishiga olib keladi.



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## **MAKTABLARDA BIOLOGIYA FANIDAN VIRTUAL LABORATORIYA MASHG'ULOTLARINI O'TKAZISH IMKONIYATLARI**

**Annotasiya.** Maqolada maktabda biologiya fanini o'qitishda laboratoriya mashg'ulotlarini o'tkazishdagi yuzaga keladigan muammolar va ularning yechimlari to'g'risida tavsiya va takliflar berilgan.

**Kalit so'zlar.** DTS, tayanch kompetensiya, fanga oid kompetensiya, bilim, ko'nikma, malaka, laboratoriya, virtual va vizual laboratoriya.

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## **OPPORTUNITIES FOR CONDUCTING VIRTUAL LABORATORY CLASSES IN BIOLOGY IN SCHOOLS**

**Abstract.** This article reveals problems and request recommendation for organizing labs classes on lessons of biology.

**Keywords.** State Educational standards, basic competence, subject competence, knowledge, ability, experience, laboratory, virtual and visual laboratory.

**Kirish.** Prezidentimiz Sh.M.Mirziyoyev “Ta’lim va tarbiya tizimining barcha bo’g’inlarini zamon talablari asosida takomillashtirish-birinchi darajali vazifamiz”deb ta’kidlaganidek, bugungi kunda uzluksiz ta’lim tizimida ta’lim-tarbiya samaradorligini oshirish jiddiy vazifa bo’lib turibdi. Buning uchun har bir o’qituvchi o’z fanini o’qitishning eng samarali zamonaviy pedagogik texnologiyalarni puxta bilishi va bu sohadagi yangiliklarni ya’ni innovasiyalarni uzluksiz o’rganib borish orqali o’z kasbiy mahoratini oshirib borishi talab qilinadi. Ta’lim-tarbiya jarayoni sifat va samaradorligini oshirish kelgusi taraqqiyotimizning asosi ekanligi ma’lum. Bu haqida birinchi Prezidentimiz I.A.Karimovning quyidagi so’zlari ibratlidir: “Shuni unutmasligimiz kerakki kelajagimiz poydevori bilim dargohlarida yaratiladi, boshqacha aytganda xalqimizning ertangi kuni qanday bo’lishi farzandlarimizning bugun qanday ta’lim-tarbiya olishiga bog’liq”.

Hozirgi kundagi asosiy vazifalarimizdan biri o’quvchilarni shaxsiy, kasbiy va ijtimoiy hayotlarida uchraydigan vaziyatlarda egallagan turli tipdagi malakalarini samarali ravishda qo’llashga o’rgatish, mustaqil ravishda fanga oid zaruriy axborotlarni izlab topish, tahlil qilish natijasida zaruriy bilimlarni oshirishga oid materiallarni ajrata olish, ko’zda tutilmagan noaniq, ya’ni muammoli vaziyatlar vujudga kelganda ish beradigan malakalarga alohida ahamiyat berish hamda egallagan bilimlarini kundalik turmush jarayonida qo’llay oladigan xususiyatlarni egallashni tarbiyalashdan iboratdir.

O’quvchilarda bu xususiyatlarni tarbiyalashda fanga oid bilim, ko’nikma va malakalarning dars jarayonida singdirish bilan birgalikda ulardakompetensiyalarni ham shakllantirilishi lozim. Biologiya fanidan o’quvchining kompetensiyasi – biologiya fani bo’yicha egallagan bilim, ko’nikma va malakalarini kundalik hayotida duch keladigan amaliy va nazariy masalalarni yechishda foydalanish va amaliyotda qo’llay olish qobiliyatidir.

Umumta’lim maktablarida o’quvchilar biologiya fanidan laboratoriya mashg’ulotlarini o’tkazish jarayonida tajribani o’tkazish maqsadini bilishi; tajriba uchun laboratoriya asboblari tanlay olishi, yig’ishi va ulardan foydalanishi; tajribaning amalga oshirish sharoiti va natijalarini yozishi va xulosalay olishi kerak.Umumta’lim maktablarida bilim beradigan o’qituvchilar o’zlari o’qituvchi kompetentligiga ega bo’lib, maktab o’quvchilarini shu fan bo’yicha beriladigan xususiy va barcha fanlar uchun tegishli bo’lgan tayanch kompetensiyalarini shakllantirib borishlari kerak.Takomillashtirilgan yangi DTS talablari asosida biologiya fanidan umumta’lim maktablarida 5-10-sinflarda 37 ta laboratoriyamashg’uloti o’tkaziladi.

**Adabiyotlar sharxi:** Biologiya fanlarini nazariy bilimlarga asoslangan holda amaliyot asosida kengroq o’rganish muhimdir. Barcha bo’limlar bo’yicha laboratoriya mashg’ulotlarini o’tkazishning muvaffaqiyati, uning mazmuni va tashkil etilishi ko’p darajada o’qituvchiga bog’liq. Laboratoriya mashg’ulotlarini o’tkazishda avvalo o’quvchilar mavzular yuzasidan puxta nazariy bilimga ega bo’lishlari kerak. Laboratoriya mashg’ulotlarida yangi materialni o’rganish, kuzatish, tabiiy obyektlardan keng foydalanish usulini tadbqiq etish ko’zda tutiladi. Ta’lim sohasida respublikamizda amalga oshirilayotgan islohotlarning asosiy

maqsadi hozirgi ilmiy-texnika taraqqiyoti davrida va erkin demokratik jamiyatga moslashgan, ijtimoiy munosabatlarga kirisha oladigan, faol, ma'naviy yetuk va har tomonlama bilimdon komil insonni tarbiyalashdan iborat. Ushbu maqsadlarni amalga oshirish uchun ta'lim-tarbiya jarayonida hozirgi zamon talablariga mos keluvchi yangi mashg'ulotlardan foydalanish lozim. Umumta'lim maktablarida tabiiy fanlarni o'qitishda o'quvchilar uchun belgilangan bilim, ko'nikma va malakalarni egallashlarida amaliy ish va laboratoriya mashg'ulotlarini bajarish muhim ahamiyatga ega. Biologiya tabiiy fanlarning bir tarmog'i bo'lib, insoniyatni borliq, jonli tabiat bilan tanishtiradi. O'quvchilarni tabiatni sevishi, tabiiy borliqni tushunib yetishi, tabiatdan o'rinli foydalanib, uni e'zozlashga, tabiiy boyliklarni muhofaza qilishga o'rgatadigan fanlardan biri biologiyadir.

Ta'lim muassasalarida biologiya fanidan dars jarayonida laboratoriya mashg'ulotlarini tashkil etish va laboratoriya jihozlaridan to'g'ri foydalanishida o'qituvchining innovasion faoliyati asosida zamonaviy o'qitish metodikasini yaratish natijasida o'quv jarayoniga qo'yilgan talablarni to'liq amalga oshirish, ta'lim jarayonida o'quvchi faolligini oshirib ta'limdan ko'zlangan natijaga erishishni osonlashtiradi, shuningdek, barkamol shaxsni shakllantirish uchun asosiy omil sanalgan pedagogik jarayonni takomillashtirish, uni yanada jadallashtirish va axborot texnologiyalaridan foydalanib zamonaviy dars ishlanmalarini tayyorlashni talab etadi. Aynan bu izlanish va tadqiqotlar bugungi kunda dolzarb muammolardan biri bo'lib, ta'lim muassasalarida laboratoriya mashg'ulotlarini tashkil etish va mashg'ulotlarni o'tkazish biologiya fanidan dars jarayoniga qo'llash orqali ta'limning sifat va samaradorligini oshirish muhim masalalardan biri hisoblanadi. Bu jarayonlarni amalga oshirilishi o'quvchilarning xususiy kompetensiyalarini o'qituvchilarning esa kompetentligini rivojlantirib boradi.

**Materiallar va usullar (Methods):** Tadqiqot davomida quyidagi usullardan foydalanildi:

- Ilmiy adabiyotlar tahlili, Oziq-ovqat tarkibini biokimyoviy baholash
- Statistik tahlil

**Natija va muhokama:** Barcha ta'lim muassasalarida bo'lgani kabi viloyat xalq ta'limi xodimlarini qayta tayyorlash va ularning malaka oshirish institutlarida ham ta'lim sifatini yaxshilash, unda tinglovchilarni mavjud bilimlarini takomillashtirib borish uchun ma'ruza va amaliy mashg'ulotlarni o'tkazishga jiddiy e'tibor qaratish, bu borada puxta asoslangan mexanizmni ishlab chiqish pedagog kadrlarni qayta tayyorlashdagi muhim vazifalardan biridir. Buning uchun, avvalo, uzluksiz ta'lim tizimining barcha shakldagi ta'lim muassasalarida ta'lim jarayoni sifatini ta'minlovchi ilg'or ilmiy-metodik jixatdan asoslangan uslublarni amalda qo'llash o'zining ijobiy natijalarini bermoqda. Malaka oshirish institutiga o'qishga kelgan o'qituvchilarning aksariyati umumta'lim maktablarida biologiya fanini o'qitishda laboratoriya mashg'ulotlarini o'tkazishda ko'p muammolarga duch kelayotganliklari haqida o'z fikrlarini bildiradi. O'qituvchilarning ayrimlari uchun laboratoriya mashg'ulotlarini o'tkazish juda murakkab muammoli dars hisoblanib bermoqda. Buning natijasida biologiya fan o'qituvchilari laboratoriya mashg'ulotlarini bajarmasdan, nazariy jihatdan

yondoshib, mashg'ulotlarni ish daftariga og'zaki tarzda aytib, yozdirib bormoqda. Masalan o'qituvchilar 6-sinf botanika fanidan "Aniqlagichdan foydalanib gulli o'simliklarni oilalarini o'rganish", 7-sinf zoologiya fanidan "Tufelkaning tuzilishi, harakatlanishi va ta'sirlanishi", 8-sinfda "Nafas bilan chiqarilgan havodagi karbonat angidridni aniqlash", "So'lak fermentining kraxmalga ta'siri", "Kunlik ovqat rasionini tuzish", 9-sinfda "Amilazaning kraxmalga ta'siri", "Monnoduragay, diduragay genlarning o'zaro ta'siriga oid masalalar yechish", "G'o'za, pomidor, nomozshomgulning chatishtirish natijasini gerbariy materiali yordamida o'rganish", "Tol, shaftoli, olma, ligistrum bargidagi o'zgaruvchanlikni variasion qator va belgining o'rtacha ko'rsatkichini statistik usulda aniqlash" mavzularidagi laboratoriya mashg'ulotlarini o'tkazishda qiyinchilikka duch kelmoqdalar. Aslida bu laboratoriya mashg'ulotlarni o'tkazish murakkab emas. Dastlab, biologiya fan o'qituvchisi o'zi laboratoriya mashg'ulotlarini o'tkazishdan avval, laboratoriya mavzusini yaxshilab tushunib olishi kerak. Chunki o'qituvchi o'zi mavzuni tushunmasdan laboratoriya mashg'ulotini bajarmoqda yoki umuman bajarmasdan qoldirmoqda. Masalan, 5-laboratoriya mashg'uloti: "Ko'krak qafasi harakatini kuzatish. Nafas havosi tarkibidagi  $\text{SO}_2$  ni aniqlash" degan laboratoriya mashg'ulotida o'qituvchilar havodagi  $\text{SO}_2$  ni miqdorini emas, balki havodagi  $\text{SO}_2$  ni borligini aniqlash kerak. Buning uchun oddiygina tajriba o'tkazamiz.

#### **Ishni bajarish tartibi:**

- Ikkita 20 ml probirka olamiz;
- Bir kun oldin  $\text{SaO}$  (so'ndirilgan ohak) dan  $\text{Sa(ON)}_2$  (so'ndirilgan ohak) tayyorlanadi va undan ustida tinigan suvidan ohakli suv olinadi;
- Yomg'ir yoki qor suvidan distillangan suv tayyorlanib qo'yiladi;
- Birinchi probirkaga 10 ml distillangan suv quyiladi;
- Ikkinchi probirkaga 10 ml tiniq ohakli suv quyiladi;
- So'ng bitta o'quvchini doska oldiga chiqarib, shisha naycha (plastmas nay) bilan ikkita probirkaga navbat bilan puflanadi;
- Natijalar kuzatiladi;
- Birinchi probirkada hyech qanday o'zgarish bo'lmaydi ya'ni distillangan suv tiniqligini yo'qotmaydi;
- Ikkinchi probirkadagi ohakli suv tiniqligini yo'qotib, unda oppoq bulutga o'xshash quyuq cho'kma hosil bo'la boshlaydi;
- Bu jarayon kimyoviy jihatdan quyidagi formula  $\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$  bilan ifodalanadi;
- $\text{CaSO}_3$  tuzi cho'kmaga tushadi;
- Agar tajribani davom ettirsak  $\text{CaSO}_3$  -kalsiy karbonat tuzi erib,  $\text{CaHCO}_3$  gidrokarbonat tuziga aylanadi. Bu jarayonda cho'kma erib ketadi;

Bu laboratoriya mashg'ulotini jihozlar bo'lmaganda mahalliy sharoitga moslashtirib ikkita stakanda o'tkazsa bo'ladi. Chunki ohak hammamizning uyimizda bor, distillangan suvni yomg'ir, qor suvidan yoki choynakda qaynagan suvni bug'idan yana qaytib suvga aylantirib olish mumkin.



**Laboratoriya mashg'ulotining xulosasi:** Biz nafas olib, nafas chiqargan havo tarkibida SO<sub>2</sub> gazi borligini tajriba orqali kuzatdik va uni nafas havosi bilan chiqishiga ishonch hosil qildik. Chunki puflangan SO<sub>2</sub> gazi ohakli suvdagi SaO bilan reaksiyaga kirishib tuz (cho'kma) hosil qildi. Distillangan suvda tuz hosil qiluvchi birikma bo'lmaganligi sababli unda tuz hosil bo'lmadi.

Ko'pgina umumta'lim maktablaridagi dolzarb muammolar bu laboratoriya jihozlaridan ayrim asboblarnig yetishmasligi sababli, laboratoriya mashg'ulotlari o'tkazilmay qolmoqda. Shu sababli bugungi kunda laboratoriya mashg'ulotlarini o'tkazishni yangicha innovasion texnologiyalari yaratilmoqda. Bu innovasiyalardan bittasi virtual va vizual laboratoriyalar hisoblanadi. Virtual va vizual laboratoriyalarni ma'ruza darslarida qo'shimcha ma'lumot sifatida namoyish qilib borish mumkin. Virtual laboratoriya – bu masofadan turib kompyuter texnologiyasi yordamida ekran orqali laboratoriya mashg'ulotini bajarish jarayoni. Vizual laboratoriyalar esa – laboratoriya mashg'ulotlarini AKT vositalaridan foydalanib, masofadan laboratoriya mashg'ulotini o'tkazilishini ekran orqali namoyish etish. Bugungi kunda barcha horijiy davlatlarida tabiiy fanlarni o'qitishda multimediya saytlarida yaratilgan virtual va vizual laboratoriyalardan foydalanib kelinmoqda. Virtual va vizual laboratoriyalar asosan fizika, ximiya, biologiya, ekologiya va astranomiya fanlari kesimida yaratilgan. Bu laboratoriyalarni biz [Http://numword.com](http://numword.com) [web.virtulab.net](http://web.virtulab.net), [Http:// multimediya.uz](http://multimediya.uz) saytlaridan yuklab olib darslarda qo'llab borishimiz mumkin. Bu laboratoriya mashg'ulotlari turli xil ko'rinishlarda berilishi mumkin. Masalan: 7-sinfda o'tkaziladigan laboratoriya mashg'ulotining o'tkazish tartibi bilan tanishib chiqamiz.

### **1-laboratoriya mashg'uloti: “Tufelkaning tuzilishi, harakatlanishi va ta'sirlanishi”**

**Maqsad:** Sodda hayvonlarning tashqi tuzilishini oddiy amyoba va infuzoriya tufelka asosida o'rganish

#### **ISHNING BORISHI:**

1. O'rganish uchun tanlangan obyekt: oddiy amyoba va infuzoriya tufelka;
2. Tanlangag hayvonning tuzilishini o'rganish;
3. Oddiy amyobaning tuzilishini asosiy qismlarini aniqlash;
4. Ko'rsatilgan strukturalar qanday vazifalar bajarishini aniqlash;
5. Infuzoriya-tufelkani tuzilishini aniqlash;

**Xulosa (Conclusion):** Xulosa qilib aytganda, umumta'lim maktablarida laboratoriya mashg'ulotlarini o'tkazish to'g'ri tashkil qilinsa, o'quvchilarning tirik obyektlarni tuzilishini to'liq tasavvur etish, kuzatish, aniqlash, laboratoriya jihozlaridan to'g'ri foydalanish ko'nikma va malakalari rivojlanib boradi. Laboratoriya mashg'ulotini o'tkazish o'quvchilarning nazariy bilimlarini amaliyot bilan bog'lashda, uni aniqlashtirishda, DTS talablarida ko'rsatilgan o'quv ko'nikmalarini shakllantiradi. Virtual va vizual laboratoriya mashg'ulotlarini o'tkazishda multimediya vositalaridan foydalanish o'quvchilarda tayanch vafanga oid umumiy kompetensiyalarni rivojlantirishda muhim ahamiyat kasb etadi.

Yuqorida berilgan topshiriqlar kompyuterda avval virtual laboratoriya orqali namoyish etiladi, so'ng o'quvchi ko'rgan jarayonni vizual laboratoriya



tarzida kompyuter orqali ekranda bajaradi. O'quvchilar virtual va vizual laboratoriyalar namoyishidan ham ko'p ma'lumotlarga ega bo'ladilar. Bunda o'quvchilarda fanga oid va tayanch kompetensiyalar shakllanib boradi.

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## **MECHANISMS OF ADSORPTION OF INORGANIC COMPOUNDS ON 5A TYPE SYNTHETIC ZEOLITE**

**Abstract:** *This article presents a comprehensive analysis of the main mechanisms of adsorption of inorganic compounds on 5A type synthetic zeolites. The study scientifically substantiates the interrelation between ion exchange, molecular sieve effect, physical adsorption, and chemical adsorption processes, as well as their influence on adsorption efficiency. In addition, the key factors affecting the adsorption process, including temperature, pH of the medium, initial concentration, and contact time, were investigated. The obtained results demonstrate that 5A type zeolites possess high selectivity and adsorption activity toward heavy metal ions and gaseous substances. The findings justify the effective application of these materials in water purification, gas separation, and industrial waste treatment processes.*

**Keywords:** *5A type zeolite. Adsorption. Ion exchange. Molecular sieve. Chemical adsorption. Physical adsorption. Heavy metal ions. Environmental purification. Industrial waste. Adsorbent materials.*

### **Introduction**

At present, the effective separation and purification of inorganic compounds has become one of the most pressing issues in industry, ecology, and medicine. In particular, there is an increasing demand for highly efficient adsorbent materials to remove heavy metal ions, toxic gases, and other harmful inorganic components present in water and gas environments. In this regard, synthetic zeolites, especially 5A type zeolites, are of particular importance due to their high selectivity, thermal stability, and well-developed porous structure. 5A type synthetic zeolites are crystalline aluminosilicate materials characterized by pores of precise size (approximately 5 Å). These pores enable selective adsorption of inorganic compounds through ion exchange and molecular sieve mechanisms. The negatively charged aluminum centers within the zeolite crystal framework interact with various cations, playing a crucial role in the adsorption process. The adsorption of inorganic compounds is a complex physicochemical process that occurs through several mechanisms, namely ion exchange, physical adsorption (via van der Waals forces), chemical adsorption (chemisorption), and capillary condensation. In 5A type zeolites, ion exchange and molecular sieve effects are predominant. This determines

their ability to effectively capture heavy metal ions (such as  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Pb}^{2+}$ ) and small gas molecules ( $\text{CO}_2$ ,  $\text{NH}_3$ ).

#### Relevance

Currently, due to the intensification of industrial activities, technogenic pollution, and urbanization processes, the concentration of inorganic compounds, particularly heavy metal ions and toxic gases, is increasing in the environment. This leads to ecological imbalance, deterioration of water and air quality, and an increase in factors negatively affecting human health. Therefore, the development of effective methods for removing harmful inorganic substances is one of the key directions of modern science. In this context, the use of advanced adsorbent materials such as synthetic zeolites becomes especially relevant.

#### Objective

The main objective of this study is to investigate in depth the mechanisms of adsorption of inorganic compounds on 5A type synthetic zeolites, to analyze their physicochemical foundations, and to determine their practical application potential. Scientific research in this direction plays an important role in improving environmental purification technologies and developing efficient adsorbent materials.

#### Main Part

5A type synthetic zeolites are crystalline aluminosilicate materials. Their structure consists of a three-dimensional framework formed by  $\text{SiO}_4$  and  $\text{AlO}_4$  tetrahedral units. Due to the presence of aluminum atoms, the framework carries a negative charge. This charge is typically balanced by cations such as  $\text{Ca}^{2+}$ . This feature provides zeolites with ion exchange properties. One of the main characteristics of 5A zeolites is their pore diameter of approximately 5 Å. This allows them to function as molecular sieves. In other words, they selectively allow molecules of certain sizes to pass through or be retained. Zeolites possess a large surface area, which enhances the adsorption process. They remain thermally stable up to temperatures of 500–600 °C. They are also chemically resistant to aggressive environments. Additionally, they have regeneration capability, allowing repeated use. Therefore, they are widely applied in industrial and environmental technologies.

Adsorption is defined as the accumulation of substances from a gas or liquid phase onto the surface of a solid phase. This process occurs through both physical and chemical mechanisms. Physical adsorption arises due to van der Waals forces. It is generally reversible in nature. Chemical adsorption, on the other hand, is stronger and involves the formation of chemical bonds. This process is often irreversible. In the adsorption of inorganic ions, ion exchange plays a significant role. In this mechanism, ions in solution are exchanged with ions present in the adsorbent structure. Diffusion is also an important process. Molecules first reach the external surface and then diffuse into the pores, distributing along the internal surface. The efficiency of adsorption is influenced by temperature, pressure, and pH conditions. Surface area and pore structure are also important factors.

Understanding these theoretical foundations is essential for improving practical adsorption processes.

In 5A type zeolites, ion exchange is one of the main adsorption mechanisms. The negative charges in the zeolite framework are balanced by cations. These cations can be exchanged with ions from the surrounding environment. For example,  $\text{Pb}^{2+}$ ,  $\text{Cd}^{2+}$ , or  $\text{Cu}^{2+}$  ions present in a solution can replace  $\text{Ca}^{2+}$  or  $\text{Na}^{+}$  ions in the zeolite structure. The process is selective in nature. The charge and ionic radius play a significant role. The degree of hydration also affects adsorption efficiency. Highly charged ions are retained more effectively. The process is kinetically controlled by diffusion. The rate at which ions enter the pores is crucial. The pH of the medium also has a significant impact. At low pH, protons compete with metal ions. This reduces adsorption efficiency. This mechanism is widely applied in water purification.

The molecular sieve property of 5A type zeolites is based on their porous structure. The pores have precise dimensions. This allows only molecules of certain sizes to enter. Small molecules penetrate into the pores and are adsorbed. Larger molecules remain outside. This property is important in gas separation processes. Physical adsorption occurs due to van der Waals forces. This process is reversible in nature. As temperature increases, adsorption decreases. The large surface area of zeolites enhances the process. The microporous structure increases adsorption efficiency. Capillary condensation may also occur. This leads to the liquefaction of gases within narrow pores. As a result, the degree of adsorption increases. These mechanisms together ensure high efficiency.

Chemical adsorption in 5A type zeolites occurs through strong interactions with inorganic compounds. Compared to physical adsorption, this process is more complex and energetically more stable. During chemisorption, chemical bonds are formed between the adsorbate and the adsorbent. These bonds may be ionic or covalent in nature. Active sites are present on the zeolite surface. These sites serve as the main centers of adsorption. Inorganic ions directly interact with these active sites. As a result, stable complexes are formed. This process is often irreversible. An increase in temperature accelerates chemisorption. However, at very high temperatures, desorption may also occur. Chemisorption is highly selective. This is important for the separation of specific ions. The rate of the process depends on the condition of the adsorbent surface. An increase in the number of active sites enhances efficiency. The composition of the solution also plays an important role. The presence of competing ions may slow down the process. Chemisorption is widely used in industrial gas purification. It is especially effective in capturing toxic gases. Therefore, a detailed study of this mechanism is essential.

The adsorption process in 5A type zeolites depends on various external and internal factors. Temperature is one of the most important factors. An increase in temperature reduces physical adsorption. However, it may enhance chemical adsorption. Pressure plays a significant role in gas-phase adsorption. An increase in pressure increases the amount of adsorption. In solution systems, pH is a crucial parameter. At low pH, protons compete with ions. This reduces adsorption

efficiency. High pH may lead to precipitation of metal ions. The surface area of the adsorbent is also important. A larger surface area provides higher adsorption capacity. The pore size and volume determine the accessibility of molecules. Diffusion rate affects the kinetics of the process. The degree of mixing is also an important factor. Intensive mixing enhances mass transfer. The initial concentration of the adsorbate plays a key role. Higher concentration increases the adsorption rate. However, once saturation is reached, the process slows down. Contact time must also be considered. Without sufficient time, equilibrium cannot be achieved. Therefore, all factors must be considered comprehensively.

5A type zeolites are among the most important materials widely used in industrial and environmental technologies. They are extensively applied in gas drying processes. In particular, they are highly effective in removing moisture from natural gas and air. Their molecular sieve property plays a crucial role in gas separation. For example, they are used in the separation of oxygen and nitrogen. They are also of great importance in water purification. They demonstrate high efficiency in the removal of heavy metal ions. They are used in the treatment of industrial waste. In the chemical industry, they are also applied as catalysts. Their thermal stability allows them to operate in high-temperature processes. The ability to regenerate them increases economic efficiency. They play a significant role in environmental purification technologies. They help reduce harmful gas emissions into the atmosphere. They are used in the protection of water resources. They are applied in energy-saving technologies. There is also potential for their application in the pharmaceutical field. In biomedicine, they are being studied as carriers for certain substances. Therefore, 5A type zeolites are considered versatile materials in many fields.

The study of adsorption processes in 5A type zeolites has great practical significance. This process plays an important role in solving environmental problems. It enables the improvement of water and air purification technologies. It allows for the effective removal of heavy metal ions. It is applied in the treatment of industrial waste. It contributes to the development of energy-efficient technologies. It is important in gas storage and transportation. It serves as a scientific basis for the development of new adsorbent materials. There are prospects for integration with nanotechnologies. Modified zeolites may exhibit higher selectivity. Their applications in the biomedical field are expanding. They are being studied as carriers for drug delivery. They can be used in environmental monitoring. They play an important role in the development of innovative technologies. They contribute to increasing economic efficiency. Their recyclability and regeneration capability help conserve resources. They open new directions for scientific research. Therefore, this field is considered highly promising.

#### Discussion and Results

In this study, the mechanisms of adsorption of inorganic compounds on 5A type synthetic zeolites were comprehensively investigated, and the obtained results confirmed the high adsorption activity of these materials. The findings showed that the adsorption process is multi-stage and complex in nature. It proceeds through the



combined action of ion exchange, molecular sieve effect, physical adsorption, and chemical adsorption mechanisms. It was determined that the ion exchange mechanism plays a dominant role. In this process,  $\text{Ca}^{2+}$  cations present in the zeolite structure are exchanged with heavy metal ions such as  $\text{Pb}^{2+}$ ,  $\text{Cd}^{2+}$ , and  $\text{Cu}^{2+}$  from the solution. The selectivity of the process was found to depend on the charge and radius of the ions. The degree of hydration was also identified as an important factor. Through the molecular sieve mechanism, pores with a size of approximately 5 Å selectively retain small molecules. This property ensures high efficiency in gas separation and drying processes.

Physical adsorption was characterized by its rapid occurrence and reversible nature. This process mainly occurs due to van der Waals forces. In contrast, chemical adsorption was characterized by the formation of strong bonds on the zeolite surface. This ensures stable retention of the adsorbate. During the study, the main factors affecting adsorption efficiency were also identified. Temperature was confirmed to be a significant factor. An increase in temperature was observed to reduce physical adsorption. In some cases, it may enhance chemical adsorption. The pH of the medium was also found to be highly important. Adsorption was higher in neutral and slightly alkaline conditions. At low pH, competition from protons reduced the efficiency. The initial concentration influenced the adsorption rate. Higher concentrations led to faster adsorption. However, once equilibrium was reached, the process slowed down.

It was determined that sufficient contact time is necessary to achieve equilibrium. The importance of diffusion processes was also observed. The rate at which ions penetrate into the pores determines the overall rate of the process. The obtained results confirmed that 5A zeolites possess a high surface area and a well-developed microporous structure. These properties make them highly efficient adsorbents. In practical applications, they were found to be effective in removing heavy metal ions from water. High performance was also observed in gas drying and separation. Their applicability in industrial waste treatment was substantiated. The regenerability of zeolites increases their economic efficiency. Their ability to be reused multiple times is a significant advantage. The results of the study provide a basis for the development of new modified zeolites. Further research is needed to improve selectivity. This field plays an important role in addressing environmental problems. The results once again confirm that 5A type zeolites are promising adsorbent materials.

### Conclusion

In this study, the main mechanisms of adsorption of inorganic compounds on 5A type synthetic zeolites were comprehensively investigated, and the obtained results confirmed the high adsorption efficiency of these materials. The findings demonstrated that the adsorption process is characterized by multiple mechanisms and occurs through the combined action of ion exchange, molecular sieve effect, physical adsorption, and chemical adsorption. The ion exchange mechanism was found to play a dominant role in the removal of heavy metal ions. The molecular sieve property is important for the selective retention of small molecules. Physical



adsorption was identified as a rapid and reversible process. In contrast, chemical adsorption is characterized by the formation of stable and strong bonds.

During the study, the main factors influencing adsorption efficiency were also determined. Temperature, pH of the medium, initial concentration, and contact time were proven to be key parameters. Under optimal conditions, a significant increase in adsorption efficiency was observed. The well-developed microporous structure and large surface area of 5A type zeolites ensure their effectiveness as high-performance adsorbents. These materials were shown to be effective in removing heavy metal ions from water. High efficiency was also observed in gas drying and separation processes. Their potential application in industrial waste treatment was demonstrated. The regenerability of zeolites enhances their economic efficiency. Their reusability is considered an important advantage. Based on the results of the study, prospects for the development of new modified adsorbents were identified. Further research is required to improve selectivity and optimize the adsorption process. In general, 5A type synthetic zeolites can be considered promising and efficient materials for solving environmental and industrial problems.

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## **THE MARKET FOR ELECTRIC LIGHTING PRODUCTS IN UZBEKISTAN: CURRENT DYNAMICS AND FUTURE PROSPECTS**

**Abstract** *This article analyzes the current state and evolutionary trends of the electric lighting products market in Uzbekistan. Amidst rapid urbanization, large-scale housing construction, and a national transition toward energy efficiency, the demand for advanced lighting solutions—particularly Light Emitting Diodes (LED)—has seen exponential growth. The study examines the shift from imported dominance to localized production, the impact of government energy-saving policies, and the integration of "Smart City" technologies. Findings suggest that while the market is becoming increasingly competitive, the future lies in high-tech localized manufacturing and sustainable smart lighting systems.*

**Keywords:** *Uzbekistan, Lighting Market, LED Technology, Energy Efficiency, Smart Lighting, Localization, Construction Sector.*

### **1. Introduction**

The Republic of Uzbekistan is currently undergoing a period of profound economic transformation. As the most populous country in Central Asia, its infrastructure development and construction sectors have become primary drivers of domestic demand. Within this context, the electric lighting products market has evolved from a basic utility sector into a high-technology industry. The transition is catalyzed by the government's Strategy for Transition to a "Green" Economy, which mandates the phasing out of inefficient incandescent lamps in favor of energy-saving alternatives. [1]

### **2. Current Market Dynamics**

Uzbekistan's economy has demonstrated steady growth in recent years. According to 2024 data, the country's gross domestic product (GDP) grew by 6.5% in real terms. According to the International Monetary Fund (IMF), Uzbekistan's economy is among the countries with the most stable growth indicators in the region (IMF, 2024). Ensuring macroeconomic stability, keeping inflation under control, and maintaining a balanced public budget demonstrate the effectiveness of the country's economic policy.[2]

In his study, Russian economist V.A. Kolesov (2021), highlighting the specific features of Uzbekistan's economic model, notes its distinctive features compared to other post-Soviet countries. In particular, he commends the country's phased reform strategy and balanced privatization processes.[3]

Industry is an important component of Uzbekistan's economy, accounting for a significant share of the gross domestic product. In recent years, the country has

developed a new industrial policy concept aimed at import substitution and increasing export potential. At the current stage of industrial development, technological modernization and the implementation of innovative solutions are considered priorities. American economist M. Porter (2020), in his theory of "competitive advantage," emphasizes that the development of modern industry should be based on technological innovation and the production of high-value-added products.[4]

Russian scholar A.G. Granberg (2019), in his theory of regional economics, examines the formation and development of industrial clusters and positively evaluates the creation of industrial zones in Uzbekistan. He particularly notes the creation of special industrial zones in the country and their transformation into attractive factors for international investors.[5]

Energy is a strategic sector of the Uzbekistan economy, playing a crucial role in ensuring the country's energy security. In 2024, a number of important changes were implemented in the energy sector. In the process of modernizing the energy system, studying international experience is essential. Japanese energy specialist T. Yamamoto (2021) examines issues of improving energy efficiency and implementing energy-saving technologies in his study. In his opinion, modernizing the energy system in developing countries is essential for economic growth.[6]

The main problems in the energy sector include outdated infrastructure, high technical losses, and low energy efficiency. To address these issues, the government has developed a comprehensive program that provides for the phased modernization of the energy system.

The lighting market in Uzbekistan can be segmented into residential, industrial, and outdoor (street) lighting. Historically, the market was heavily reliant on imports from China, Turkey, and Europe. However, recent years have seen a structural shift.

- **Construction Boom:** With the "New Uzbekistan" initiative, the scale of residential and commercial real estate development has reached record highs. Every new housing unit requires a comprehensive lighting suite, ranging from internal fixtures to external aesthetic lighting. [7]

- **The LED Revolution:** In accordance with national energy efficiency programs, Uzbekistan has implemented a phased ban on the sale of high-wattage incandescent bulbs. This has led to a near-total dominance of LED products, which now account for over 80% of retail sales in the urban sector. [8]

### **Localization and Industrial Policy**

A key feature of the current market is "Localization." To reduce import dependency, the government has provided tax incentives and customs preferences for domestic manufacturers.

- **Major Players:** Companies such as *Akfa Lighting*, *Royal*, and various enterprises under the *Uzeltechsanoat* Association have established full-cycle assembly lines. According to the Association "Uzeltechsanoat" [9], localized brands now compete effectively with international giants by offering localized warranties and lower price points.

- **Innovation in Production:** Local manufacturers have invested heavily in R&D to adapt products to the specific climatic conditions and voltage fluctuations of the region. [10]

### **Technological Trends: Smart and Solar Lighting**

The prospects of the market are inextricably linked to two technological frontiers:

1. **Smart Lighting:** As Tashkent and Samarkand adopt "Smart City" concepts, the demand for Automated Lighting Control Systems (ALCS) is rising. These systems utilize motion sensors and remote dimming to reduce electricity consumption by an additional 30-40%. [11]

2. **Solar-Powered Solutions:** Given Uzbekistan's high solar insolation (up to 300 sunny days a year), there is a significant push for autonomous solar street lighting, particularly along national highways and in remote rural areas. [12]

### **Challenges and Constraints**

Despite the positive trajectory, several barriers remain. The market is still navigating issues with counterfeit products and a reliance on imported semiconductor components. Furthermore, the efficiency of public lighting remains a priority for international financial institutions supporting the country's energy reforms. [13]

### **Conclusion and Future Prospects**

The electric lighting products market in Uzbekistan is poised for a projected annual growth rate of 10-15% over the next decade. The future of the industry will be defined by the "Internet of Lights" (IoL), where lighting fixtures serve as nodes in a broader digital infrastructure. For investors and manufacturers, the strategic focus should shift from simple assembly to the production of high-tech semiconductor components and the development of intelligent software for energy management. [14]

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## **THE ROLE OF ARTIFICIAL INTELLIGENCE IN DISEASE PREDICTION BASED ON MEDICAL DATA**

**Abstract.** Artificial intelligence (AI) has emerged as a transformative paradigm in predictive medicine, fundamentally altering the methodologies used for disease risk assessment and early diagnosis. By leveraging heterogeneous medical datasets, including electronic health records, imaging modalities, genomic sequences, and longitudinal patient data, AI-driven systems facilitate the identification of latent patterns that are often imperceptible through conventional statistical approaches. This study provides a comprehensive analytical synthesis of AI applications in disease prediction, with particular emphasis on model performance, interpretability constraints, data governance challenges, and clinical integration barriers. Drawing upon peerreviewed literature indexed in Scopus, PubMed, and Web of Science, the study reveals that while advanced machine learning architectures—particularly deep neural networks and ensemble methods—demonstrate superior predictive performance, their deployment in realworld clinical environments is constrained by issues related to transparency, bias, reproducibility, and regulatory compliance.

**Keywords:** artificial intelligence, disease prediction, machine learning, medical data, healthcare analytics, predictive modeling, clinical decision support

**Introduction.** The exponential growth of medical data generated through digitized healthcare infrastructures has created unprecedented opportunities for the application of artificial intelligence in predictive medicine. Contemporary healthcare systems increasingly rely on electronic health records (EHRs), diagnostic imaging, wearable sensor outputs, and genomic datasets, all of which contribute to highdimensional, complex, and often nonlinear data environments. Traditional statistical approaches, while effective in controlled settings, are limited in their ability to capture intricate relationships embedded within such datasets. Artificial intelligence, particularly machine learning and deep learning techniques, has demonstrated significant potential in addressing these limitations by enabling automated feature extraction, pattern recognition, and predictive inference. These methods are trained on large datasets to identify associations between input variables and clinical outcomes, thereby supporting early detection of diseases such as cardiovascular disorders, malignancies, neurological conditions, and metabolic syndromes. However, the increasing reliance on AI-based predictive systems introduces several conceptual and operational challenges. Among these are the interpretability of complex models, the reproducibility of results across diverse populations, and the integration of algorithmic outputs into clinical workflows.



Furthermore, the shift from humancentered to datadriven decisionmaking raises fundamental questions regarding clinical responsibility, epistemic authority, and the evolving role of healthcare professionals.

**Methods.** This study employs a structured qualitative synthetic methodology based on a systematic review of scholarly literature indexed in Scopus, PubMed, and Web of Science databases. The selected timeframe spans publications from 2019 to 2025, reflecting the most recent advancements in AI driven predictive healthcare technologies. The inclusion criteria encompassed peerreviewed studies that investigate the application of machine learning, deep learning, or hybrid computational models in disease prediction using medical datasets. Studies lacking clinical applicability or focusing solely on algorithmic development without healthcare relevance were excluded from the analysis. The analytical process involved thematic synthesis of findings across multiple studies, focusing on key dimensions such as predictive accuracy, model interpretability, dataset characteristics, validation methodologies, and deployment challenges. Comparative evaluation was conducted to identify consistent patterns and divergences across different AI approaches and application domains. To strengthen the validity of the synthesis, findings reported in highly cited studies and metaanalyses were incorporated into the conceptual framework. The analysis also considered statistical summaries and benchmark results commonly reported in peerreviewed journals to contextualize performance metrics across different modeling techniques.

**Results.** The synthesized evidence indicates that artificial intelligence models consistently outperform traditional statistical methods in disease prediction tasks, particularly in scenarios involving highdimensional and multimodal datasets. Deep learning architectures, such as convolutional neural networks and recurrent neural networks, exhibit exceptional performance in imagebased diagnostics and temporal data analysis, while ensemble methods provide robustness and improved generalization across structured datasets.

**Table 1. Comparative Performance of AI Based Models in Disease Prediction**

| Model Type                 | Clinical Application             | Predictive Performance | Strengths                        | Limitations                 |
|----------------------------|----------------------------------|------------------------|----------------------------------|-----------------------------|
| Logistic Regression        | Cardiovascular risk prediction   | Moderate (70–78%)      | Interpretability, simplicity     | Limited nonlinear modelling |
| Random Forest              | Chronic disease classification   | High (78–85%)          | Feature importance, robustness   | Computational complexity    |
| Gradient Boosting Machines | Oncology and survival prediction | Very high (82–90%)     | Strong predictive power          | Sensitivity to overfitting  |
| Deep Neural Networks       | Medical imaging and genomics     | Very high (88–95%)     | Feature abstraction, scalability | Low interpretability        |
| Hybrid Ensemble Models     | Multi-source medical data        | High (85–93%)          | Combines multiple algorithms     | Implementation complexity   |

The comparative analysis demonstrates that while deep learning and ensemble models achieve superior predictive accuracy, their applicability in clinical practice is limited by interpretability constraints. Clinicians often require explainable outputs to validate algorithmic recommendations and integrate them into decisionmaking processes.

Furthermore, data-related factors such as sample size, class imbalance, feature selection, and preprocessing techniques significantly influence model performance. Bias in training datasets remains a critical issue, particularly when models are trained on nonrepresentative populations, potentially leading to reduced generalizability and inequitable outcomes.

**Discussion.** The findings highlight a fundamental tradeoff between predictive performance and interpretability in AI-driven healthcare systems. Although advanced models achieve high accuracy, their internal mechanisms often remain opaque, complicating their acceptance in clinical environments where transparency and accountability are essential. The integration of AI into clinical workflows represents a paradigm shift in medical practice, wherein decisionmaking is increasingly supported by algorithmic recommendations. This transition requires healthcare professionals to develop competencies not only in interpreting predictive outputs but also in communicating uncertainty and probabilistic information to patients.

From a systems perspective, the deployment of AI introduces new governance challenges, particularly in relation to data privacy, informed consent, and regulatory oversight. Ensuring compliance with ethical standards and legal frameworks is essential to maintaining trust in AI-enabled healthcare systems. Interdisciplinary collaboration emerges as a key enabler of successful AI integration. The convergence of expertise from computer science, clinical medicine, biostatistics, and medical humanities facilitates the development of systems that are not only technically robust but also ethically sound and socially acceptable.

**Conclusion.** Artificial intelligence represents a significant advancement in the field of disease prediction, offering enhanced capabilities for analyzing complex medical datasets and generating clinically relevant insights. However, the effectiveness of AI systems is contingent upon more than algorithmic performance; it requires transparency, ethical governance, and seamless integration into clinical practice.

The study concludes that AI should be conceptualized as a complementary decision support tool rather than a replacement for clinical expertise. Future research should focus on improving model explainability, addressing data bias, and developing standardized frameworks for validation and deployment. Equally important is the incorporation of interdisciplinary perspectives to ensure that technological innovation aligns with the principles of patient-centered care and equitable healthcare delivery.

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## **EXPERIMENTAL STUDY OF THE RESISTANCE COEFFICIENTS OF THE MESH-DRUM APPARATUS BLADES**

**Abstract.** *As a result of the experimental studies conducted in this article, the resistance coefficients of the blades, which ensure the rotational movement of the newly created wet dust cleaning drum apparatus with three different angles of inclination, were determined under variable gas flow regimes. Depending on the resistance coefficients, the number of blades rotations was also determined. To calculate the theoretical resistance coefficients of the blades, the values of the correction coefficient were determined depending on the experimentally determined resistance coefficients and the main parameters. Depending on these determined parameters, it was possible to determine the total pressure losses in the apparatus.*

**Keywords:** *wet method, drum, mesh, blade, resistance coefficient, number of revolutions, angle of inclination.*

Nowadays, wet dust cleaning devices are widely used in industry. The creation of more efficient and energy-saving devices for cleaning dusty gases emitted into the atmosphere from industrial enterprises is one of the pressing issues of the present day, and we have invented a new design of a wet dust cleaning device with a dust drum and are conducting scientific research. The main indicators of wet dust cleaning devices are productivity and cleaning efficiency, and these indicators, in turn, depend on the resistance coefficients of the working and contact elements of the device. This research work presents the results of an experimental study on determining the resistance coefficients in the experimental device of a newly created dust drum device [1].

### **Object and research method**

The experimental device of the rotary drum apparatus created by the Department of "Technological Machines and Equipment" of Fergana State Technical University was used as the object of research. Figure 1 shows the kinematic diagram of the experimental device, Figure 2 shows a photogrammetry, and Formula 1 [1,2,3,4,5], which calculates the total pressure loss in the device, was derived as a result of theoretical research.

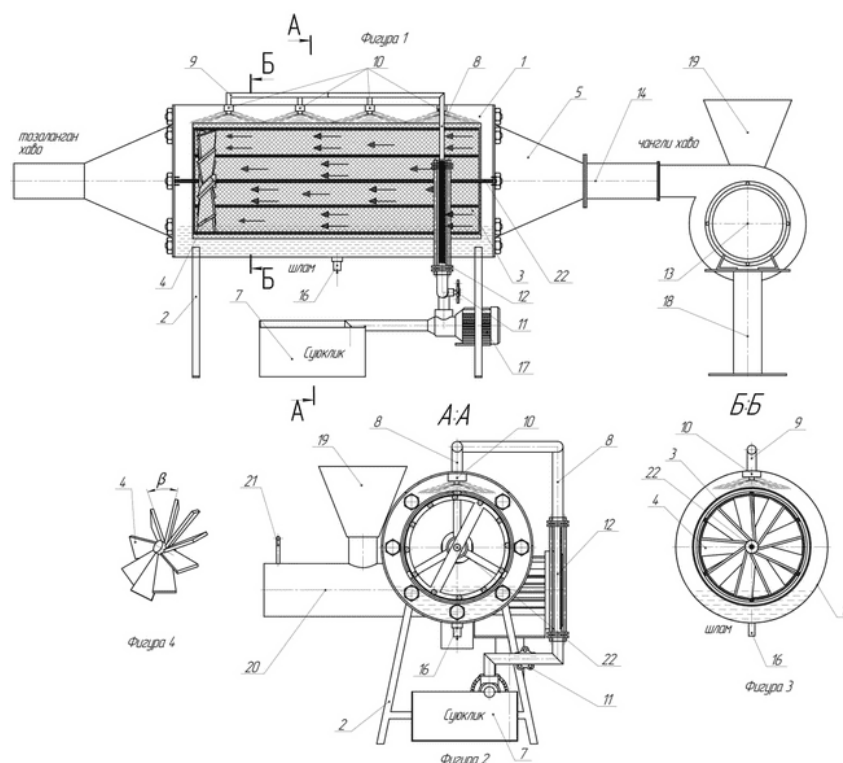


**Figure 1. Kinematic scheme of the device**

1-device tanasi. 2-built base, 3-type drum, 4-parrak, 5-changli gas injector conesimon tube, 6- powdered gas extraction conussimon tube, 7-water supply, , 8,9-water supply tubes, 10-nozzle, 11-valve, 12-rotameter, 13-fan, 14-directional pipe, 15- pulverized gas extraction pipe, 16- slurry extraction pipe, 17- pump, 18-support, 19-chang bunker, 20-auger loading, 21-shiber, 22-right.

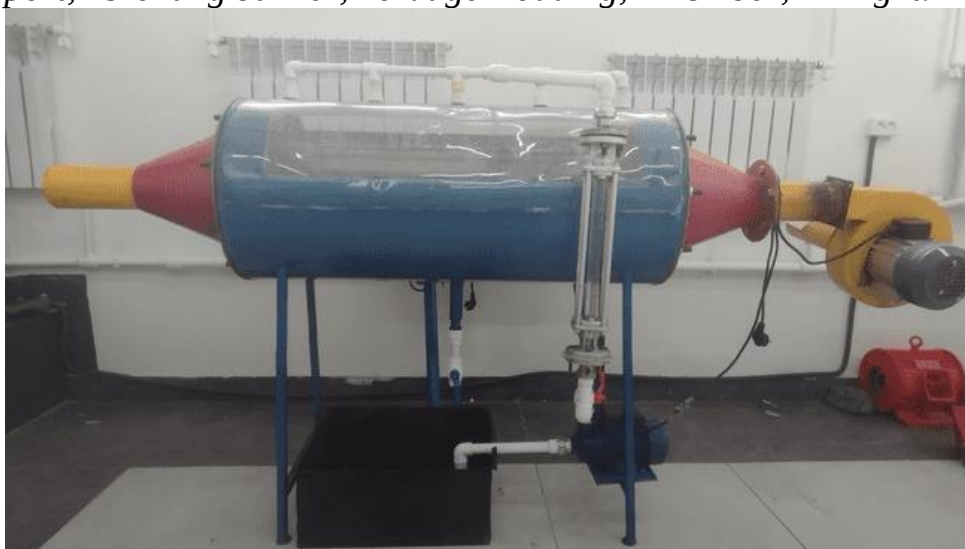


**Figure 2. Photo of the experimental device.**

$$P_{об} = \lambda_1 \cdot \frac{l}{d} \cdot \rho_{см} \cdot \frac{\omega_{см}^2}{2} + (\xi_c + \xi_{жс}) \frac{\rho_{ар} \cdot \omega_{ар}^2}{2} + \frac{4 \cdot \pi \cdot R^2}{\Delta k \cdot n \cdot a \cdot b \cdot \sin \beta} \cdot \frac{\rho_{ар} \cdot \omega_{ар}^2}{2} + \lambda_2 \cdot \frac{l}{d} \cdot \rho \cdot \frac{\omega^2}{2} \quad (1)$$

This formula 1 was derived to calculate the total pressure loss when the device is supplied with liquid and dusty gas. The main task of this article is to determine the total resistance coefficient of the device. To determine the resistance coefficient of the device, experimental studies were conducted in the absence of water spray.

From formula 1, we can write the formula that determines only the total resistance coefficient of the device as follows.

$$\xi_{\text{св}} = \lambda_1 \cdot \frac{l}{d} + (\xi_c + \xi_{\text{жс}}) + \frac{4 \cdot \pi \cdot R^2}{\Delta k \cdot n \cdot a \cdot b \cdot \sin \beta} + \lambda_2 \cdot \frac{l}{d} \quad (2)$$

where  $\lambda_1$  is the coefficient of friction between the pipe wall and the dust gas supply to the device,  $l$  is the length of the pipe through which the dust gas moves, m;  $d$  is the pipe diameter, m;  $\xi_c$  - the resistance coefficient of the drum mesh,  $\xi_{\text{жс}}$  is the resistance coefficient formed by spraying liquid into the device, and it is ignored in these experimental studies because the resistance coefficients are determined without liquid supply.

For the drag coefficient of the wings  $\Delta k$  is the correction factor, determined experimentally,  $n$  - number of pieces, pieces;  $a$  - the length of the lateral side, m;  $b$  - the slope angle of the gas flow surface, degrees;  $b$  - blade width, m; (see Fig. 1)  $\lambda_2$  - coefficient of friction in the pipe for removing purified air from the apparatus;  $l$  - length of the pipe through which purified air moves, m;  $d$  - pipe diameter, m;

### **The results obtained.**

Using equation 2, the total resistance coefficients of the apparatus are determined.

Experimental studies to determine the resistance coefficients were conducted in the following sequence.

1. A damper (movable damper) was installed on the suction side of the ventilator installed in the experimental device to change the gas flow rate. The damper was changed in the range of 30°-90° (in steps of 15°), and the gas velocities exiting the ventilator and the gas flow rates depending on it were determined. When the damper was opened to 30°,  $Q_g = 141 \text{ m}^3/\text{h}$ , when opened to 45°,  $Q_g = 282 \text{ m}^3/\text{h}$ , when opened to 60°,  $Q_g = 423 \text{ m}^3/\text{h}$ , when opened to 75°,  $Q_g = 564 \text{ m}^3/\text{h}$ , When opened to 90°,  $Q_g = 705 \text{ m}^3/\text{h}$ .

2. In this process of experiments, a fan and a grid drum were installed in the apparatus body, and the results were obtained. The square hole size of the grid is  $a = 0.6 \text{ mm}$ . The gas flow rate determined above was given as  $Q = 141 \div 705 \text{ m}^3/\text{h}$  (in steps of  $141 \text{ m}^3/\text{h}$ ), and the gas flow rate leaving the apparatus was determined. In this case, when the gate is opened to 30°,  $Q_g = 115.6 \text{ m}^3/\text{h}$ , when it is opened to 45°,  $Q_g = 220 \text{ m}^3/\text{h}$ , when it is opened to 60°,  $Q_g = 338.4 \text{ m}^3/\text{h}$ , when it is opened to 75°,  $Q_g = 433.8 \text{ m}^3/\text{h}$ , When opened to 90°,  $Q_g = 555 \text{ m}^3/\text{h}$  was obtained. The resistance coefficient with the screen installed in the device was determined by the difference in the determined gas consumption. To determine the difference in gas flow rates, an electronic gas velocity measuring device of the ANOMOMETER



VA06-TROTEC brand was used. The resistance with the grid installed in the device coefficient was  $x=1.26$ .

3. 0,30,45 ° were sequentially installed on a grid drum with a square hole size  $a=0.6$  mm installed in the apparatus body , and the total resistance coefficient of the apparatus was determined (see Figs. 3 and 4).



**Figure 3 is shown below. Browsing of pages**

Each of the blades installed in the screen drum was supplied with gas *at a rate of*  $Q=141\div 705$  m<sup>3</sup>/h ( in steps of 141 m<sup>3</sup>/h ). Separate experimental studies were conducted for each blade. According to the results of the conducted experimental studies, when a blade with a slope angle of  $\beta=15^\circ$  was installed, the total resistance coefficient of the device was  $\zeta_H = 1.81$ , when a blade with a slope angle of  $\beta=30^\circ$  was installed, the total resistance coefficient of the device was  $\zeta_H = 1.62$ , and when a blade with a slope angle of  $\beta=45^\circ$  was installed , the total resistance coefficient of the device was  $\zeta_c = 1.42$  .

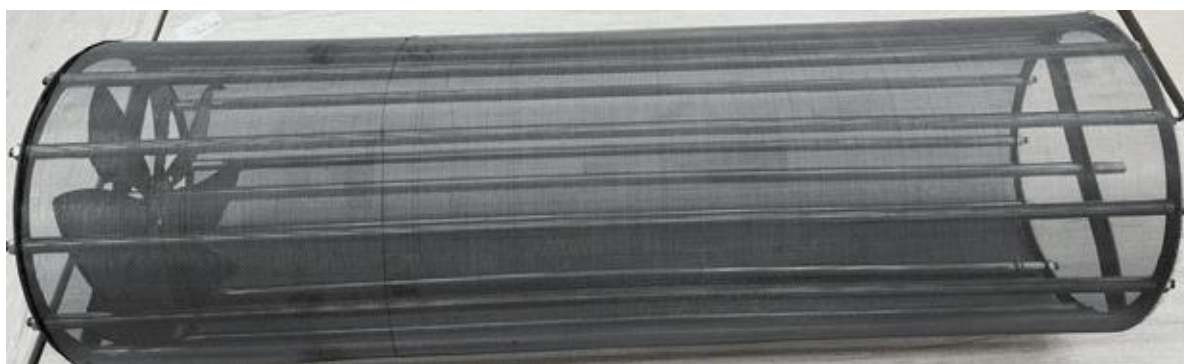


**Figure 4. In the state where the screen drum is installed.**

These determined drag coefficients are the total drag coefficients when the device is not supplied with fluid. Subtracting the local drag coefficients from these values gives the drag coefficients of the blades. A) When  $\beta=15^\circ$  ;  $\xi_\pi = 1.81-1.26=0.55$  B) when  $\beta=30^\circ$  ;  $\xi_p = 1.62-1.26=0.36$  C) when  $\beta=15^\circ$  ;  $\xi_p = 1.42-1.26=0.16$

The results of the empirical study are presented in Table 1.

**Table 1. Results obtained in the determination of the coefficients of resistance**

3. When the impeller is installed, and water is not sprayed:  $\omega$  g - gas velocity, m/s;  $Q_g$  - gas flow, m<sup>3</sup>/h;  $\xi_0$  - resistance coefficient; n - number of revolutions of the screen drum, rpm.

| №                                      | A°  | Outflow from the ventilator |                    | Grid, installed waterless condition |                    |         | The leaf is not installed or watered |                    |            | n cycle / minute |
|----------------------------------------|-----|-----------------------------|--------------------|-------------------------------------|--------------------|---------|--------------------------------------|--------------------|------------|------------------|
|                                        |     | $\omega_r$ ,<br>м/с         | $Q_r$ м³/<br>hours | $\omega_r$ ,<br>м/с.                | $Q_r$ м³/<br>hours | $\xi_0$ | $\omega_r$ ,<br>м/с.                 | $Q_r$ м³/<br>hours | $\xi_{ym}$ |                  |
| $\alpha=15^0$ , d=0,6mm                |     |                             |                    |                                     |                    |         |                                      |                    |            |                  |
| 1                                      | 30° | 5                           | 141                | 4,1                                 | 115,6              | 1,22    | 2,7                                  | 78,3               | 1,8        | 4                |
| 2                                      | 45° | 10                          | 282                | 7,8                                 | 220                | 1,28    | 5,5                                  | 155                | 1,81       | 8                |
| 3                                      | 60° | 15                          | 423                | 12,2                                | 338,4              | 1,23    | 8,1                                  | 231                | 1,83       | 12               |
| 4                                      | 75° | 20                          | 564                | 15,8                                | 433,8              | 1,3     | 11                                   | 311                | 1,81       | 16               |
| 5                                      | 90° | 25                          | 705                | 19,7                                | 555                | 1,27    | 13,7                                 | 387                | 1,82       | 20               |
| Average cost of resistance coefficient |     |                             |                    |                                     |                    | 1,26    |                                      |                    | 1,81       |                  |
| $\alpha=30^0$ , d=0,6mm                |     |                             |                    |                                     |                    |         |                                      |                    |            |                  |
| 1                                      | 30° | 5                           | 141                | 4,1                                 | 115,6              | 1,22    | 3,1                                  | 87,5               | 1,61       | 2                |
| 2                                      | 45° | 10                          | 282                | 7,8                                 | 220                | 1,28    | 6,2                                  | 174                | 1,62       | 4                |
| 3                                      | 60° | 15                          | 423                | 12,2                                | 338,4              | 1,23    | 9,3                                  | 263                | 1,61       | 6                |
| 4                                      | 75° | 20                          | 564                | 15,8                                | 433,8              | 1,3     | 12                                   | 343                | 1,64       | 8                |
| 5                                      | 90° | 25                          | 705                | 19,7                                | 555                | 1,27    | 15,3                                 | 432                | 1,63       | 10               |
| Average cost of resistance coefficient |     |                             |                    |                                     |                    | 1,26    |                                      |                    | 1,62       |                  |
| $\alpha=45^0$ , d=0,6mm                |     |                             |                    |                                     |                    |         |                                      |                    |            |                  |
| 1                                      | 30° | 5                           | 141                | 4,1                                 | 115,6              | 1,22    | 3,5                                  | 99,2               | 1,42       | 1                |
| 2                                      | 45° | 10                          | 282                | 7,8                                 | 220                | 1,28    | 6,9                                  | 197                | 1,43       | 2                |
| 2                                      | 45° | 10                          | 282                | 7,8                                 | 220                | 1,28    | 6,9                                  | 197                | 1,43       | 3                |
| 4                                      | 75° | 20                          | 564                | 15,8                                | 433,8              | 1,3     | 13,9                                 | 394                | 1,43       | 4                |
| 5                                      | 90° | 25                          | 705                | 19,7                                | 555                | 1,27    | 17,6                                 | 496                | 1.42       | 5                |
| Average cost of resistance coefficient |     |                             |                    |                                     |                    | 1,26    |                                      |                    | 1,42       |                  |

As a result of experimental studies, the general resistance coefficients of the blades and the device in the state where no liquid was sprinkled on the device were determined. The next task focused on determining the correction coefficients for calculating the resistance coefficients of the feathers.

$$\xi_n = \frac{4 \cdot \pi \cdot R^2}{\Delta k \cdot n \cdot a \cdot b \cdot \sin \beta} \quad (3)$$

The calculation scheme of the wing is presented in Figure 5.

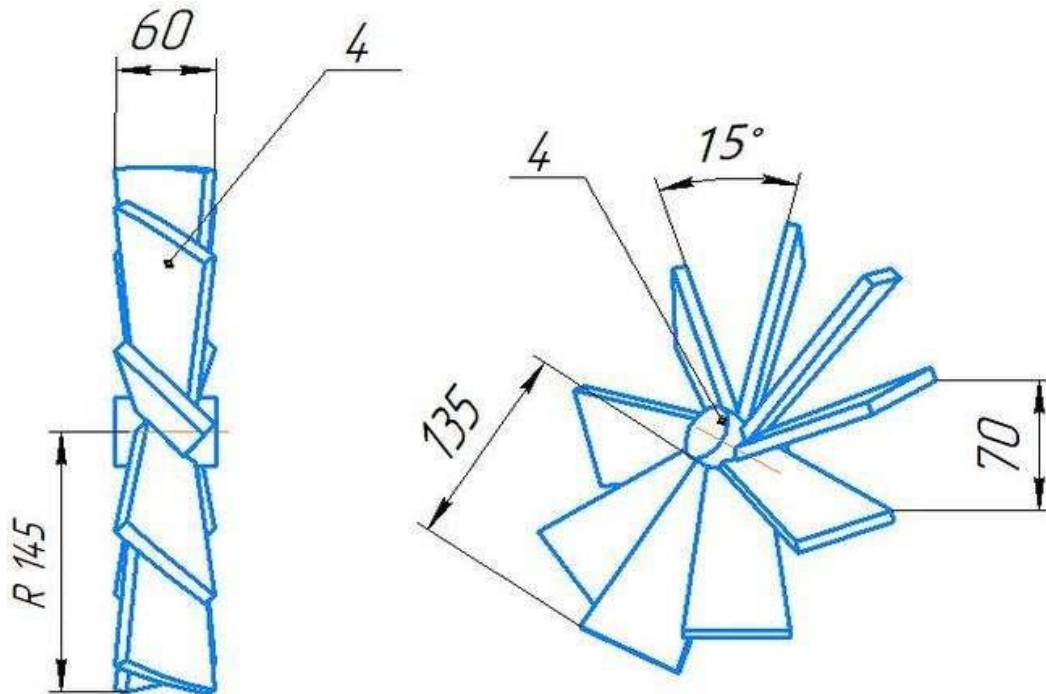


**Figure 5. Parrak's calculation scheme.**

The technical characteristics of the hair according to formula 3 are as follows. Blade radius,  $R=145\text{mm}$  , blade width  $b=60\text{mm}$  , number of blades  $n=9$  , blade side length  $a=135\text{mm}$  , blade angle  $\beta = 15^\circ, 30^\circ, 45^\circ$  The coefficient of relative resistance of the pipe is found as follows.

$$\xi_n = \frac{S_{ob}}{S_\beta} = \frac{4 \cdot \pi \cdot R^2}{n \cdot a \cdot b \cdot \sin \beta} \quad (4)$$

Here,  $S_{ob}$  is the total surface area of the wing disk,  $\text{m}^2$  , and  $S_\beta$  is the surface area occupied by the angular displacement,  $\text{m}^2$  . Substituting the values, we find the coefficient of relative drag.

When  $\beta = 15^\circ$

$$\xi_n = \frac{S_{ob}}{S_\beta} = \frac{4 \cdot \pi \cdot R^2}{n \cdot a \cdot b \cdot \sin \beta} = \frac{4 \cdot 3,14 \cdot 145^2}{9 \cdot 135 \cdot 60 \cdot 0,26} = \frac{1821}{18954} = 0,096$$

When  $\beta = 30^\circ$

$$\xi_n = \frac{S_{o\delta}}{S_\beta} = \frac{4 \cdot \pi \cdot R^2}{n \cdot a \cdot b \cdot \sin \beta} = \frac{4 \cdot 3,14 \cdot 145}{9 \cdot 135 \cdot 60 \cdot 0,5} = \frac{1821}{36450} = 0,05$$

When  $S \beta - 45^0$

$$\xi_n = \frac{S_{o\delta}}{S_\beta} = \frac{4 \cdot \pi \cdot R^2}{n \cdot a \cdot b \cdot \sin \beta} = \frac{4 \cdot 3,14 \cdot 145}{9 \cdot 135 \cdot 60 \cdot 0,71} = \frac{1821}{51759} = 0,035$$

We find the correction coefficient using the following formula.

$$\xi_n = \frac{\xi_n}{\xi_n} \quad (5)$$

here  $\xi_n$  is the relative resistance coefficient of the parrack,  $\xi_n$  is the experimentally calculated resistance coefficient of the parracks. Putting the values into the 5-formula, we find the coefficient of adjustment of the values.

$$\text{When } S \beta - 15^0: \xi_n = \frac{\xi_n}{\xi_n} = \frac{0,55}{0,096} = 6$$

$$\text{When } S \beta - 30^0: \xi_n = \frac{\xi_n}{\xi_n} = \frac{0,36}{0,05} = 7$$

$$\text{When } S \beta - 45^0: \xi_n = \frac{\xi_n}{\xi_n} = \frac{0,16}{0,035} = 5$$

It is recommended to take the value of the correction coefficient in the range  $\Delta k=5 \div 7$ . The results obtained from the experimental studies were processed by a computer program, and graphs of dependence were built. (Figures 6 , 7 , 8. )

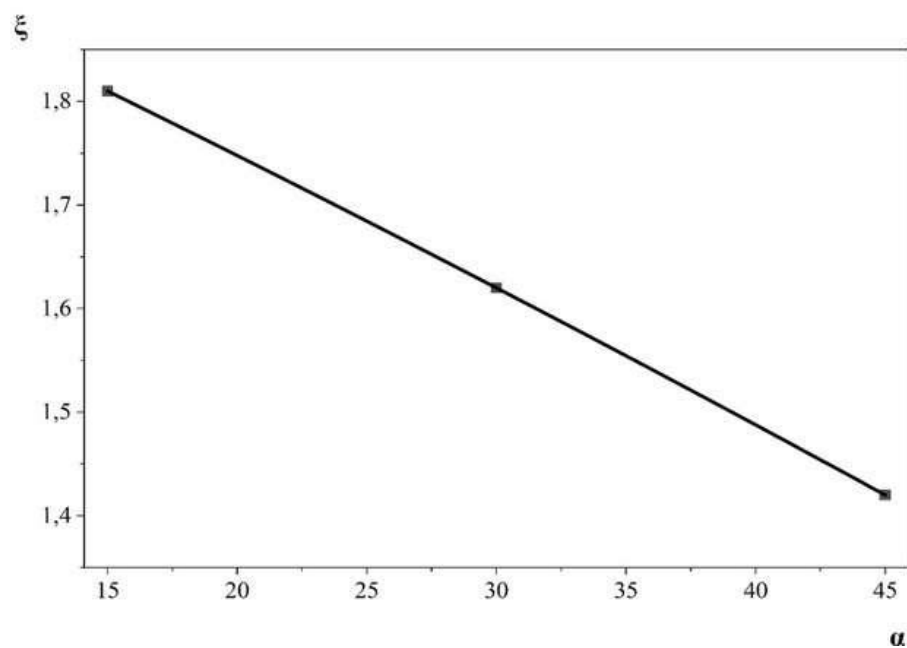


**Figure 6 . Total resistance coefficient in the case of no liquid supply to the apparatus**

Specified regression equations

$$y = -0.013 x + 2.0067$$

$$R^2 = 0.9998$$

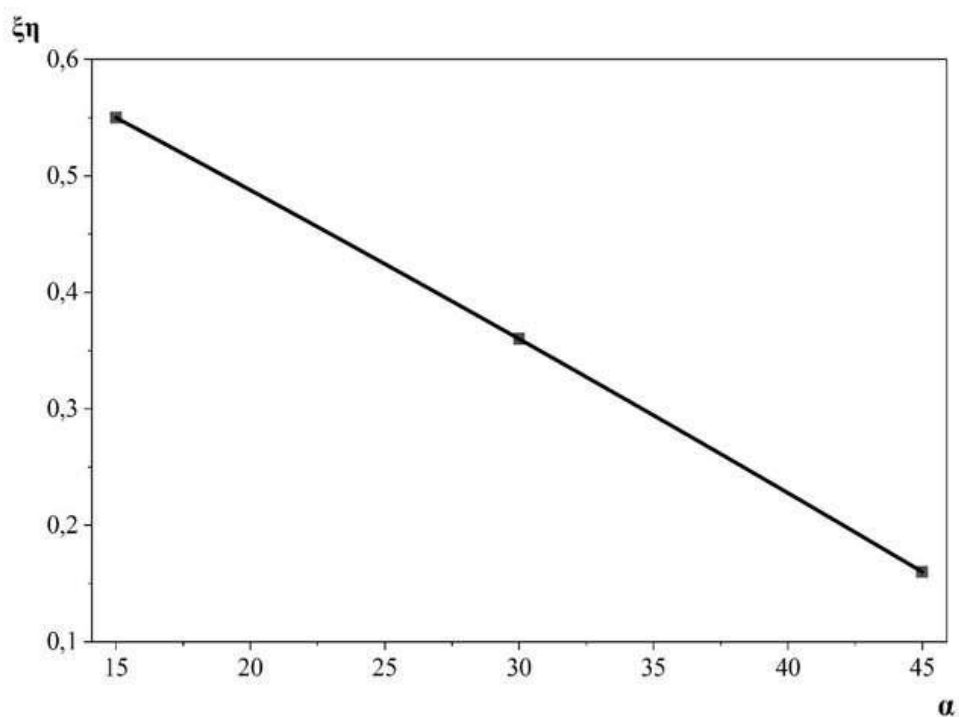


**Figure 7 . The coefficient of resistance of the wings**

Specified regression equations

$$y = -0.013x + 0.7467$$

$$R^2 = 0.9998$$

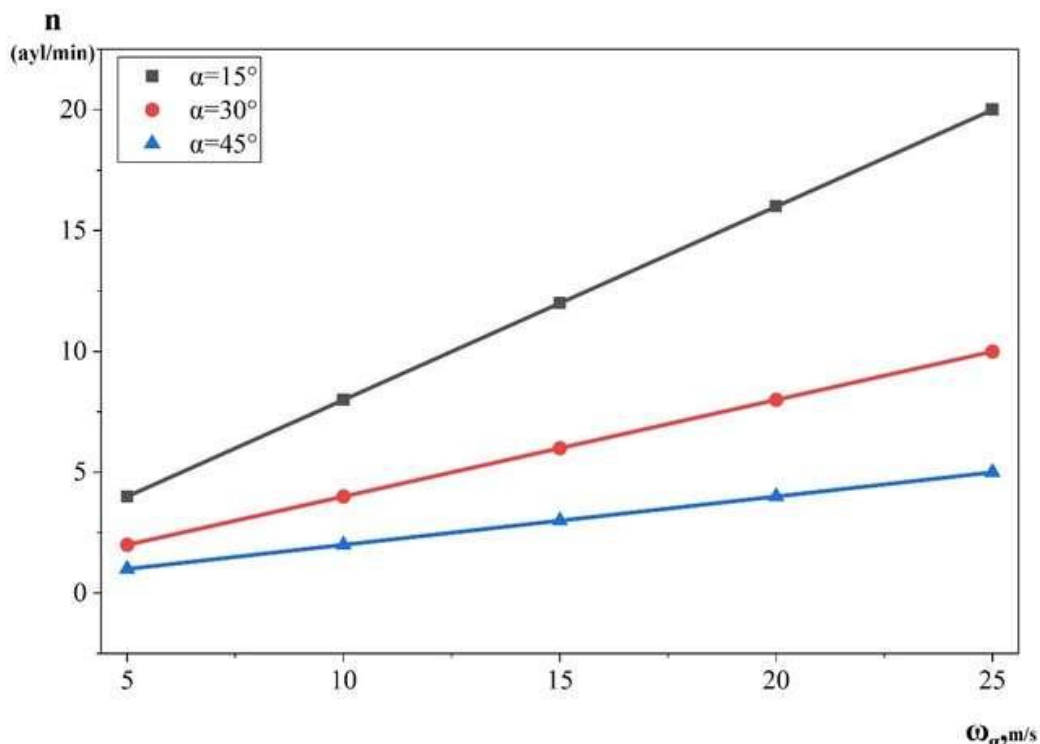


**Figure 8. Gas to the speed related in case of the bird rotations of the number change schedule**

Specified regression equations

$$y = 0.8xR^2 = 1$$

$$y = 0.4xR^2 = 1$$

$$y = 0.2xR^2 = 1$$

Conclusion. As a result of the conducted experimental studies, the resistance coefficients of the blades with three different values of the inclination angle, which provide the rotational motion of the newly created wet dust-cleaning drum device, were determined in the regimes of variable gas flows. Depending on the resistance coefficients, the number of revolutions of the blades was also determined. To calculate the theoretical resistance coefficients of the blades, the values of the correction coefficient were determined depending on the experimentally determined resistance coefficients and their main parameters. Depending on these determined parameters, it was possible to determine the total pressure loss in the device.



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***Jizzax viloyati favqulodda vaziyatlar boshqarmasi hayot faoliyati***  
***xavfsizligini o'qitish markazining o'qituvchisi***

## **ZAHARLI ILON VA HASHORATLAR CHAQQANDA, SHUNINGDEK ZAHARLANISH HOLATLARIDA BIRINCHI YORDAM KO'RSATISH**

**Annotatsiya:** Ushbu maqolada zaharli ilon va turli hashoratlar chaqqanida, shuningdek oziq-ovqat, dori vositalari, kimyoviy moddalar va gazlardan zaharlanish holatlarida birinchi yordam ko'rsatish masalalari tahlil qilinadi. Favqulodda vaziyatlarda to'g'ri, tezkor va oqilona harakat qilish jabrlanuvchining hayotini saqlab qolish, asoratlarni kamaytirish va keyingi tibbiy davolash samaradorligini oshirishda muhim o'rin tutadi. Maqolada zaharlanish va chaqilish belgilarini aniqlash, xavfli alomatlarni farqlash, mumkin bo'lgan xatolarning oldini olish hamda birinchi yordamning amaliy tamoyillari yoritilgan.

**Kalit so'zlar:** birinchi yordam, zaharli ilon, hashorat chaqishi, zaharlanish, anafilaksiya, oziq-ovqatdan zaharlanish, kimyoviy zaharlanish, toksik ta'sir, favqulodda holat, tibbiy yordam.

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## **FIRST AID IN CASES OF VENOMOUS SNAKE AND INSECT BITES, AS WELL AS VARIOUS TYPES OF POISONING**

**Abstract:** This article analyzes the issues of providing first aid in cases of bites from venomous snakes and various insects, as well as poisoning caused by food, medications, chemical substances, and gases. It emphasizes that correct, prompt, and rational actions in emergency situations play a crucial role in saving the victim's life, reducing complications, and improving the effectiveness of subsequent medical treatment. The article also discusses the identification of signs of bites and poisoning, differentiation of dangerous symptoms, prevention of possible mistakes, and outlines the practical principles of first aid.

**Keywords:** first aid, venomous snakes, insect bites, poisoning, anaphylaxis, food poisoning, chemical poisoning, toxic exposure, emergency situation, medical care.

### **Kirish**

Inson hayoti va salomatligini saqlashda birinchi yordam ko'rsatish madaniyati nihoyatda muhimdir. Kundalik turmushda, ayniqsa tabiat qo'ynida, dala va bog' ishlarida, sayohat, piknik yoki qishloq hududlarida zaharli ilon va hashoratlar bilan to'qnash kelish ehtimoli mavjud. Bundan tashqari, uy sharoitida sifatsiz oziq-ovqat iste'mol qilish, dorilarni me'yoridan ortiq qabul qilish, maishiy kimyoviy moddalar

bilan ehtiyotsiz muomala qilish yoki gaz ta'siriga uchrash kabi holatlar ham tez-tez uchrab turadi. Bunday vaziyatlarda vahimaga tushish emas, balki vaziyatni to'g'ri baholash va dastlabki yordamni oqilona ko'rsatish zarur.

Birinchi yordamning asosiy maqsadi kasallik yoki shikastlanishni to'liq davolash emas, balki jabrlanuvchining ahvolini og'irlashib ketishidan saqlash, nafas va qon aylanishini qo'llab-quvvatlash, zaharning organizm bo'ylab tarqalishini sekinlashtirish hamda professional tibbiy yordam kelguncha xavfsiz holatni ta'minlashdan iborat. Ayniqsa zaharli ilon chaqishi, hashorat nishi yoki zaharli moddalarning organizmga kirishi bilan bog'liq holatlarda vaqt omili juda muhim. Noto'g'ri ko'rsatilgan yordam esa ba'zan zaharning o'zidan ham xavfliroq oqibatlarga olib kelishi mumkin. Shu bois har bir inson eng zarur birinchi yordam qoidalarini bilishi va ularni amalda to'g'ri qo'llay olishi kerak.

#### Zaharli ilon chaqqanda birinchi yordam

Ilon chaqishi tibbiyotda eng xavfli favqulodda holatlardan biri hisoblanadi. Bunda zahar organizmga teri va yumshoq to'qimalar orqali kirib, mahalliy shish, og'riq, qon ivishining buzilishi, asab tizimi falajlanishi yoki nafas yetishmovchiligi kabi og'ir asoratlarni keltirib chiqarishi mumkin. Alomatlar ilon turiga, yuborilgan zahar miqdoriga, chaqqan joyga, jabrlanuvchining yoshiga va umumiy sog'lig'iga qarab farqlanadi. WHO tavsiyasiga ko'ra, ilon chaqishida eng muhim choralar — jabrlanuvchini imkon qadar qimirlatmaslik, chaqqan a'zoni harakatsizlantirish va tezda tibbiy muassasaga yetkazishdir. Kuchli arterial turniket qo'llash tavsiya etilmaydi. Ayrim maxsus neurotoksik ilonlar uchun bosimli immobilizatsiya usuli ma'lum holatlarda qo'llanishi mumkin, ammo u barcha ilon chaqishlari uchun bir xil tavsiya etilmaydi.

Ilon chaqqan odamda ko'pincha chaqqan joyda ikki nuqtali tish izi, kuchli og'riq, shish, qizarish yoki ko'karish kuzatiladi. Ayrim hollarda bosh aylanishi, ko'ngil aynishi, qusish, ko'rishning xiralashishi, mushaklarda bo'shashish, nafasning qiyinlashishi va hushning pasayishi ham paydo bo'lishi mumkin. Mahalliy shish tez kuchayib borishi, qonash belgilari yoki nafas buzilishi xavfli belgilardandir.

Birinchi yordam ko'rsatishda eng avvalo jabrlanuvchini tinchlantirish zarur. Qo'rquv va vahima yurak urishini tezlashtirib, zaharning tezroq tarqalishiga yordam berishi mumkin. Jabrlanuvchini yotqizish, harakatini cheklash va chaqqan qo'l yoki oyoqni iloji boricha qimirlatmaslik kerak. A'zo shina yoki oddiy tayanch bilan harakatsizlantirilsa yanada yaxshi bo'ladi. Soat, uzuk, bilaguzuk kabi siqib qolishi mumkin bo'lgan buyumlarni shish paydo bo'lishidan oldin yechib qo'yish foydali. Jarohat joyini toza saqlash kerak, ammo uni kesish, kuydirish, muz bosib qo'yish, kimyoviy moddalar surtish, zaharni og'iz bilan so'rib olish mutlaqo tavsiya etilmaydi. WHO bunday an'anaviy usullar zararli va foydasiz ekanini alohida qayd etadi.

Jabrlanuvchini iloji boricha tez tibbiy muassasaga yetkazish muhim, chunki ilon zahariga qarshi maxsus davolash — antizahar va kuzatuv — faqat tibbiyot muassasasida amalga oshiriladi. Agar imkon bo'lsa, ilonning o'zini ushlashga yoki o'ldirishga urinish kerak emas; bu yana qo'shimcha chaqish xavfini tug'diradi.

Faqat ilonning rangi yoki tashqi ko'rinishini eslab qolish foydali bo'lishi mumkin, ammo bu ham xavf tug'dirmasligi kerak.

Hashoratlar chaqqanda birinchi yordam

Hashoratlar chaqishi ko'pincha ari, asalari, chayon, o'rgimchak va boshqa turdagi jonivorlar bilan bog'liq bo'ladi. Aksariyat hollarda chaqish mahalliy og'riq, achishish, qizarish, qichishish va shish bilan kechadi. Biroq ayrim odamlarda, ayniqsa allergik moyilligi borlarda, og'ir tizimli reaksiya — anafilaksiya rivojlanishi mumkin. NHS ma'lumotiga ko'ra, anafilaksiya juda tez boshlanadigan va hayot uchun xavfli bo'lgan allergik reaksiya bo'lib, unga hashorat stinglari ham sabab bo'lishi mumkin.

Oddiy hashorat chaqishida birinchi yordam sifatida chaqqan joyni toza suv bilan ehtiyotkorlik bilan tozalash, shish bo'lsa matoga o'ralgan sovuq kompressni kamida 20 daqiqa qo'yish, zararlangan a'zoni balandroq tutish, og'riq bo'lsa yosh va holatga mos og'riq qoldiruvchi qo'llash mumkin. Qichishishni kamaytirish uchun antihistamin vositalar yoki ayrim hollarda gidrokortizonli krem ishlatiladi. Agar ari nishi terida qolgan bo'lsa, uni ezib yubormasdan, ehtiyotkorlik bilan olib tashlash lozim.

Agar chaqishdan keyin nafas qisilishi, tomoqda shish hissi, ovoz bo'g'ilishi, tez tarqaluvchi toshma, bosh aylanishi, hushdan ketish, lab va yuzning shishishi kuzatilsa, bu anafilaksiya belgilari bo'lishi mumkin. Bunday vaziyatda shoshilinch yordam chaqirish kerak. NHS tavsiyasiga ko'ra, og'ir allergiyasi bor ayrim kishilar o'zida adrenal avtoinjektor olib yuradi; bunday holatda undan foydalanishga yordam berish mumkin.

Zaharlanish tushunchasi va uning asosiy turlari

Zaharlanish — organizmga zaharli moddaning tushishi oqibatida uning hayotiy faoliyati izdan chiqadigan holatdir. Zahar og'iz orqali yutilishi, nafas orqali kirishi, teri orqali so'rilishi yoki in'eksiya kabi yo'llar bilan organizmga tushishi mumkin. Amaliyotda zaharlanishning bir necha ko'p uchraydigan shakllari mavjud: oziq-ovqatdan zaharlanish, dori vositalaridan zaharlanish, maishiy kimyoviy moddalardan zaharlanish, gaz va tutundan zaharlanish, spirtli ichimlik yoki surrogatlardan zaharlanish.

Zaharlanishning umumiy belgilari turlicha bo'lsa-da, ko'pincha ko'ngil aynishi, qusish, qorin og'rishi, ich ketishi, bosh og'rishi, bosh aylanishi, holsizlik, terlash, uyquchanlik, ong chalkashishi, nafas buzilishi yoki tirishishlar kuzatilishi mumkin. Belgilar zahar turiga qarab tez yoki sekin rivojlanadi. Shu sababli birinchi yordamda eng muhim vazifa — zahar turi va organizmga kirish yo'lini taxminan aniqlashdir.

Oziq-ovqatdan zaharlanishda birinchi yordam

Oziq-ovqatdan zaharlanish, odatda, mikroblar yoki ularning toksinlari bilan ifloslangan taom va ichimliklarni iste'mol qilish natijasida yuz beradi. Mayo Clinic ma'lumotiga ko'ra, oziq-ovqatdan zaharlanishda ko'p uchraydigan belgilar — me'da bezovtaligi, ich ketishi va qusish bo'lib, ular bir necha soat yoki bir necha kun ichida boshlanishi mumkin. Ko'pchilik holatlar yengil kechsa-da, ayrim bemorlarda suvsizlanish va og'ir asoratlar rivojlanishi mumkin.

Birinchi yordam sifatida bemorga dam berish, ko‘p emas, oz-ozdan tez-tez suyuqlik ichirish, suvsizlanish belgilari kuzatilsa e‘tiborli bo‘lish kerak. Qattiq qusishdan keyin birdan ko‘p suyuqlik ichirish ko‘ngil aynishini kuchaytirishi mumkin, shuning uchun mayda yutumlar ma‘qul. Agar qonli ich ketish, yuqori isitma, hush pasayishi, kuchli holsizlik, siydikning kamayishi, ko‘zning ichiga botishi kabi suvsizlanish yoki og‘irlashish belgilari bo‘lsa, darhol shifokorga murojaat qilish zarur.

Dori va kimyoviy moddalar bilan zaharlanishda birinchi yordam

Dori vositalari me‘yoridan ortiq qabul qilinganda yoki noto‘g‘ri dorilar ichilganda zaharlanish yuz berishi mumkin. Xuddi shuningdek, maishiy tozalagichlar, kislota-ishqorlar, erituvchilar, pestitsidlar va boshqa kimyoviy moddalar ham juda xavfli. Red Cross va Mayo Clinic tavsiyalariga ko‘ra, zaharlanishda jabrlanuvchini ataylab qusdirish tavsiya etilmaydi; bu ko‘pincha qo‘shimcha zarar yetkazadi. Ayniqsa kuydiruvchi moddalar, neft mahsulotlari yoki noma‘lum moddalarda qusdirish xavfni oshiradi. Jabrlanuvchiga nimadir yedirish yoki ichirish ham faqat mutaxassis ko‘rsatmasi bo‘lsa qilinadi.

Bunday vaziyatda birinchi qadam — voqea joyining xavfsizligini ta‘minlash. So‘ng modda nomi, qachon va qancha miqdorda qabul qilingani haqida ma‘lumot to‘plash kerak. Idish, qadoq yoki yorliqni saqlab qo‘yish muhim. Agar modda teriga yoki ko‘zga tegsa, u joyni ko‘p suv bilan chayish kerak; agar zaharli gazdan shubha bo‘lsa, jabrlanuvchini darhol toza havoga olib chiqish zarur. Nafas yo‘llari, nafas olish va hush holati doimo kuzatib boriladi. Agar bemor hushsiz bo‘lsa, og‘ziga hech narsa berilmaydi va tez yordam chaqiriladi.

Gaz va tutundan zaharlanish

Gaz, tutun yoki uglerod oksidi bilan zaharlanish yashirin, ammo o‘ta xavfli holatdir. Bunda bosh og‘rishi, bosh aylanishi, ko‘ngil aynishi, holsizlik, uyquchanlik, hushning chalkashishi va og‘ir holatda hushdan ketish kuzatilishi mumkin. Birinchi yordam sifatida eng avvalo jabrlanuvchini xavfli hududdan olib chiqish va toza havoga olib chiqish kerak. Yopiq joyda gaz sizib chiqayotgan bo‘lsa, o‘zingizning xavfsizligingizni ham unutmang. Zarurat bo‘lsa, favqulodda xizmatlarni chaqirish lozim.

Birinchi yordamda yo‘l qo‘yiladigan xatolar

Favqulodda vaziyatlarda odamlar ko‘pincha xalq orasida keng tarqalgan, ammo noto‘g‘ri usullardan foydalanadilar. Ilon chaqishida jarohatni kesish, zaharni so‘rish, qattiq turniket qo‘yish, muz bosish yoki chaqqan joyni kuydirish noto‘g‘ri hisoblanadi. Hashorat chaqishida esa shishni kuch bilan ezish, terini tirnash yoki noma‘lum malhamlarni ko‘p surtish foydadan ko‘ra zarar keltirishi mumkin. Zaharlanishda esa odamni majburan qusdirish, sut ichirish, spirtli ichimlik berish yoki “uy sharoitidagi davo”ga suyanish juda xavfli. Zamonaviy tavsiyalar bunday xatolardan qochishni ta‘kidlaydi.

Profilaktika choralari

Birinchi yordamni bilish bilan birga, bunday holatlarning oldini olish ham muhimdir. Tabiatda yopiq poyabzal va uzun kiyim kiyish, tosh, buta va o‘tlar orasida qo‘lni ehtiyotsiz suqmaslik, bolalarni nazoratsiz qoldirmaslik, uyda dorilar

va kimyoviy moddalarni bolalar ololmaydigan joyda saqlash, oziq-ovqat mahsulotlarining sifati va yaroqlilik muddatini tekshirish zarur. Allergiyaga moyil kishilar esa o'z dori vositalarini yonida olib yurishi va yaqinlariga bu haqda aytib qo'yishi foydalidir.

### **Xulosa**

Zaharli ilon va hashoratlar chaqqanda, shuningdek turli zaharlanish holatlarida birinchi yordam ko'rsatish hayotiy zarurat hisoblanadi. Bunday vaziyatlarda eng muhim tamoyillar — vahimaga berilmaslik, vaziyatni tez baholash, jabrlanuvchini xavfsiz holatga keltirish, noto'g'ri va xavfli usullardan voz kechish hamda imkon qadar tez tibbiy yordamga murojaat qilishdir. Ilon chaqishida a'zoni harakatsizlantirish va tez transport muhim bo'lsa, hashorat chaqishida og'ir allergik belgilarni erta tanib olish hal qiluvchi ahamiyatga ega. Zaharlanishda esa zahar turini bilmasdan qusdirish yoki ichimlik berish jiddiy xatoga aylanishi mumkin. Demak, birinchi yordam bo'yicha to'g'ri bilim inson salomatligi va hayotini saqlab qolishda katta ahamiyat kasb etadi.

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## **METHODOLOGICAL ASPECTS OF STUDYING THE TERRITORIAL FEATURES OF POPULATION MORBIDITY**

**Abstract.** *It is well known that the distribution, structure, and dynamics of diseases are determined not only by biological factors but are also closely related to the natural-geographical environment, ecological conditions, and socio-economic factors. Therefore, a comprehensive analysis of the territorial aspects of population morbidity is of significant scientific and practical importance for sustainable development, public health, and the effective planning of healthcare systems. The study of territorial characteristics of population morbidity includes the assessment of natural-ecological factors, geochemical and geological conditions, environmental status and anthropogenic impact, as well as the influence of socio-economic factors, urbanization, working conditions, and demographic and cultural determinants on public health.*

**Keywords:** *ecological conditions, socio-economic factors, urbanization, geochemical factors, demographic factors.*

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## **AHOLI KASALLIKLARINING HUDUDIIY JIHATLARINI O'RGANISHNING USLUBIIY JIHATLARI**

**Annotatsiya.** *Ma'lumki, kasalliklarning tarqalishi, tarkibi va dinamikasi faqat biologik omillar bilan emas, balki tabiiy-geografik muhit, ekologik holat va ijtimoiy-iqtisodiy sharoitlar bilan ham uzviy bog'liqdir. Shu bois aholi kasalliklarining hududiy jihatlarini kompleks tahlil qilish barqaror rivojlanish, jamoat salomatligi va sog'liqni saqlash tizimini samarali rejalashtirishda muhim ilmiy-amaliy ahamiyatga ega. Aholi kasalliklarining hududiy jihatlarini o'rganishda tabiiy-ekologik omillar, geokimyoviy va geologik omillar, ekologik holat va antropogen ta'sirni o'rganish, ijtimoiy-iqtisodiy omillarning aholi kasalliklariga ta'siri, shaharlashuv va mehnat sharoiti, shuningdek, demografik va madaniy omillarning aholi kasalliklariga ta'siri o'rganiladi.*

**Kalit soʻzlar:** Ekologik holat, ijtimoiy-iqtisodiy omillar, shaharlashuv, geokimyoviy, demografik.

**Kirish.** Aholi salomatligining hududiy farqlanishi tibbiyot geografiyasi va nozogeografiya fanlarining markaziy tadqiqot obyekti hisoblanadi. Maʼlumki, kasalliklarning tarqalishi, tarkibi va dinamikasi faqat biologik omillar bilan emas, balki tabiiy-geografik muhit, ekologik holat va ijtimoiy-iqtisodiy sharoitlar bilan ham uzviy bogʻliqdir. Shu bois aholi kasalliklarining hududiy jihatlarini kompleks tahlil qilish barqaror rivojlanish, jamoat salomatligi va sogʻliqni saqlash tizimini samarali rejalashtirishda muhim ilmiy-amaliy ahamiyatga ega.

**-Mavzuga oid adabiyotlarning tahlili (Literature review).**

SHuni alohida taʼkidlash lozimki, tibbiy geografik tadqiqotlar, jumladan aholining kasallanish koʻrsatkichlari hamda kasalliklarning hududiy tarkibi masalalari sobiq Ittifoq va hozirgi MDH davlatlari olimlari tomonidan tadqiq qilingan. Ular qatoriga eng avvalo D.K.Zabolotnyy, E.N.Pavlovskiy, A.A.SHoshin, A.V.CHaklin, A.P.Avsym, E.I.Ignatev, B.B.Proxorov, E.L.Rayx, V.P.Podolyan, A.A.Keller, A.G.Voronov kabilarni kiritish mumkin.

Bundan tashqari, geografik omillar va kasalliklar kelib chiqishi oʻrtasidagi bogʻliqliklarni tahlil qilish usuli asosida Gruzija Respublikasida ayrim *parazitar kasalliklarning tibbiy-geografik atlasini* yaratish boʻyicha tadqiqotlar olib borildi. G.M.Maruashvili, L.L.Topuriya va T.L.Bakradzening qayd etishicha ushbu atlas kartalarida tabiiy va ijtimoiy-iqtisodiy muhit omillarining parazitar kasalliklar tarqalishiga, patogenlar va tashuvchilarning tarqalishiga, aholining ayrim parazitar kasalliklar bilan kasallanishiga bevosita taʼsiri aks ettirilgan.

Keyingi yillarda yaratilgan hududiy tibbiy-geografik atlaslarning alohida ahamiyati, birinchi navbatda, ular sogʻliqni saqlash va atrof muhitni muhofaza qilish tashkilotlariga geografik muhit omillarining inson organizmiga salbiy taʼsirining oldini olish boʻyicha aniq chora-tadbirlarni ilmiy asoslash imkonini berishidadir. Yaratilgan bunday kompleks tibbiy-geografik atlaslar metodologiyasining asosiy qoidalari A.A. Shoshin (1962), Y.S. Feldman (1977), L.A.Xlebovich (1972) va boshqalar tomonidan ishlab chiqilgan. Keyinchalik Rossiyada tibbiy-geograf va kartograf olimlar tomonidan aynan tibbiy geografik tadqiqotlarga bagʻishlangan qator atlaslar yaratilgan. Bu esa mamlakatda bir qator murakkab ekologik muammolarning paydo boʻlishini ilmiy asoslash va sogʻliqni saqlash, atrof-muhitni muhofaza qilish choralari tezkorlik bilan amalga oshirish imkonini beradi.

**- Tadqiqot metodologiyasi (Research Methodology).** Jahonning koʻpgina mamlakatlarida tibbiy geografiyaning bir qator ustuvor yoʻnalishlari, shu jumladan iqlimiy-geografik sharoitlarning aholi salomatligiga taʼsirini aniqlash va tibbiy-geografik kartalarni tuzish boʻyicha tadqiqotlarga katta eʼtibor qaratilmoqda. Jumladan: iqlimning inson salomatligiga taʼsirini monitoring qilish usullari ishlab chiqilgan, kasalliklarining tabiiy oʻchoqlari boʻyicha nozogeografik kartalar tuzilgan; tibbiy ekologiya va inson ekologiyasining nazariy masalalari borasida tahlillar olib borilgan. Oʻzbekistonda koʻrilayotgan muammoga biroz yaqin sohalar bilan N.Komilova, I.R.Turdimambetov, M.Hamroyev, Salomatlik va tibbiy

statistika, Epidemiologiya, mikrobiologiya va yuqumli kasalliklar ilmiy-tekshirish institutlari hamda Ijtimoiy fikr markazi mutaxassislari shug'ullanishgan.

- **Tahlil va natijalar (Analysis and results).** Ta'kidlash lozimki, avvalo nozogeografik tadqiqotlar *tabiiy-ekologik omillarning aholi kasalliklariga ta'sirini* o'rganadi. Jumladan, iqlim aholi salomatligiga ta'sir etuvchi asosiy tabiiy omillardan biri hisoblanadi. Havo harorati, namlik, atmosfera bosimi, shamollar va mavsumiy o'zgarishlar inson organizmining fiziologik holatiga ta'sir ko'rsatadi. Ye.N. Pavlovskiy va A.A. Keller tadqiqotlarida issiq va quruq iqlim hukmron bo'lgan hududlarda yurak-qon tomir, nafas olish tizimi hamda suv-tuz almashinuvi bilan bog'liq kasalliklar keng tarqalishi ilmiy jihatdan asoslangan. Sovuq iqlimli hududlarda esa nafas yo'llari kasalliklari, revmatizm, immunitet pasayishi bilan bog'liq kasalliklar ustun keladi. Shu tarzda iqlim aholi kasalliklarining hududiy differentsiatsiyasini belgilaydigan asosiy omil sifatida namoyon bo'ladi.

*Geokimyoviy va geologik omillarni o'rganish ham muhim ahamiyat kasb etadi.* Tuproq, suv va havo tarkibidagi kimyoviy elementlar miqdori aholi salomatligiga bevosita ta'sir ko'rsatadi. Yod, ftor, selen kabi mikroelementlarning tanqisligi yoki ortiqchaligi endemik kasalliklarning shakllanishiga olib keladi. Masalan, yod tanqis hududlarda qalqonsimon bez kasalliklari, ftor ortiqcha bo'lgan hududlarda esa flyuoroz keng tarqalgan. V.P. Kaznacheev inson salomatligini geoximik muhit bilan bog'liq holda tahlil qilib, kasalliklarni inson-biosfera o'zaro ta'sirining natijasi sifatida baholaydi.

*Ekologik holat va antropogen ta'sirni o'rganish ham nozogeografik tadqiqotlarning muhim jihatidir.* Sanoatlashuv, transport tizimining rivojlanishi, qishloq xo'jaligida kimyoviy moddalardan keng foydalanish ekologik muhitning ifloslanishiga sabab bo'lmoqda. Atmosfera havosining ifloslanishi bronxial astma, allergik va onkologik kasalliklar xavfini oshiradi. Ifloslangan ichimlik suvi esa me'da-ichak kasalliklari va yuqumli xastaliklar tarqalishining asosiy sabablaridan biri hisoblanadi. Nozogeografik tadqiqotlarda ekologik omillar hududiy kasallik majmuini shakllantiruvchi asosiy determinant sifatida baholanadi.

*Ijtimoiy-iqtisodiy omillarning aholi kasalliklariga ta'siri* ham olimlar tomonidan chuqur o'rganilgan. Jumladan, aholining turmush darajasi va daromadlari ham uning kasallanish ko'rsatkichlariga jiddiy ta'sir ko'rsatadi. Ijtimoiy-iqtisodiy taraqqiyot darajasi aholi salomatligini belgilovchi muhim omil hisoblanadi. Yu.P. Lisisin ta'kidlaganidek, aholi daromadlarining pastligi, kam ta'minlanganlik, oziq-ovqat sifatining yomonligi kasallanish darajasini oshiradi. Bu holat ayniqsa bolalar va qariyalar salomatligida yaqqol namoyon bo'ladi.

*Shaharlashuv va mehnat sharoiti* ham o'z navbatida nozogeografik holatga ta'sir ko'rsatadi. Shaharlashuv jarayonlari bir tomondan tibbiy xizmatlardan foydalanish imkoniyatini kengaytira, ikkinchi tomondan stress, gipodinamiya, havo ifloslanishi kabi omillarni kuchaytiradi. Sanoat korxonalarida ishlaydigan aholi orasida kasb kasalliklari, asab tizimi va nafas olish organlari kasalliklari yuqori ulushni tashkil etadi.

*Shuningdek, demografik va madaniy omillar ham o'z navbatida kasalliklarning hududiy tarkibiga, o'zgarishlar dinamikasiga ta'sir ko'rsatadi.*

Aholining yosh tarkibi, migratsiya jarayonlari, ta'lim darajasi va sanitariya-gigiyena madaniyati kasalliklarning hududiy tarqalishida muhim o'rin tutadi. Sog'lom turmush tarziga rioya qilinmasligi, zararli odatlar (chekish, alkogol iste'moli) yuqori bo'lgan hududlarda surunkali kasalliklar keng tarqaladi.

Nozogeografik tadqiqotlarda tabiiy va ijtimoiy omillarning kompleks ta'siri ham chuqur o'rganiladi. Zamonaviy tibbiyot geografiyasi aholi kasalliklarini alohida omillar emas, balki ularning o'zaro ta'siri natijasi sifatida qarashni talab qiladi. Tabiiy-ekologik va ijtimoiy-iqtisodiy omillar birgalikda **nozogeografik vaziyat**ni shakllantiradi. Shu bois hududiy sog'liqni saqlash siyosatini ishlab chiqishda kompleks, tizimli va hududiy yondashuv ustuvor ahamiyat kasb etadi.

Nozogeografik tadqiqotlarda qo'llaniladigan usullarining mazmun-mohiyatini tahlil qilganda quyidagicha talqin etish mumkin.

*Nozogeografik tavsif.* Bu usul muayyan hududda aholi salomatligining holati, kasalliklarning tarqalishi, tabiiy va ijtimoiy-iqtisodiy sharoitlar bilan bog'liq xususiyatlarni tizimli ravishda yoritib berishni nazarda tutadi. Unda hududning iqlimi, relyefi, suv resurslari, ekologiyasi, aholining yashash tarzi, mehnat sharoiti kabi omillar salomatlik nuqtayi nazaridan tahlil qilinadi. Shuningdek, bunda muayyan hududdagi tabiiy, ijtimoiy-iqtisodiy, tibbiy-sanitariya sharoitlari hamda kasallanish holati to'g'risidagi ma'lumotlar yig'iladi. Olingan ma'lumotlar tizimlashtiriladi, ilmiy umumlashtiriladi va sifat jihatdan tahlil qilinadi. Bu esa ushbu hudud aholisi salomatligiga ta'sir etuvchi barcha omillarni aniqlashga xizmat qiladi.

*Nozogeografik xaritalashtirish.* Zamon talablariga javob beradigan geografik kartalar ishlab chiqish va ularni ishlab chiqarishga tadbiiq qilish ham nazariy, ham amaliy tomondan juda katta ahamiyatga ega. Bu borada aholi salomatligini baholovchi, unga ta'sir etuvchi tabiiy-ekologik, ijtimoiy-iqtisodiy va demografik omillarni o'zida aks ettiruvchi tibbiy-geografik kartalar yaratish dolzarb muammo hisoblanadi. Bu usul tibbiy-geografik ma'lumotlarni xaritalar orqali ifodalashga asoslanadi. Xaritalashtirish orqali kasalliklarning hududiy tarqalishi, sog'liq uchun xavfli yoki, aksincha, qulay hududlar, tibbiy xizmatlar joylashuvi yaqqol ko'rinishda namoyon bo'ladi. Xaritalar tadqiqot natijalarini tahlil qilish va ular asosida xulosa chiqarishda muhim ahamiyatga ega. Inson organizmining atrof-muhit bilan o'zaro aloqasi va o'zaro bog'liqligini, turli darajadagi yaxlit geotizimlar shaklida ifodalangan tabiiy muhit sharoitida faoliyat ko'rsatish xususiyatlarini ko'p qirrali tarzda aks ettirishdan iborat. Ushbu usulning mohiyati shundaki, u tabiatda bevosita kuzatib bo'lmaydigan hodisalarni fazoviy tahlil qilish imkonini beradi. Masalan, muhitning qulaylik (komfortlik) darajasi, uning ifloslanish holati, kasallanish bilan o'zaro nisbati va boshqalarni aniqlash mumkin. Kartalash usuli ilmiy tadqiqotning ko'pchilik usullariga xos bo'lmagan qator xususiyatlarga ega. Bularga abstraktlik, tanlab olish, masshtablilik, uzluksizlik, ko'rgazmalilik, umumiy qamrov va geografik moslik kiradi. Ana shu jihatlar tibbiy-geografik hodisalarni xaritada keng ko'lamda ifodalash imkonini beradi. Bu turdagi xaritalar qatoriga klimatologik prognoz xaritalari ham kiradi. Ular iqlimning insonga ta'sirini baholashga yordam beradi. Ularning mazmuni kompleks meteorologik

ko'rsatkichlarning ehtimoliy taqsimlanishi hamda iqlim turiga bog'liq holda fiziologik moslashuv tizimlarida yuzaga kelishi mumkin bo'lgan zo'riqish darajasini tahlil qilishga asoslanadi.

3. *Statistik usul.* Statistik usul aholi salomatligiga oid ko'rsatkichlarni (kasallanish, o'lim, tug'ilish, hayot davomiyligi va boshqalar) raqamlar asosida tahlil qilishga xizmat qiladi. U orqali ma'lum hududlardagi tibbiy-demografik holatni solishtirish, dinamikasini aniqlash va qonuniyatlarni ochib berish mumkin. Tibbiy statistika quyidagilarni aniqlash imkonini beradi:

- aholining umumiy salomatlik holati va uning dinamikasini (davlat yoki uning alohida hududlari bo'yicha), shuningdek sifat jihatdan bir xil guruhlar (jinsi, kasbi, mehnat staji va boshqalar bo'yicha)ning muayyan joy va vaqt sharoitidagi salomatlik holatini;

- sog'liqni saqlash muassasalari va organlarining holati hamda faoliyatini (tibbiy kadrlar, muassasalar tarmog'i, ularning davolash-profilaktika, sanitariya-gigiyena va epidemiyaga qarshi ishlari ko'rsatkichlari va boshqalar);

- insonni o'rab turgan muhitni va uning salomatligini muhofaza qilish bo'yicha amalga oshirilayotgan tadbirlar samaradorligini (umuman hudud bo'yicha hamda sifat jihatdan bir xil guruhlar kesimida).

4. *Kompleks tibbiy-geografik yondashuv.* Ijtimoiy-iqtisodiy, sanitariya-gigiyena, profilaktik, sog'lomlashtirish va boshqa har qanday tadbirlarni tibbiy-geografik tadqiqotlarsiz amalga oshirish mumkin emas. Bunda kompleks yondashuv muhim o'rin tutadi. Ayniqsa, tibbiy-geografik jihatdan kam o'rganilgan o'zlashtirilayotgan hududlar uchun ushbu yondashuvdan foydalanish alohida ahamiyatga ega. Bu yondashuv yuqoridagi barcha usullarni o'zaro bog'liq holda qo'llashni nazarda tutadi. Ya'ni inson salomatligi tabiiy, ijtimoiy, iqtisodiy va ekologik omillarning birgalikdagi ta'siri natijasida shakllanishi hisobga olinadi. Kompleks yondashuv tibbiy-geografik muammolarni chuqur va har tomonlama o'rganish imkonini beradi.

Tibbiy-geografik tadqiqotni to'g'ri tashkil etishda hududni tanlash juda muhimdir. Ko'plab mutaxassislar fikriga ko'ra, kompleks tibbiy-geografik tadqiqotlar uchun hududiy-ishlab chiqarish komplekslari (HICHK) doirasidagi hududlarni tanlash maqsadga muvofiq. Ular texnologik va iqtisodiy jihatdan o'zaro bog'liq bo'lgan, cheklangan hududda joylashgan hamda uning resurslari va yagona infratuzilmasidan foydalanuvchi ishlab chiqarishlar va korxonalar majmuasidan iborat. Bunday hududlarda inson uchun ehtimoliy xavf zonasi shakllanadi va ular tibbiy-geografik tadqiqotlarda aniqlanishi lozim.

Kompleks tibbiy-geografik tavsif quyidagi ketma-ketlikda amalga oshiriladi:

1. Mazkur hududning tabiiy va ijtimoiy-iqtisodiy sharoitlari aniqlanadi;
2. Aholi salomatligining holati o'rganiladi;
3. Aholi salomatligi bilan uni o'rab turgan muhit o'rtasidagi sabab-oqibat bog'liqliklari aniqlanadi;

4. Sanoat va qishloq xo'jaligi korxonalarida yetakchi kasbiy guruhlar mehnatini sog'lomlashtirish, atrof-muhitni sog'lomlashtirish, maishiy sharoitlarni ta'minlash, shuningdek hudud aholisiga tibbiy yordam ko'rsatish va davolash



tizimini takomillashtirish bo'yicha tadbirlar o'rganiladi. Shuningdek, bunday tadqiqotlarda keng foydalaniladigan usullardan biri sifatida tibbiy geografik prognozlashtirish usuli ham mavjud bo'lib, u tibbiy geografiyaning eng yuqori ilmiy-amaliy ahamiyatga ega, murakkab va istiqbolli yo'nalishlaridan biri hisoblanadi.

5. *Nozogeografik prognozlashtirish* - bu muayyan hududda aholi salomatligi holati, kasallanishning hududiy-vaqtli dinamikasi hamda unga ta'sir etuvchi tabiiy, ekologik, ijtimoiy-iqtisodiy va demografik omillarning kelajakdagi ehtimoliy o'zgarishlarini ilmiy asosda oldindan baholashga qaratilgan kompleks tadqiqot usulidir. Ushbu usul tibbiy geografiyaning nazariy bazasini chuqurlashtiradi, amaliy sog'liqni saqlash siyosati uchun ilmiy asos yaratadi, hududiy rivojlanish strategiyalarida inson salomatligini ustuvor mezon sifatida belgilash imkonini beradi.

#### **Xulosalar:**

-nozogeografik vaziyatni baholash bilan bog'liq tadqiqotlarda tabiiy omillar tarkibiga relyef, iqlim sharoiti, tuproq qoplami, yer usti va yer osti suv resurslari, o'simlik hamda hayvonot dunyosi kiradi. Hududning iqtisodiy holatini tahlil qilishda esa uning aholi tarkibi va joylashuvi, aholi punktlari tizimi, sanoat va qishloq xo'jaligi rivoji, transport infratuzilmasi hamda tashqi iqtisodiy aloqalari asosiy ko'rsatkich sifatida qaraladi.

-har qanday nozogeografik tadqiqotlar davomida quyidagi an'anaviy usullardan keng foydalaniladi: rayonlashtirish, tibbiy-geografik tavsif, tibbiy-geografik xaritalashtirish va unda GIS texnologiyalaridan foydalanish, statistik, anketa-so'rov, tibbiy-geografik prognozlashtirish, kompleks tibbiy-geografik yondashuv.

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## **CHANGES IN THE INTRAORGAN BLOOD VESSELS OF THE STOMACH IN MALIGNANT TUMORS AND PEPTIC ULCER**

**Abstract:** *The article studies changes in the intraorgan blood vessels of the stomach in malignant tumors and peptic ulcer disease. A dense network of capillaries with clear contours was revealed in the serous membrane. In peptic ulcer disease, the capillaries and small vessels were often tortuous, dilated and filled with blood, and medium-sized vessels were somewhat narrowed. In tumors, finger-shaped protrusions were found on the veins, and spherical expansions were found on the venules at the border with the submucosal layer.*

**Keywords:** *blood vessels, wall, tumor, stomach, peptic ulcer disease, capillaries, vascular network, vessel contours, veins.*

**Introduction.** The problem of studying peptic ulcer disease remains relevant today both from a theoretical and practical standpoint. Despite the large number of domestic and foreign works on this topic, many key issues of pathogenesis, clinical presentation, and treatment remain controversial and not fully clarified [1,2,3].

The last decades have been characterized by significant advances in the study of various aspects of the pathogenesis, clinical course, diagnosis, and treatment of peptic ulcer disease. In particular, the results of comprehensive studies have been reflected in the analysis of the pathogenetic significance of vascular changes [4,5], as well as the clinical manifestations of peptic ulcer disease depending on the localization of the process and its combination with diseases of the cardiovascular system. Until recently, the study of the sequence of disease phases, the depth of gastric and duodenal wall lesions, and changes in hemodynamics and microcirculatory status in peptic ulcer disease has generally been carried out in isolation; the dynamics of the diagnosed disorders have not been studied, and consequently, no pathways for their adequate pathophysiologically grounded correction have been proposed [6,7].

**Aim of the study.** The objective of the present work is to study the intraorgan blood vessels of the stomach in malignant tumors and peptic ulcer disease.

**Materials and methods.** The material for the study consisted of individuals aged 28 to 61 years. In 25 resected stomachs obtained from patients with peptic ulcer disease (11 cases) and malignant tumors (14 cases) in individuals aged 28 to 61 years, the vessels were filled with colored masses; the stomach was clarified in aqueous solutions of glycerol. Its wall was divided into layers, in which the vessels were examined under a binocular microscope MBS-2.

**Results.** In tumors, the capillary networks in some areas were denser, while in others they were sparser. Some small vessels showed sharp tortuosity and uneven, as if eroded, contours; others ran in a straight line. Unchanged vessels were also encountered. Arteries were less tortuous than veins. In tumors, finger-like protrusions were observed on veins, and spherical dilatations were noted on venules at the border with the submucosal layer. In the muscular coat, the capillary networks were dense. Small and medium-sized vessels — mainly veins — had a tortuous course. Along the same vessel, alternations of constrictions and dilatations were frequently noted. Overall, the changes in veins in the muscular coat were more pronounced than in arteries. In small veins, at sites of bends, significant dilatations with thickened walls were observed. Many vessels had an uneven caliber and indistinct, sometimes eroded contours, which was more commonly seen in cancer. In the deeper layers of the muscular coat, many veins were dilated. From the vascular network around the tumor, thin vessels with uneven caliber were directed toward the tumor; they then seemed to break off and were no longer visible further. The vessels of the submucosal plexus were, in some cases, sharply tortuous and dilated. Small bead-like veins of the submucosal layer formed rich networks (usually in tumors) or were sparse. Along with them, thin straight arterioles and venules were encountered. The vessels of the mucous membrane were markedly altered. At the border with the tumor, capillaries did not fill at all or were revealed in islands; they were tortuous, in places slightly dilated or, conversely, narrowed throughout their length or partially. The tumor zone was delimited by a dense network of vessels. At the periphery of the tumor, torn loops of vascular networks and seemingly broken arterioles and venules were revealed. Small and medium-sized vessels were tortuous in the form of glomeruli, spirals, and loops. Areas of mucosa poor in vessels were encountered. The contours of vessels of all calibers were often indistinct and eroded. Markedly dilated veins throughout their length or, conversely, in separate segments were frequently observed. It can be assumed that in some cases the vessels undergo pathological changes totally, while in others — fragmentarily. Frequently observed were markedly narrowed or, conversely, dilated veins. The accompanying arteries were less altered.

**Conclusion.** No vascular changes specific to peptic ulcer disease or malignant tumors have been identified so far, with the exception of the presence of a dense vascular network around the tumor, rich networks of small submucosal veins with multiple spherical and spindle-shaped dilatations, uneven visualization of the finest networks in the serous coat, and frequent blood engorgement with the presence of numerous extravasates. It can be assumed that different etiological factors cause identical changes in the vessels.

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## **IN VITRO KO‘CHAT YETISHTIRISH TEXNOLOGIYALARI ASOSIDA MEVA-SABZAVOTCHILIK VA UZUMCHILIKNI RIVOJLANTIRISH (BIOSEED LAB MISOLIDA)**

**Annotatsiya.** Tadqiqotlar BioSeed Lab laboratoriyasi sharoitida olib borilib, mikroklonal ko‘paytirish bosqichlari, oziqa muhitlari tarkibi, fitogormonlarning ta’siri hamda o‘simliklarning regeneratsiya ko‘rsatkichlari o‘rganildi. Turli konsentratsiyadagi 6-BAP va IAA qo‘llanilgan variantlar taqqoslanib, optimal muhit aniqlangan.

**Kalit so‘zlar:** *in vitro, mikroklonal ko‘paytirish, MS muhiti, fitogormonlar, regeneratsiya, akklimatizatsiya, uzumchilik, ko‘chat yetishtirish.*

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## **DEVELOPMENT OF FRUIT AND VEGETABLE GROWING AND VITICULTURE BASED ON IN VITRO SEEDLING CULTIVATION TECHNOLOGIES (ON THE EXAMPLE OF BIOSEED LAB)**

**Annotation.** The research was conducted in the conditions of the BioSeed Lab laboratory, and the stages of microclonal propagation, the composition of nutrient media, the effect of phytohormones, and the regeneration indicators of plants were studied. Variants using 6-BAP and IAA in different concentrations were compared, and the optimal environment was identified.

**Keywords:** *in vitro, microclonal propagation, MS medium, phytohormones, regeneration, acclimatization, viticulture, seedling cultivation.*

**Kirish.** Bugungi kunda qishloq xo‘jaligini modernizatsiya qilish, yuqori hosildor va eksportbop mahsulotlar yetishtirish O‘zbekiston Respublikasining ustuvor yo‘nalishlaridan biri hisoblanadi. Ayniqsa, meva-sabzavotchilik va

uzumchilik tarmoqlarini ilmiy asosda rivojlantirish, sifatli va kasalliklarga chidamli ekish materiallari yaratish dolzarb vazifalardan biri bo'lib qolmoqda.

O'zbekiston Respublikasi Prezidentining 2020 yil 15 oktabrdagi PQ-4863-sonli "Sarimsoq hamda to'qsonbosti usulida sabzavot mahsulotlarini yetishtirish va eksport qilishni ko'paytirish chora-tadbirlari to'g'risida"gi qarorida qishloq xo'jaligi ekinlarini yetishtirishda zamonaviy agrotexnologiyalarni joriy etish, yuqori sifatli urug' va ko'chat materiallari ishlab chiqarishni kengaytirish muhim vazifalardan biri sifatida belgilangan.

Shuningdek, O'zbekiston Respublikasi Prezidentining 2022 yil 28 yanvardagi PF-60-sonli "2022–2026 yillarga mo'ljallangan Yangi O'zbekistonning taraqqiyot strategiyasi to'g'risida"gi farmonida agrar sohada innovatsion texnologiyalarni keng joriy etish, biotexnologiya yutuqlaridan samarali foydalanish hamda yuqori samarali laboratoriyalar tashkil etish orqali qishloq xo'jaligi mahsulotlari hajmi va sifatini oshirish ustuvor yo'nalishlar sifatida qayd etilgan.

Mazkur vazifalarni amalga oshirishda in vitro texnologiyalari, ya'ni o'simliklarni sun'iy oziqa muhitida steril sharoitda ko'paytirish usullari alohida ahamiyat kasb etadi. Ushbu usul orqali qisqa muddat ichida genetik jihatdan bir xil, virus va bakteriyalardan holi bo'lgan ko'chatlar olish imkoniyati mavjud. An'anaviy ko'paytirish usullariga nisbatan in vitro texnologiyasi bir qator afzalliklarga ega bo'lib, ular orasida yuqori ko'paytirish koeffitsienti, yil davomida ishlab chiqarish imkoniyati, kasalliklardan xoli material olish hamda seleksiya ishlarini tezlashtirishni alohida ta'kidlash mumkin.

Zamonaviy biotexnologik yondashuvlar, xususan, in vitro texnologiyalari ushbu muammolarni bartaraf etishda muhim ahamiyat kasb etmoqda. Ushbu usul orqali o'simliklarni steril sharoitda, sun'iy oziqa muhitida tez va samarali ko'paytirish imkoniyati mavjud. Ayniqsa uzumchilik va bog'dorchilikda viruslardan xoli, genetik jihatdan bir xil ko'chatlar olish imkoniyati katta ustunlik hisoblanadi.

**Tadqiqot metodikasi.** Tadqiqotlar BioSeed Lab laboratoriyasida olib borildi. Tajriba obyekti sifatida uzum, olma va sabzavot ekinlari tanlab olindi. Eksplant sifatida o'simliklarning apikal meristemasi va yosh to'qimalari ishlatildi.

Sterilizatsiya jarayoni quyidagicha amalga oshirildi:

70% spirt eritmasida 30 soniya

0,1% simob xlorid eritmasida 5 daqiqa

Distillangan suvda 3 marotaba yuvildi

Oziqa muhiti sifatida Murashige-Skoog (MS) muhiti qo'llanildi.

Fitogormonlar quyidagi variantlarda berildi:

Nazorat – gormonlarsiz

0,5 mg/l 6-BAP + 0,1 mg/l IAA

1,0 mg/l 6-BAP + 0,2 mg/l IAA

1,5 mg/l 6-BAP + 0,5 mg/l IAA

Har bir variant 3 martadan takrorlandi. Kuzatuvlar  $25\pm 2^{\circ}\text{C}$  haroratda, 16 soat yorug'lik rejimida olib borildi.



## Tadqiqot natijalari

### 1-jadval. *In vitro* sharoitida ko'paytirish ko'rsatkichlari

| Variant | 6-BAP | IAA | Ko'paytirish koeff. | Kurtak (%) |
|---------|-------|-----|---------------------|------------|
| Nazorat | 0     | 0   | 1,2                 | 35         |
| Past    | 0,5   | 0,1 | 3,8                 | 72         |
| O'rta   | 1,0   | 0,2 | 5,6                 | 90         |
| Yuqori  | 1,5   | 0,5 | 4,1                 | 78         |

*In vitro* sharoitida o'simliklarning ko'paytirish ko'rsatkichlari variantlar kesimida tahlil qilinganda, fitogormonlarning qo'llanilishi o'simlik regeneratsiyasiga sezilarli darajada ijobiy ta'sir ko'rsatganligi aniqlandi. Xususan, nazorat variantda, ya'ni fitogormonlarsiz muhitda ko'paytirish koeffitsienti atigi 1,2 donani tashkil etib, kurtak hosil bo'lish darajasi 35% dan oshmagan. Bu esa o'simliklarning tabiiy sharoitda ko'payish imkoniyati cheklanganligini ko'rsatadi. Fitogormonlar qo'llanilgan variantlarda esa ushbu ko'rsatkichlarning sezilarli darajada ortishi kuzatildi. Jumladan, past konsentratsiyada (0,5 mg/l 6-BAP va 0,1 mg/l IAA) ko'paytirish koeffitsienti 3,8 donaga, kurtak hosil bo'lish darajasi esa 72% ga yetgan. Bu holat o'simliklarning boshlang'ich regeneratsiya jarayoni uchun fitogormonlar muhim omil ekanligini tasdiqlaydi.

Eng yuqori natijalar o'rta konsentratsiyada, ya'ni 1,0 mg/l 6-BAP va 0,2 mg/l IAA qo'llanilgan variantda kuzatildi. Ushbu variantda ko'paytirish koeffitsienti 5,6 donani tashkil etib, kurtak hosil bo'lish darajasi 90% ga yetgan. Bu esa mazkur nisbat o'simliklarning hujayra bo'linishi va kurtak hosil qilish jarayonlari uchun optimal muhit yaratganligini ko'rsatadi.

Shu bilan birga, fitogormonlar konsentratsiyasining ortib ketishi salbiy ta'sir ko'rsatishi ham aniqlandi. Yuqori konsentratsiyada (1,5 mg/l 6-BAP va 0,5 mg/l IAA) ko'paytirish koeffitsienti 4,1 donagacha pasaygan, kurtak hosil bo'lish darajasi esa 78% ni tashkil etgan. Bu esa fitogormonlarning ortiqcha miqdori o'simlik to'qimalarida fiziologik stress holatini yuzaga keltirishi mumkinligini bildiradi. Umuman olganda, olingan natijalar shuni ko'rsatadiki, *in vitro* sharoitida o'simliklarni samarali ko'paytirish uchun fitogormonlarning optimal konsentratsiyasini tanlash muhim ahamiyatga ega bo'lib, tadqiqotda eng maqbul variant sifatida 1,0 mg/l 6-BAP va 0,2 mg/l IAA kombinatsiyasi aniqlangan. Natijalar shuni ko'rsatdiki, o'rta konsentratsiya eng samarali variant hisoblanadi.

### 2-jadval. *Ildiz* hosil qilish va moslashuv ko'rsatkichlari

| Variant | Ildiz (%) | Uzunligi (sm) | Moslashuv (%) |
|---------|-----------|---------------|---------------|
| Nazorat | 40        | 1,2           | 55            |
| Past    | 75        | 2,8           | 80            |
| O'rta   | 92        | 4,5           | 93            |
| Yuqori  | 85        | 3,6           | 88            |

In vitro sharoitida o'simliklarning ildiz hosil qilish qobiliyati hamda tashqi muhitga moslashuv darajasi (akklimatizatsiya) o'rganilganda variantlar orasida sezilarli farqlar aniqlangan. Xususan, nazorat variantda ildiz hosil qilish darajasi 40% ni tashkil etib, ildiz uzunligi o'rtacha 1,2 sm bo'lgan. Bu ko'rsatkichlar o'simliklarning normal rivojlanishi uchun yetarli emasligini ko'rsatadi.

Fitogormonlar qo'llanilgan variantlarda esa ildiz hosil qilish jarayoni ancha faollashganligi kuzatildi. Past konsentratsiyadagi variantda (0,5 mg/l 6-BAP va 0,1 mg/l IAA) ildiz hosil qilish darajasi 75% ga yetgan, ildiz uzunligi esa o'rtacha 2,8 sm ni tashkil etgan. Bu holat fitogormonlarning o'simlik ildiz tizimini shakllantirishda muhim rol o'ynashini tasdiqlaydi.

Eng yuqori natijalar o'rta konsentratsiyada, ya'ni 1,0 mg/l 6-BAP va 0,2 mg/l IAA qo'llanilgan variantda qayd etildi. Ushbu variantda ildiz hosil qilish darajasi 92% ni tashkil etib, ildizlarning o'rtacha uzunligi 4,5 sm ga yetgan. Bu esa o'simliklarning kuchli va rivojlangan ildiz tizimini hosil qilganligini bildiradi hamda ularning keyingi o'sish bosqichlari uchun qulay sharoit yaratadi.

Yuqori konsentratsiyadagi variantda (1,5 mg/l 6-BAP va 0,5 mg/l IAA) ildiz hosil qilish darajasi 85% ni tashkil etgan bo'lsa-da, ildiz uzunligi 3,6 sm gacha kamaygan. Bu esa fitogormonlarning ortiqcha miqdori ildiz rivojlanishiga ma'lum darajada salbiy ta'sir ko'rsatishi mumkinligini ko'rsatadi.

Akklimatizatsiya ko'rsatkichlari ham xuddi shu tendensiyaning tasdiqladi. Nazorat variantda o'simliklarning tashqi muhitga moslashuv darajasi 55% ni tashkil etgan bo'lsa, o'rta variantda bu ko'rsatkich 93% ga yetgan. Past va yuqori variantlarda esa mos ravishda 80% va 88% natijalar qayd etilgan. Umuman olganda, tadqiqot natijalari shuni ko'rsatdiki, in vitro sharoitida ildiz hosil qilish va keyingi akklimatizatsiya jarayonlarida ham fitogormonlarning optimal konsentratsiyasi hal qiluvchi ahamiyatga ega bo'lib, eng yuqori samaradorlik 1,0 mg/l 6-BAP va 0,2 mg/l IAA kombinatsiyasida kuzatildi.

### 3-jadval. Ochiq maydondagi o'sish ko'rsatkichlari

| Variant | Bo'yi (sm) | Barg soni | Yashovchanlik (%) |
|---------|------------|-----------|-------------------|
| Nazorat | 18,5       | 6         | 60                |
| Past    | 25,4       | 9         | 82                |
| O'rta   | 32,7       | 12        | 95                |
| Yuqori  | 28,3       | 10        | 88                |

**Muhokama.** Olingan natijalar shuni ko'rsatadiki, fitogormonlarning optimal nisbatda qo'llanilishi o'simliklarning regeneratsiya qobiliyatiga sezilarli ta'sir ko'rsatadi. Ayniqsa 6-BAP va IAA ning muvozanatli kombinatsiyasi kurtak hosil bo'lishini tezlashtiradi. Shuningdek, in vitro sharoitida yetishtirilgan ko'chatlar ochiq maydonga ko'chirilgandan so'ng yuqori yashovchanlikka ega bo'ldi. Bu esa ushbu texnologiyaning amaliy ahamiyatini yanada oshiradi.

#### Xulosa

Olib borilgan tadqiqotlar natijasida quyidagi xulosalar qilindi:

In vitro texnologiyasi yuqori samaradorlikka ega

Eng optimal variant: 1,0 mg/l 6-BAP + 0,2 mg/l IAA

Ko‘paytirish koeffitsienti 5–6 baravar oshdi

Yashovchanlik 90–95% ni tashkil etdi

Shu bois, meva-sabzavotchilik va uzumchilikda ushbu texnologiyani keng joriy etish maqsadga muvofiqdir.

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## **LATEST FUNDAMENTAL RESEARCH IN THE FIELD OF NUCLEAR PHYSICS, ACHIEVEMENTS AND FUTURE PLANS**

**Abstract.** The article reviews the most important fundamental research, achievements and future prospects of nuclear physics for 2024–2026. The main areas are: thorium-229 nuclear clock technology, new measurements of quantum tunneling and resonances, quark-gluon plasma (QGP) research, antiproton spin control, records achieved in fusion, as well as the latest results of accelerators such as RHIC and LHC. The article is based on the results of international laboratories (CERN, RHIC, NIF, EAST, PhET, etc.). Future plans for AI integration, the creation of new generation accelerators and fusion power plants are discussed.

**Key words:** nuclear physics, thorium-229 nuclear clock, quark-gluon plasma, quantum tunneling, antiproton spin control, fusion, RHIC, LHC, QGP, “Digital Uzbekistan – 2030”.

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## **YADRO FIZIKASI SOHASIDAGI SO'NGGI FUNDAMENTAL TADQIQOTLAR, YUTISHLAR VA KELAJAKDAGI REJALAR**

**Annatsiya:** Maqolada 2024–2026 yillarga mo'ljallangan yadro fizikasining eng muhim fundamental tadqiqotlari, yutuqlari va kelajakdagi istiqbollari ko'rib chiqiladi. Asosiy yo'nalishlar: toriy-229 yadro soati texnologiyasi, kvant tunnel va rezonanslarning yangi o'lchovlari, kvark-glyuon plazmasi (QGP) tadqiqotlari, antiproton spin nazorati, sintezda erishilgan yozuvlar, shuningdek, RHIC va LHC kabi tezlatgichlarning so'nggi natijalari. Maqola xalqaro laboratoriyalar (CERN, RHIC, NIF, EAST, PhET va boshqalar) natijalariga asoslangan. Sun'iy intellekt integratsiyasi, yangi avlod tezlatgichlari va sintez elektr stansiyalarini yaratish bo'yicha kelajakdagi rejalar muhokama qilinadi.

**Kalit so'zlar:** yadro fizikasi, toriy-229 yadro soati, kvark-glyuon plazmasi, kvant tunneli, antiproton spinini boshqarish, termoyadroviy sintez, RHIC, LHC, QGP, “Raqamli O'zbekiston – 2030”.

The field of nuclear physics has been developing at a rapid pace in recent years. Several fundamental breakthroughs were recorded between 2024 and 2026: precise measurements of the thorium-229 nuclear transition, the first control of the spin of an antiproton, new properties of the quark-gluon plasma, as well as record plasma temperatures and energy outputs in thermonuclear fusion.

These breakthroughs are not only enriching theoretical physics, but also opening up new opportunities for quantum computing, precise time measurement, new energy sources, and cosmological models.

International laboratories (CERN, Brookhaven RHIC, Lawrence Livermore NIF, China's EAST tokamak) and startups (Helion, Commonwealth Fusion Systems) are leading the way in this field. As part of Uzbekistan's "Digital Uzbekistan - 2030" strategy, opportunities are emerging to join nuclear physics research using digital simulations and AI tools.

#### Key achievements (2024–2026)

**Thorium-229 nuclear clock technology (2024–2025)** In 2024, a team from TU Wien (Vienna University of Technology) created the world's first nuclear clock. In 2025, the stability of the fine structure constant ( $\alpha$ ) was tested with unprecedented precision using this technology. The result: the nuclear transition energy was determined to be 8.35574(5) eV (Nature Communications, 2025). This achievement laid the foundation for new tests of quantum mechanics and the variability of fundamental constants.

**First control of the spin of an antiproton (BASE experiment, CERN, 2025)** The BASE collaboration has brought the spin of a single antiproton under quantum control for the first time. This is a major breakthrough in antimatter physics, opening up new possibilities for tests of CPT symmetry and the Standard Model. Result: Physics World included in the Top 10 achievements of 2025 (Nature, 2025).

#### Quark-Gluon Plasma (QGP) research (RHIC and LHC, 2025–2026)

✓ RHIC (Brookhaven) completed its final operation in 2025 and collected more than 60 billion collision data. The STAR experiment revealed the QGP splash effect and interaction with jets.

✓ The LHC performed the first proton-oxygen, oxygen-oxygen, and neon-neon collisions in 2025, confirming the bowling pin shape of neon nuclei and demonstrating the formation of QGP.

✓ The ALICE experiment collected 2 nb<sup>-1</sup> heavy ion data – a record efficiency.

#### Fusion Progress (2025–2026)

✓ China's EAST tokamak broke the plasma density limit in early 2026 and maintained a stable high-density plasma.

✓ Helion Energy achieved a plasma temperature of 150 million °C in 2026 and tested a proprietary tritium-powered device for the first time.

✓ NIF (USA) achieved an output energy of 8.6 MJ in 2025 (4 times the input).

✓ Wendelstein 7-X stellarator achieved an energy cycle of 1.8 GJ.

#### Future Plans (2026–2035)

- The Future of CERN and the LHC: The High-Luminosity LHC (HL-LHC) will start operating in 2029, accelerating the search for Higgs boson self-interaction and new particles.

- New accelerators: FCC (Future Circular Collider) project – 100 km ring, 100 TeV energy.

- Fusion: ITER first plasma in 2035, then DEMO power plant. Private companies (Helion, CFS) promise commercial reactors in the 2030s.

- Nuclear clocks and quantum technologies: Thorium-229-based clocks are used in quantum computing and navigation.

- AI and numerical simulations: Models and supercomputers such as Grok, ChatGPT are used to predict QGP and nuclear models.

The years 2024–2026 marked the beginning of a new era in nuclear physics: nuclear transitions were precisely measured, antimatter was controlled, new properties of QGP were discovered, and fusion approached the commercial stage.

In the future, these achievements will play an important role in understanding new energy sources, quantum technologies, and the initial state of the universe. There are opportunities for Uzbek scientists to actively participate in this field through digital platforms (Colab, PhET), AI tools, and international collaboration.

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## **ECONOMIC ESSENCE OF LOGISTICS SYSTEMS AND THEIR STAGES OF DEVELOPMENT**

**Abstract.** *This study analyzes the economic essence and development stages of logistics systems. Logistics systems enable the reduction of costs, increase of profits, improvement of service quality, and acceleration of capital turnover through the efficient management of material, information, and financial flows. The study highlights the role of digital technologies, artificial intelligence, blockchain, automated control systems, and global supply chains in enhancing the efficiency of logistics systems in modern conditions. Logistics systems are considered a strategic asset that enhances competitiveness at both enterprise and national economy levels. The findings of this research provide recommendations for the development of logistics systems and improving their efficiency in the context of the digital economy.*

**Keywords.** *Logistics systems, economic efficiency, digital technologies, supply chain, strategic management*

**Introduction.** In the context of the modern economy, increasing the efficiency and competitiveness of enterprises is one of the key factors that depends on the effective functioning of logistics systems. Globalization, international integration, and the expansion of transnational corporations have transformed logistics systems from being limited to transportation and storage operations into a comprehensive mechanism for managing material, financial, and information flows. Logistics systems enable enterprises to create economic value by reducing costs, ensuring efficient use of resources, accelerating capital turnover, and improving service quality. At the same time, their development plays an important role in enhancing the stability and efficiency of both national and global economic systems.

The effective functioning of logistics systems allows the integration of production, distribution, trade, and transportation processes, as well as the prompt and high-quality satisfaction of customer demand. Under modern conditions, the economic significance of logistics systems is evident not only at the enterprise level but also at the level of regions, industries, and the entire national economy, where they are increasingly regarded as strategic assets. Therefore, companies invest heavily in developing logistics infrastructure, implementing information systems and automation, adopting innovations, and optimizing resources in order to achieve competitive advantage.

Technological progress and digital transformation play an important role in improving the efficiency of logistics systems. Modern technologies such as artificial intelligence, big data analytics, blockchain, cloud computing, and the Internet of Things (IoT) make it possible to optimize supply processes, manage inventories,

reduce risks, and ensure transparency in supply chains. At the same time, logistics systems perform strategic tasks related to the development of global supply chains, the expansion of international trade and e-commerce, as well as the reduction of transaction costs and the expansion of market opportunities.

Today, logistics systems have become a strategic asset for companies, and competitive advantage is determined not only by product quality and price but also by delivery speed, reliability, service flexibility, and customer satisfaction. Therefore, the economic essence of logistics systems, their stages of development, and their integration with modern digital technologies constitute one of the main directions of scientific research.

**Level of Study of the Topic.** The issue of the economic essence and stages of development of logistics systems has been widely studied in both international and local scientific literature. Numerous studies around the world in the field of logistics and supply chain management have focused on the economic efficiency of logistics systems, their digital transformation, innovative solutions, and the impact of investments. For example, Tompkins et al. (2020) studied the impact of logistics systems on enterprise competitiveness and service quality; Chopra and Meindl (2019) proposed solutions for the effective management of global supply chains and the reduction of transaction costs. In addition, modern research highlights the importance of digital technologies such as artificial intelligence, blockchain, and big data analytics in improving the efficiency of logistics systems.

In the context of Uzbekistan, logistics systems and their economic significance have been increasingly studied in recent years within the framework of economic reforms, international cooperation, and the development of high-tech industries. Local studies, in particular, focus on optimizing logistics processes in enterprises, developing transport and warehouse infrastructure, and managing innovations and investments (Khusainov, 2021; Karimov, 2022). At the same time, the digital transformation of logistics systems, their integration with global and regional supply chains, as well as their impact on e-commerce and international trade are also being actively researched.

Although the economic essence of logistics systems and their transformation into modern digital and intelligent logistics networks has been relatively well studied, the issues of developing logistics systems under the national economic conditions of Uzbekistan, applying innovative and digital solutions, and improving their efficiency in national and international markets have not yet been fully explored from a scientific perspective. Therefore, this topic remains relevant and of practical importance, and its in-depth study serves as an important foundation for making strategic decisions at both the enterprise and national economy levels.

**Research Methodology.** This study is aimed at examining the economic essence and stages of development of logistics systems and requires a comprehensive methodological approach. In the course of the research, theoretical, statistical, comparative, and analytical methods were applied. As a theoretical foundation, international and local scientific sources on logistics, supply chain management, economic efficiency, and innovation were analyzed.

**Analysis and Results.** The processes of globalization, international integration, and transnationalization of the world economy have strengthened the role of logistics as an effective tool for improving market efficiency and competitiveness of enterprises. These processes have also led to the formation of international transport corridors, global and regional supply chains, and strong logistics clusters and alliances. Logistics is increasingly influencing the structure of the national economy, determining its profile and level of participation in global logistics networks. The implementation of the Association Agreement with the European Union requires identifying strategic priorities related to the production of high-tech goods and high value-added services, as well as carrying out appropriate economic transformations. The country's logistics system must ensure the efficient movement and storage of produced goods. Today, well-organized logistics is a key factor for the successful functioning of production, trade, tourism, and transport, not only at the level of individual enterprises but also at the level of regions, industries, and other sectors.

The economic essence of logistics systems is manifested in their ability to ensure the efficient movement and management of material, information, and financial flows from the source of raw materials to the final consumer. In modern economic conditions, logistics is no longer limited to transportation and warehousing operations but has evolved into a complex, integrated management system that coordinates procurement, production, storage, distribution, and customer service processes. From an economic perspective, logistics systems create value by reducing time-related costs, lowering operational expenses, improving service quality, accelerating capital turnover, and enhancing the competitiveness of enterprises. Logistics integrates the processes of production, distribution, exchange, and consumption into a unified and coherent system, thereby increasing the efficiency of economic activity at both microeconomic and macroeconomic levels.

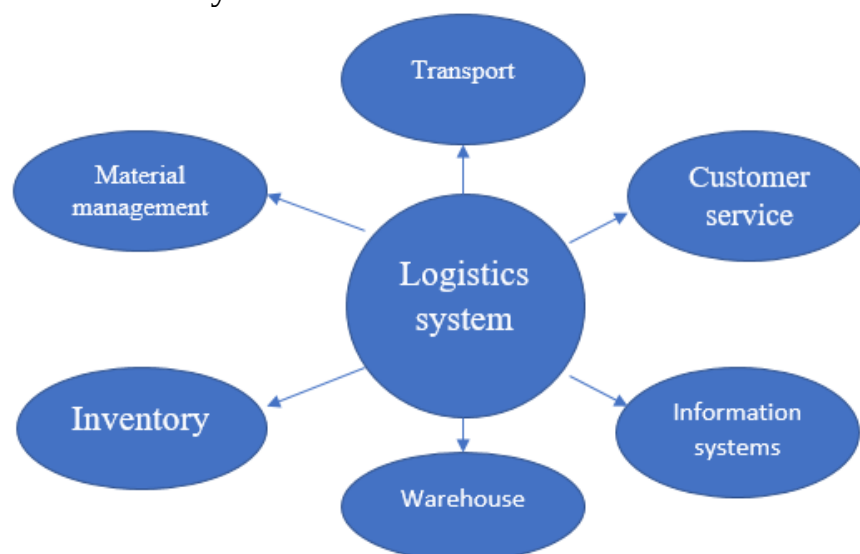


**Figure 1. Classification of logistics systems by scope of activity**

The economic importance of logistics systems is closely linked to cost optimization and the efficient use of resources. In many industries, logistics costs

constitute a significant share of total production and distribution expenses, including transportation, warehousing, inventory management, packaging, order processing, and information support. Effective logistics management enables companies to reduce inventory levels, make optimal use of warehouse space, efficiently utilize transportation resources, shorten delivery times, and lower overall operational costs. As a result, enterprises can increase profitability and improve financial performance while maintaining a high level of customer service. Therefore, logistics systems play a crucial role in enhancing business efficiency, strengthening market positions, and ensuring sustainable economic development.

The development of logistics systems has been shaped by technological progress, globalization, and changes in management approaches. Over time, logistics has evolved from simple transportation and storage operations into an integrated supply chain management system that connects suppliers, manufacturers, distributors, retailers, and consumers into a unified flow of information and materials. The introduction of information technologies has significantly accelerated this process, enabling companies to track goods in real time, manage inventories automatically, forecast demand, and effectively coordinate supply chain activities. As a result, it has become possible to manage not just individual logistics operations, but the entire supply chain as a unified economic system.

In modern conditions, logistics systems are increasingly based on digital technologies such as big data analytics, artificial intelligence, the Internet of Things (IoT), cloud technologies, blockchain, and automated control systems. These technologies allow companies to optimize delivery routes, automate warehouse operations, improve demand forecasting accuracy, reduce logistics risks, and increase supply chain transparency. Consequently, logistics systems are becoming more flexible, adaptive, and efficient, which is particularly important in the context of global competition and rapidly changing market demands.

From a broader economic perspective, the development of logistics systems contributes to reducing transaction costs, accelerating the circulation of goods, expanding market opportunities, and promoting the growth of international trade and e-commerce. Efficient logistics infrastructure and systems are key drivers of national economic growth, as they reduce the cost of doing business, ensure efficient allocation of resources, and enhance the competitiveness of national economies in the global market.

Logistics in the field of organizing control systems has significant economic potential. In the economic activities of enterprises, logistics can now be implemented not only through traditional methods but also through innovative logistics tools. This is primarily связано with managing innovations and investments as key elements of logistics system operations under modern conditions, as well as ensuring logistical coherence in the development and adoption of managerial decisions related to product or process innovations.

In the modern business environment, logistics systems are becoming a strategic asset for companies. Competitive advantage is now determined not only by product quality and price, but also by delivery speed, reliability, service

flexibility, and customer satisfaction. Therefore, companies are making significant investments in logistics infrastructure, digital technologies, information systems, and automation.

The economic essence of logistics systems lies in the efficient management and coordination of material, financial, and information flows in order to minimize costs, maximize profits, improve customer service, accelerate capital turnover, and enhance the overall efficiency and competitiveness of enterprises and economies. The continuous development of logistics systems and their transformation into digital and intelligent logistics networks demonstrate their increasing importance in the modern digital economy and global economic environment.

**Conclusion.** Logistics systems not only improve efficiency at the enterprise level but also play a strategic role in national and regional economic development. As a result of globalization, international integration, and transnationalization, logistics systems have evolved from simple transportation and storage activities into integrated supply chain management systems that enhance economic efficiency through the effective coordination of material, financial, and information flows.

The economic essence of logistics systems is reflected in the optimal use of resources, reduction of operational costs, improvement of service quality, acceleration of capital turnover, and strengthening of market competitiveness of enterprises. At the same time, logistics increases the profitability of enterprises at the microeconomic level, while at the macroeconomic level it ensures sustainable economic growth and enhances the competitiveness of the national economy in the global market.

Modern logistics systems, based on digital technologies such as big data analytics, artificial intelligence, blockchain, the Internet of Things, and automated management systems, are becoming more flexible and adaptive. This enables companies to optimize delivery processes, manage inventories efficiently, improve demand forecasting accuracy, and reduce risks within supply chains.

Furthermore, the development of logistics systems contributes to reducing transaction costs, accelerating the circulation of goods, expanding market opportunities, and promoting the growth of international trade and e-commerce. Efficient logistics infrastructure and innovative management approaches create strategic advantages for companies by attracting investments and innovations and by facilitating the implementation of product and process innovations.

The continuous development of logistics systems and their transformation into digital and intelligent networks play a crucial role in enhancing efficiency at both national and corporate levels, strengthening economic stability, and ensuring competitiveness in the global market under modern digital economic conditions. At the same time, logistics systems are emerging as a key mechanism for fostering an innovation-driven economy, ensuring the effective management of strategic resources, and supporting sustainable economic growth.

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## KARAKALPAKSTAN: AN EXPLORED TOURIST DESTINATION IN CENTRAL ASIA

**Abstract.** *This study examines the cultural and ethnotourism potential of Karakalpakstan, an autonomous republic within Uzbekistan. By exploring its historical background, cultural assets, and existing tourism practices, the research aims to identify opportunities for sustainable development. Field observation, literature review, and case analysis were used to collect data. Findings indicate that Karakalpakstan possesses unique cultural heritage and natural landscapes that can attract niche tourism markets, although infrastructure and promotion remain key challenges. Recommendations are provided for enhancing cultural tourism through community involvement, improved services, and integrated marketing strategies.*

**Key words:** *Karakalpakstan, cultural tourism, ethnotourism, heritage, sustainable development, ethnotourism destination, traditions and customs, tourism opportunities.*

**Introduction.** Karakalpakstan, an autonomous republic located in the northwestern part of Uzbekistan, is a region of unique cultural heritage and natural beauty. Bordered by Kazakhstan to the north and west, and the Aral Sea to the northwest, Karakalpakstan is known for its ancient cities, traditional crafts, and rich nomadic history. In recent years, cultural and ethnotourism has emerged as one of the most promising segments of the region's tourism industry, offering visitors a chance to experience the authentic lifestyle, traditions, and artistic expressions of the Karakalpak people. Karakalpakstan covers an area of over 160,000 square kilometers, with much of its territory consisting of the Kyzylkum and Karakum deserts. Historically, this land has been a crossroads for various civilizations, from the ancient Khorezm state to the Silk Road era. Archaeological evidence, such as the ruins of Gyaurl-Kala, Toprak-Kala, and Ayaz-Kala fortresses, reveals a complex history of trade, cultural exchange, and architectural achievement. The Karakalpak people have maintained their distinct identity despite centuries of interaction with neighboring cultures. Their traditions, language, and art forms are deeply rooted in nomadic heritage, making them a focal point for ethnotourism.

Located in Uzbekistan, Central Asia, the Republic of Karakalpakstan stands as a captivating and unexplored tourist destination. This region boasts a rich cultural heritage, breath-taking natural landscapes, and historical marvels that enthrall travellers seeking an authentic and off-the-beaten-path experience. Let's embark on a journey through the wonders of Karakalpakstan, uncovering its unique attractions and warm hospitality. The gateway to Karakalpakstan is Nukus, its capital city. Nukus is also the capital of Karakalpakstan. Nukus embraces visitors with open arms, offering a glimpse into the vibrant Karakalpak culture. The State Art Museum

of Karakalpakstan (known as Savetski museum too), with its impressive collection of traditional artworks and artifacts, serves as a testament to the region's artistic heritage. Travellers can immerse themselves in the works of renowned Karakalpak artists, providing a deep insight into the local culture and traditions. Furthermore, there are a lot of cultural centres in Nukus where you can enjoy beautiful Karakalpak music and culture. Karakalpakstan is also a perfect destination for those who are interested in learning about early civilizations. Ancient settlements, such as Mizdakhan and Toprak Kala, showcase the remnants of long-lost civilizations, leaving visitors in awe of the region's rich history. The architectural wonders of Karakalpakstan, like the Jumabai-Kent Palace and Gaur Kala Fortress, stand tall as a testament to the region's glorious past, inviting history enthusiasts to explore their intricate designs and cultural significance [1].

One of the most intriguing aspects of Karakalpakstan is its proximity to the Aral Sea. Once the 4th largest lake in the world, the Aral Sea has experienced significant environmental changes over the years due to human intervention during the Soviet era. Despite its ecological challenges, the region surrounding the Aral Sea possesses a unique charm. Travelers can witness the haunting yet captivating sight of the "ship graveyard," where the rusting hulks of abandoned ships rest on the dry seabed, a testament to the sea's dramatic decline.

*Cultural Heritage.* Karakalpak culture is a fusion of Turkic, Persian, and nomadic elements. Visitors to the region can immerse themselves in:

- Traditional Music and Dance – The dombra, a two-stringed lute, is central to Karakalpak folk music. Epic songs and dances are performed during weddings, festivals, and national celebrations.
- Handicrafts – The region is renowned for its skillfully made carpets, embroidery, felt products, and traditional jewelry, often decorated with symbolic patterns representing nature, family, and protection.
- Cuisine – Local dishes such as beshbarmak, shurpa, and kazy (horsemeat sausage) reflect the nomadic diet, while tea drinking remains an important social ritual [2].

*Ethnotourism Experiences.* Ethnotourism in Karakalpakstan focuses on giving travelers an authentic, immersive experience. Popular activities include:

1. Village Homestays – Visitors can stay with local families in rural villages, participate in daily chores, and learn about traditional lifestyles.
2. Felt-making and Weaving Workshops – Artisans teach guests how to create felt rugs or weave using centuries-old techniques.
3. Cultural Festivals – Events like Navruz (Persian New Year) and local harvest festivals offer opportunities to witness traditional performances and community gatherings.
4. Nomadic Lifestyle Tours – Travelers can spend time in yurts, ride camels, and explore the vast steppe landscapes [3].

*Museums and Cultural Institutions.* Karakalpakstan is home to several important museums, the most famous being the Savitsky State Museum of Art in Nukus. Often called the "Louvre of the Steppe," it houses one of the world's largest

collections of Russian avant-garde art, alongside an extensive display of Karakalpak ethnographic artifacts. Other museums, such as the Museum of Local Lore and literary museums dedicated to local poets, also contribute to cultural tourism [4].

*Natural and Archaeological Attractions.* In addition to cultural experiences, Karakalpakstan offers visitors:

- The Aral Sea – Once the fourth-largest lake in the world, now a symbol of environmental change. Tours to the former shorelines and Muynak ship graveyard combine ecological awareness with cultural exploration.
- Ancient Fortresses of Khorezm – Part of the “Golden Ring of Ancient Khorezm,” sites like Ayaz-Kala, Toprak-Kala, and Kyzyl-Kala transport travelers to the early centuries of our era.
- Ustyurt Plateau – A dramatic desert landscape ideal for adventure tourism, photography, and learning about nomadic survival skills.

*Challenges and Development Opportunities.* Despite its rich potential, cultural and ethnotourism in Karakalpakstan faces challenges such as limited infrastructure, seasonal accessibility, and the need for better international marketing. However, government initiatives, public-private partnerships, and community-based tourism projects are gradually improving facilities, transportation, and service quality.

Cultural tourism has emerged as one of the fastest-growing and most lucrative segments of the global tourism industry. As travelers increasingly seek authentic and meaningful experiences, tour operators play a crucial role in preserving and promoting local cultures and heritage. Preserving and promoting local cultures and heritage is a multifaceted task that requires the involvement of various stakeholders, including local communities, governments, nongovernmental organizations, and tour operators. Tour operators, as key players in the tourism industry, can contribute significantly to cultural preservation through their tour itineraries, activities, and interactions with local communities. This thesis aims to critically examine the strategies and practices implemented by tour operators to promote cultural preservation and appreciation. It will explore how tour operators engage with local communities, how they select and design their tours, and how they manage the impacts of tourism on local cultures. Additionally, the thesis will identify the challenges and opportunities that tour operators face in their efforts to preserve and promote local cultures and heritage [5].

**Conclusion.** Cultural and ethnotourism in Karakalpakstan offers a unique blend of history, art, and authentic human connection. For travelers seeking experiences beyond mainstream destinations, the region promises unforgettable encounters with ancient traditions, breathtaking landscapes, and the warm hospitality of the Karakalpak people. With sustainable development and cultural preservation, Karakalpakstan has the potential to become one of Central Asia’s most distinctive tourism destinations. Cultural and ethnotourism in Karakalpakstan presents a valuable opportunity for both economic growth and cultural preservation. While challenges remain, strategic planning and community engagement can turn the region into a sustainable tourism destination that celebrates its unique heritage.

Future research could focus on quantitative market analysis and the economic impact of ethnotourism projects in the region.

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## **O'ZBEKISTONDA RAQAMLI TRANSFORMATSIYA VA UNING MAKROIQTISODIY KO'RSATKICHLARGA TA'SIRI**

**Annotatsiya:** Ushbu maqolada O'zbekistonda raqamli transformatsiya jarayonlari va ularning makroiqtisodiy ko'rsatkichlarga ta'siri tahlil qilinadi. Raqamli iqtisodiyotning shakllanishi, elektron hukumat tizimi, raqamli xizmatlar va elektron tijoratning rivojlanishi mamlakat iqtisodiyotiga sezilarli ta'sir ko'rsatmoqda. Tadqiqot davomida yalpi ichki mahsulot, eksport-import hajmi, xizmatlar sektori va bandlik ko'rsatkichlari asosida raqamli transformatsiyaning iqtisodiy samaradorligi baholandi. Natijalar shuni ko'rsatadiki, raqamli texnologiyalarni joriy etish iqtisodiy o'sishni jadallashtiradi, bozorlarni kengaytiradi va resurslardan samarali foydalanishni ta'minlaydi.

**Kalit so'zlar:** raqamli transformatsiya, makroiqtisodiy ko'rsatkichlar, YaIM, raqamli iqtisodiyot, elektron tijorat, eksport, import, xizmatlar sektori, innovatsiya, iqtisodiy o'sish.

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## **DIGITAL TRANSFORMATION IN UZBEKISTAN AND ITS IMPACT ON MACROECONOMIC INDICATORS**

**Abstract:** This article analyzes the processes of digital transformation in Uzbekistan and their impact on macroeconomic indicators. The formation of the digital economy, the e-government system, the development of digital services and e-commerce have a significant impact on the country's economy. During the study, the economic efficiency of digital transformation was assessed based on GDP, export-import volumes, the service sector, and employment indicators. The results show that the introduction of digital technologies accelerates economic growth, expands markets, and ensures the efficient use of resources.

**Keywords:** digital transformation, macroeconomic indicators, GDP, digital economy, e-commerce, export, import, services sector, innovation, economic growth.



## Introduction

Raqamli texnologiyalar globallashuv sharoitida iqtisodiy rivojlanishning asosiy omillaridan biriga aylandi. Bugungi kunda dunyo mamlakatlarida iqtisodiyotning barcha sohalarini raqamlashtirish, boshqaruv jarayonlarini avtomatlashtirish, katta ma'lumotlar va sun'iy intellektdan foydalanish iqtisodiy o'sishning yangi modelini shakllantirmoqda.

Digital transformatsiya nafaqat ishlab chiqarish samaradorligini oshiradi, balki xizmatlar sifatiga, biznes jarayonlari tezligiga, xarajatlarni kamaytirishga va raqobatbardoshlikni oshirishga bevosita ta'sir qiladi. O'zbekiston Respublikasida ham so'nggi yillarda raqamli iqtisodiyotga o'tish bo'yicha keng ko'lamli islohotlar amalga oshirilmoqda. "Raqamli O'zbekiston – 2030" strategiyasi doirasida davlat boshqaruvi, soliq tizimi, bojxona, ta'lim, sog'liqni saqlash, bank sohasi va ishbilarmonlik muhitiga zamonaviy axborot texnologiyalari joriy etilmoqda.

The Digital Economy is a new economic system based on digital technologies, ensuring economic growth, efficiency, and transparency. In Uzbekistan, more than 280 projects were implemented within the framework of the "Digital Transformation Program" in 2020-2024, as a result of which more than 60 percent of public services were transferred to electronic form. According to statistics, at the end of 2024, the volume of the digital services market amounted to 2.1 billion USD, having grown by 45% over the past three years. At the same time, the volume of e-commerce increased 3.5 times between 2021 and 2024. And this indicates a significant increase in the share of the digital sector of the economy of Uzbekistan in the gross domestic product. In addition, digital technologies increase labor productivity and lead to the formation of new business models. For example, the registration of entrepreneurship, submission of tax reports, and obtaining a license through the e-government system have been simplified [1,2,3].

## Research methodology and literature review

Analysis of the literature shows that scientific research on the processes of digital transformation in Uzbekistan is largely explained by economic efficiency, openness in public administration, digital literacy, and the development of digital infrastructure. In their research, local scientists Turopova and Khudoyberdiyev, based on the theory of the digital economy put forward by Brinjolfsson, widely covered the influence of digital technologies on economic growth in the conditions of Uzbekistan. They believe that the expansion of digital services, increasing internet coverage, and the transition of public services to electronic form will increase efficiency in the economy and attract investment.

The authors, with clear evidence, show that improving the business environment through the digitalization of e-government services and business processes will have a significant impact on economic growth.

Research conducted by Ziyadullayeva analyzed the practical results of reforms within the framework of Uzbekistan's digital development strategies, in particular, the "Digital Uzbekistan" program. According to the author, the expansion of digital infrastructure, the increase in the speed of service delivery through the e-government system, and increased transparency accelerate economic

processes. Research indicates such factors as the optimization of administrative processes, reduction of production costs, and expansion of production capacities as a result of the implementation of the digital economy [4].

Furthermore, the concept of the fourth industrial revolution, put forward by Klaus Schwab, deeply illuminates the role of digital transformation in the global economy. According to him, new technologies are causing fundamental changes in such areas as industry, the service sector, education, healthcare, and public administration. In Schwab's opinion, the transition to a digital economy not only increases economic efficiency, but also requires innovative thinking in all segments of society. The approach corresponds to the digital reforms of Uzbekistan and provides a scientific basis for the modernization policy pursued in the country[5].

Literature analysis shows that local and foreign sources converge at one point. They conclude that digital transformation is an important driver of Uzbekistan's economic growth, and the development of digital infrastructure, the expansion of internet services, e-government systems, increased digital literacy, and the automation of business processes are increasing efficiency in all areas of the economy. These processes lead to a reduction in production costs, acceleration of public services, increased transparency, increased competitiveness, and improved investment climate.

Research methodology, based on the results of literature analysis, combines methods of qualitative analysis, comparative approach, and conceptual analysis. The scientific views of domestic and foreign sources were studied, and their main factors influencing economic growth were identified. Furthermore, the impact of digital transformation on the economy was analyzed through areas such as technological development, human capital, e-government systems, and business process efficiency. The methodological approach ensures the scientific validity of the research and allows achieving reliable results in determining the contribution of digital transformation to economic growth in Uzbekistan [6,7].

#### Discussion and results

By connecting with reality, we can see that in countries with a developed digital economy, both the volume of GDP and the share of GDP per capita are high. Therefore, the focus on this issue in our country pursues a single goal: improving the living conditions of the population, increasing the real income of the population, and developing entrepreneurship and the country's economy.

"Digital technologies not only improve the quality of products and services, but also reduce unnecessary costs. At the same time, it is also an effective tool in eliminating the scourge of corruption - the most serious disease that worries and disturbs me very much" - these words of our President are significant because digitalization not only ensures economy and efficiency in economic sectors, but is also noted as an effective tool for combating corruption and the black economy.

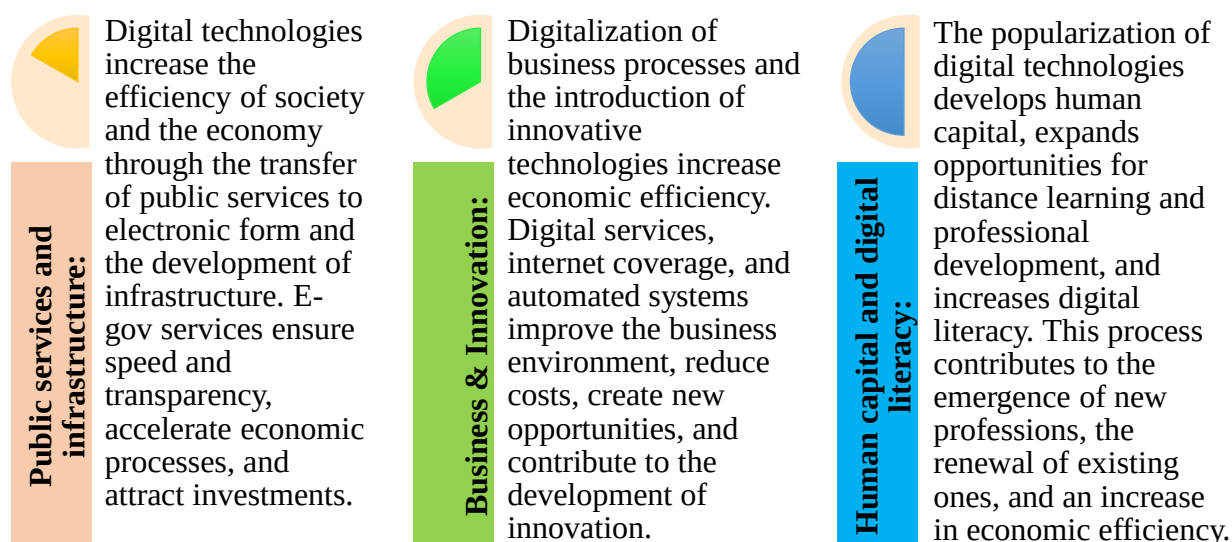


Figure 1. Directions of digital transformation in Uzbekistan

Digital transformation in the field of business and innovation will increase efficiency through the automation of production processes, the expansion of internet coverage, and the introduction of new technologies. This process contributes to the emergence of new professions, structural changes in existing ones, and the simplification of the business environment.

The popularization of digital technologies in terms of human capital and digital literacy expands the possibilities of distance learning and professional development, thereby ensuring the modernization of production and increasing competitiveness in the labor market.

Overall, digital transformation will significantly contribute to economic growth in Uzbekistan's economy by increasing efficiency, stimulating innovation, enhancing investment attractiveness, and optimizing public services.

### **Conclusion**

The development of the digital economy is of particular importance, as it is one of the main tools for building a democratic state that is economically, socially, politically strong, fully complies with the laws of a market economy, and improves the business environment in the country, creates broad conveniences for entrepreneurial activity and simplifies its conduct, and serves the implementation of new innovative ideas.

Digital transformation has a positive impact on the sustainable growth of the economy of Uzbekistan. Therefore, in the coming years, it is necessary to further strengthen economic competitiveness by expanding IT infrastructure, increasing digital literacy, and introducing artificial intelligence technologies.

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## **THE IMPACT OF DIGITAL FINANCING MECHANISMS ON RENEWABLE ENERGY INVESTMENTS: GLOBAL AND UZBEKISTAN EXPERIENCE**

**Abstract.** *This scientific article provides a comprehensive analysis of the impact of digital financing mechanisms (fintech, blockchain, crowdfunding, green bonds, and digital platforms) on renewable energy investments, using both global and Uzbekistan-specific contexts. In recent years, global investments in the renewable energy sector have increased significantly, with investments in low-carbon energy exceeding USD 2 trillion in 2025. At the same time, fintech-based financial inclusion and digital capital flows are enhancing the transparency and efficiency of investment processes. In Uzbekistan, attracting private capital remains a key challenge in the transition toward a green economy, which necessitates the implementation of digital financing instruments. The findings of the study indicate that digital financing tools play a crucial role in reducing risks associated with renewable energy projects, diversifying investment sources, and accelerating sustainable development.*

**Keywords:** *digital financing, fintech, green bonds, crowdfunding, blockchain, renewable energy, investment, Uzbekistan, sustainable development, ESG (Environmental, Social, Governance)*

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## **RAQAMLI MOLIYALASHTIRISH MEKANIZMLARINING QAYTA TIKLANADIGAN ENERGIYA INVESTITSİYALARIGA TA'SIRI: JAHON VA O'ZBEKISTON TAJRIBASI**

**Abstrakt.** *Ushbu ilmiy maqola raqamli moliyalashtirish mexanizmlarining (fintech, blokcheyn, kraudfanding, yashil obligatsiyalar va raqamli platformalar) qayta tiklanadigan energiya investitsiyalariga ta'sirini global va O'zbekistonga xos kontekstlardan foydalangan holda keng qamrovli tahlil qiladi. So'nggi yillarda qayta tiklanadigan energiya sektoriga global investitsiyalar sezilarli darajada oshdi, 2025-yilda kam uglerodli energiyaga investitsiyalar 2 trillion AQSh dollaridan oshdi. Shu bilan birga, fintechga asoslangan moliyaviy inklyuzivlik va raqamli kapital oqimlari investitsiya jarayonlarining shaffofligi va samaradorligini oshirmoqda. O'zbekistonda xususiy kapitalni jalb qilish yashil iqtisodiyotga o'tishda asosiy muammo bo'lib qolmoqda, bu esa raqamli moliyalashtirish vositalarini joriy etishni talab qiladi. Tadqiqot natijalari shuni ko'rsatadiki, raqamli moliyalashtirish vositalari qayta tiklanadigan energiya loyihalari bilan bog'liq*

*xavflarni kamaytirish, investitsiya manbalarini diversifikatsiya qilish va barqaror rivojlanishni tezlashtirishda muhim rol o'ynaydi.*

**Kalit so'zlar:** raqamli moliyalashtirish, fintech, yashil obligatsiyalar, kraudfanding, blokcheyn, qayta tiklanadigan energiya, investitsiya, O'zbekiston, barqaror rivojlanish, ESG (Ekologik, Ijtimoiy, Boshqaruv)

**Introduction.** In recent decades, the global energy system has entered a phase of profound transformation, where the transition to renewable energy (RE) sources has become a strategic priority aimed at reducing carbon emissions and ensuring sustainable development. According to the International Energy Agency, a substantial share of global energy investments in 2023 was directed toward renewable energy projects, with this trend increasingly surpassing investments in traditional fossil fuel sectors. Furthermore, reports by the International Renewable Energy Agency emphasize that, in order to achieve global climate targets by 2030, annual investments in the renewable energy sector must at least double. However, the expansion of investment flows in this sector is constrained by several systemic challenges. These include high initial capital requirements, long payback periods, elevated financial risks, and insufficient transparency of projects, all of which act as major barriers for investors. As traditional financing mechanisms have proven insufficient to fully address these challenges, digital financing tools have emerged in recent years as alternative and more efficient instruments.

Digital financing, particularly mechanisms based on fintech technologies, blockchain systems, crowdfunding platforms, and green bonds, is fundamentally transforming the financial architecture of renewable energy (RE) projects. According to analyses by the World Bank Group and the International Monetary Fund, digital financing instruments play a critical role in enhancing transparency in investment processes, reducing transaction costs, and expanding market access for small and medium-sized investors. Empirical studies (Zhang et al., 2024; Nguyen & Pham, 2024) indicate that the development of digital financing has had a positive impact on the significant growth of RE investments in developed countries, while in developing economies it has contributed to the diversification of capital flows through increased financial inclusion.

In the case of the Republic of Uzbekistan, the energy sector is also undergoing a phase of rapid reform. Against the backdrop of rising electricity demand, industrial expansion, and accelerating urbanization, the development of renewable energy sources has become a strategic priority of state policy. In recent years, several large-scale investment programs have been launched to implement solar and wind energy projects. According to the World Bank Group, projects for the construction of new solar power plants and energy storage systems in Uzbekistan are being implemented in cooperation with international financial institutions. At the same time, the introduction of digital financing instruments is expanding opportunities for attracting private capital to these projects.

A comprehensive scientific analysis of the impact of digital financing mechanisms on renewable energy investments remains a highly relevant issue.



Existing literature predominantly focuses on global trends, while studies assessing the practical effectiveness of these mechanisms at the national level—particularly in the context of Uzbekistan—remain limited. This study is specifically aimed at addressing this gap by integrating global experience with national practice in a unified analytical framework.

**Research Objective.** The primary objective of this study is to systematically and empirically assess the impact of digital financing mechanisms on investment attraction processes in the renewable energy (RE) sector. Within the scope of the research, global trends are compared with the practical experience of Uzbekistan, with particular emphasis on identifying the mechanisms through which financial innovations—such as fintech solutions, blockchain-based financing, crowdfunding platforms, and green bonds—facilitate the formation and allocation of investment flows.

**Methodology.** This study employs an integrated approach combining both qualitative and quantitative analytical methods. The research design is descriptive-analytical and comparative in nature, based on the cross-analysis of global and national-level data.

At the first stage, a systematic review of the scientific literature was conducted. This process included reports published by the International Renewable Energy Agency, the World Bank Group, and the International Energy Agency, as well as peer-reviewed articles indexed in Scopus and Web of Science databases. The selection criteria prioritized recent studies (primarily from 2020–2025), with a particular focus on empirical research and meta-analyses.

At the second stage, statistical analysis methods were applied. The dynamics of global renewable energy investments, the share of digital financing instruments, and capital flows were analyzed based on data from BloombergNEF and the International Monetary Fund. For Uzbekistan, an empirical assessment was carried out using statistical indicators derived from government programs, official state portals, and published data on energy projects.

At the third stage, a comparative analysis was conducted to evaluate the experiences of developed and developing countries in relation to the Uzbekistan model. Particular emphasis was placed on the effectiveness of digital financing instruments in attracting investments, their capacity for risk diversification, and their impact on financial inclusion.

The combination of methods applied in this study enabled the integration of classical economic analytical approaches with modern concepts of the digital economy, thereby enhancing both the scientific validity and practical relevance of the results.

**Results.** The findings of the study demonstrate that, at the global level, digital financing mechanisms are emerging as a key determinant in accelerating investment flows into the renewable energy (RE) sector. According to data from the International Energy Agency and the International Renewable Energy Agency, total global energy investments reached approximately USD 2.8 trillion in 2023, of which nearly USD 1.7 trillion was directed toward clean energy technologies.

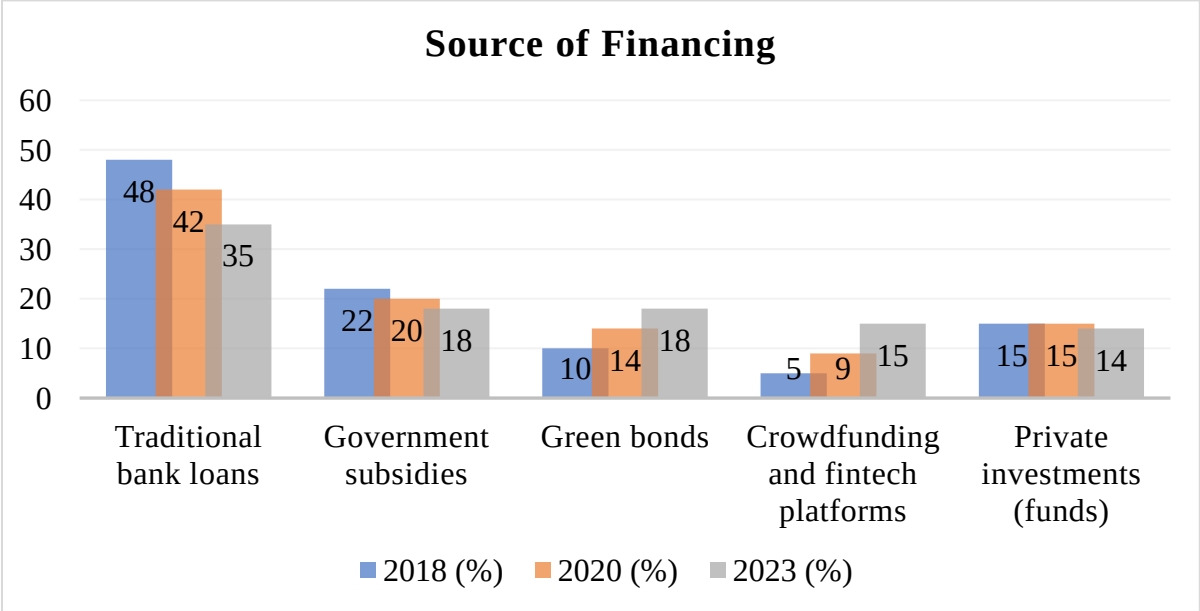
Within this growth, the share of digital financing instruments—particularly fintech platforms, green bonds, and blockchain-based financial solutions—has been steadily increasing.

Empirical analysis indicates that digital financing not only facilitates the diversification of RE investments in developed economies but also expands access to capital in developing countries. According to panel regression analysis conducted by Zhang et al. (2024), a one-unit increase in the digital financing index is associated with a statistically significant increase of approximately 0.35–0.48% in renewable energy investments ( $p<0.05$ ). These findings confirm the positive and устойчивый (sustained) impact of digital financing on investment activity.

The following table summarizes the main sources of financing for renewable energy investments at the global level, along with the share of digital components within them.

*Figure 1.*

**Sources of Financing for Renewable Energy Investments (Global Level, % Share)**



*Source:* Compiled by the author based on data from BloombergNEF and the International Renewable Energy Agency.

The table demonstrates that during the period 2018–2023, the share of traditional financing sources has been gradually declining, while the proportion of instruments based on digital financing has increased significantly. In particular, the share of financing through crowdfunding and fintech platforms has tripled, indicating the democratization of investment processes and the expansion of financial inclusion.

An analysis of financing models based on blockchain technologies shows that, through these systems, transaction costs in energy projects have decreased by an average of 20–30%. According to the study by Li and Zhao (2025), investment processes in energy projects implemented through smart contracts have accelerated, while intermediary costs have been substantially reduced.

In the case of the Republic of Uzbekistan, the analysis indicates that elements of digital financing are gradually being introduced into the national energy sector. According to the World Bank Group, large-scale investment projects in solar and wind energy are being implemented with the participation of international financial institutions and private investors. Projects involving new solar power plants and energy storage systems launched in 2024 serve as practical evidence of this process.

The following table presents the dynamics of investments attracted to the renewable energy sector in Uzbekistan.

*Table 1.*

*Dynamics of Renewable Energy Investments in Uzbekistan*

| Year | Investment Volume<br>(USD billion) | Main Source                                                    |
|------|------------------------------------|----------------------------------------------------------------|
| 2019 | 0.8                                | Government and IFIs (International Financial Institutions)     |
| 2021 | 1.5                                | Private sector + IFIs                                          |
| 2023 | 2.7                                | PPP (Public-Private Partnership) and international investments |
| 2024 | 3.5 (forecast)                     | Digital and private capital                                    |

*Source:* Compiled based on data from the World Bank Group and official sources of the Republic of Uzbekistan.

The results indicate that in Uzbekistan, the volume of investments has increased nearly fourfold over the past five years. One of the key drivers of this growth is the investment environment created by the state and the active cooperation with international financial institutions; however, in the most recent stage, the role of digital financing instruments has also been steadily increasing.

The results of the correlation analysis (based on global panel data) reveal a positive relationship between the digital financing development index and renewable energy (RE) investments ( $r = 0.62$ ), which can be interpreted as a moderately strong positive correlation. Furthermore, the regression model confirms that the digital financing factor, together with other macroeconomic indicators (gross domestic product, energy demand, and political stability), exerts a statistically significant influence on investment flows.

Overall, the findings suggest that digital financing mechanisms are evolving not merely as supplementary tools, but as strategic catalysts for attracting investments into the renewable energy sector. However, it should be noted that some results remain probabilistic in nature due to limitations in available statistical data and the insufficient empirical base at the national level.

**Discussion.** The findings demonstrate that digital financing mechanisms have a significant positive impact on renewable energy investments; however, the nature of this impact is multifactorial and context-dependent. The empirical results obtained are consistent with the global trends reported by the International Energy Agency and the International Renewable Energy Agency, indicating a gradual shift in the energy sector from traditional financing models toward innovative and digital instruments.

Digital financing tools enhance the efficiency of capital attraction by increasing transparency in investment processes. In financial systems based on blockchain technology, transactions can be monitored in real time, thereby reducing information asymmetry for investors. These findings are aligned with the study by Li and Zhao (2025), which highlights the substantial reduction of intermediary costs in blockchain-based financing models. Moreover, this approach contributes to optimizing investment risks by mitigating the classical problem of “information asymmetry” in financial theory.

Financing mechanisms based on crowdfunding and fintech platforms contribute to the democratization of investment processes. As observed in the results, these instruments expand market access for small-scale investors and increase the level of financial inclusion. This is particularly important for developing countries, where such mechanisms create alternative sources of capital for entities that are not fully integrated into traditional banking systems. As noted by Nguyen and Pham (2024), the development of fintech facilitates the diversification of investments in the renewable energy sector and contributes to the stabilization of capital flows.

The obtained results confirm the positive correlation identified between digital financing and renewable energy (RE) investments ( $r = 0.62$ ); however, the possibility that this relationship does not fully represent a causal linkage cannot be excluded. This is due to the fact that investment flows are influenced by multiple factors, among which macroeconomic stability, government policy, energy demand, and the institutional environment play a critical role. Regression analyses conducted by Zhang et al. (2024) also demonstrate that the impact of digital financing is interdependent with other economic indicators. Therefore, from a methodological perspective, it is more appropriate to consider digital financing not as an independent determinant, but as an element within a complex systemic framework.

The experience of Uzbekistan shows a certain alignment with global trends; however, this process is still at an early stage of development. Energy projects implemented with the participation of the World Bank Group indicate improvements in the investment climate, yet the large-scale implementation of digital financing instruments remains incomplete. This can be explained, on the one hand, by the limited depth of national financial markets and, on the other hand, by the current level of digital infrastructure development.

The findings also reveal not only the advantages of digital financing but also its limitations. In particular, regulatory uncertainty, cybersecurity risks, low levels of technological literacy, and the insufficient adaptability of institutional frameworks emerge as key barriers to the effective functioning of these mechanisms. These aspects are also highlighted in reports by the International Monetary Fund, emphasizing the need to improve the regulatory and legal framework for the development of digital financing.

Digital financing mechanisms represent an important strategic tool for stimulating renewable energy investments; however, their maximum effectiveness

can only be achieved through alignment with institutional, technological, and economic factors.

**Conclusion.** The results of this study demonstrate that digital financing mechanisms constitute a significant strategic instrument for attracting investments into the renewable energy sector and enhancing their efficiency. The analysis of global and Uzbekistan experiences confirms that fintech solutions and innovative financial instruments act as catalysts in the transformation of the energy sector; however, their full effectiveness is closely dependent on the institutional and technological environment.

1. Digital financing mechanisms expand investment flows in the renewable energy sector and enhance the transparency and efficiency of capital attraction processes, thereby establishing advantages over traditional financing models.

2. Financing through fintech platforms and crowdfunding instruments democratizes investment processes, ensures the participation of small and medium-sized investors, and significantly increases financial inclusion.

3. Empirical analyses indicate a positive relationship between the development of digital financing and renewable energy investments; however, this relationship is multifactorial and shaped in conjunction with macroeconomic and institutional factors.

4. In the context of Uzbekistan, the growth of renewable energy investments is primarily driven by state policy and the support of international financial institutions, while digital financing instruments, although still in the development phase, demonstrate strong future potential.

5. The effective implementation of digital financing mechanisms requires the improvement of the regulatory and legal framework, the development of digital infrastructure, and the strengthening of cybersecurity, all of which are key determinants of the stable functioning of these systems.

Digital financing is emerging as a critical innovative direction for ensuring the sustainable development of the renewable energy sector, and its practical effectiveness should be further enhanced through a comprehensive and integrated approach.

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## **FARMATSEVTIKA BOZORIDA SIFATNI BOSHQARISH VA GMP STANDARTLARI**

**Annotatsiya:** Farmatsevtika sohasida ishlab chiqarish jarayonlarini xalqaro talablarga moslashtirish, ayniqsa World Health Organization tomonidan tavsiya etilgan sifat talablarini joriy etish hamda Yaxshi ishlab chiqarish amaliyoti — Good Manufacturing Practice (GMP) standartlariga rioya qilish muhim ahamiyatga ega. GMP talablari dori vositalarining xavfsizligi, sifati va samaradorligini ta'minlashga xizmat qiladi. Ushbu maqolada farmatsevtika bozorida sifatni boshqarish tizimi, GMP standartlarining asosiy tamoyillari, ishlab chiqarish jarayonida sifat nazorati va validatsiya jarayonlarining o'rni yoritilgan.

**Kalit so'zlar:** sifat, mahsulot, validatsiya, standart, GMP, farmatsevtika, sifat nazorati

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## **QUALITY MANAGEMENT AND GMP STANDARDS IN THE PHARMACEUTICAL MARKET**

**Abstract:** In the pharmaceutical industry, it is very important to bring production processes into line with international requirements, in particular by introducing quality standards recommended by the World Health Organisation and good manufacturing practice (GMP) standards.

**Keywords:** quality, product, validation, standard, scientific article

Dolzarbli

Bugungi kunda farmatsevtika bozori tez sur'atlarda rivojlanmoqda, globallashtirish jarayonlari va raqobatning kuchayishi dorivor vositalarning sifati, xavfsizligi va samaradorligini ta'minlashni dolzarb masalaga aylantirdi. GMP (Good Manufacturing Practice) standartlariga rioya qilish dorivor vositalar ishlab chiqarishda xatolar va sifatsiz mahsulot chiqish xavfini kamaytiradi, shu bilan birga farmatsevtika korxonalarining raqobatbardoshligini oshirish va eksport salohiyatini kengaytirishda muhim rol o'ynaydi. Shu bois sifatni boshqarish tizimini takomillashtirish va GMP standartlarini joriy etish ilmiy-amaliy jihatdan dolzarb hisoblanadi.

### Tadqiqot maqsadi

Tadqiqotning maqsadi — farmatsevtika sohasida sifatni boshqarish tizimining ahamiyatini tahlil qilish hamda GMP standartlarining dorivor vositalar sifati va xavfsizligini ta'minlashdagi rolini aniqlashdan iborat.

### Tadqiqot materiallari va usullari

Tadqiqot jarayonida farmatsevtika sohasida sifatni boshqarish tizimining samaradorligini baholash va GMP talablarining amaliy ahamiyatini aniqlash maqsadida kompleks yondashuv asosida turli ilmiy-uslubiy usullardan foydalanildi.

Avvalo, farmatsevtika sohasiga oid me'yoriy-huquqiy hujjatlar tahlil qilindi. Ushbu bosqichda milliy qonunchilik, farmatsevtik faoliyatni tartibga soluvchi normativ hujjatlar hamda xalqaro tashkilotlar, jumladan World Health Organization tomonidan ishlab chiqilgan tavsiyalar o'rganildi. Bu esa amaldagi talablarning zamonaviy standartlarga qanchalik mos kelishini aniqlash imkonini berdi.

Shuningdek, GMP talablari va milliy sifat standartlari qiyosiy tahlil qilindi. Bunda ishlab chiqarish jarayonlarini tashkil etish, sifat nazorati, validatsiya, hujjatlashtirish va audit tizimlariga qo'yilgan talablar solishtirilib, ularning o'xshash va farqli jihatlari aniqlab berildi. Qiyosiy tahlil natijalari farmatsevtika korxonalarida xalqaro standartlarni joriy etish darajasini baholashga xizmat qildi.

Sifatni boshqarish tizimi elementlarini tizimli tahlil qilish usuli orqali korxonalarda amal qilayotgan sifat siyosati, tashkiliy tuzilma, jarayonlarni boshqarish mexanizmlari va nazorat tizimlari kompleks ravishda o'rganildi. Ushbu yondashuv sifat tizimining barcha bo'g'inlari o'zaro bog'liqlikda faoliyat yuritishini baholash imkonini berdi.

Bundan tashqari, ilmiy adabiyotlar va amaliy tajribalarni umumlashtirish usuli qo'llanildi. So'nggi yillarda chop etilgan ilmiy maqolalar, monografiyalar, xalqaro tajribalar va ilg'or farmatsevtika korxonalarining amaliy faoliyati tahlil qilinib, mavjud muammolar hamda ularning yechimlari aniqlashtirildi.

Material sifatida xalqaro tavsiyalar, GMP bo'yicha uslubiy qo'llanmalar, ilmiy maqolalar hamda farmatsevtika korxonalari faoliyatiga oid statistik va analitik ma'lumotlardan foydalanildi. Ushbu ma'lumotlar tadqiqot natijalarining ishonchliligini ta'minlash va ilmiy xulosalarni asoslash uchun muhim manba bo'lib xizmat qildi.

### Natijalar va muhokama

Tahlil natijalari shuni ko'rsatdiki, farmatsevtika korxonalarida sifatni boshqarish tizimi samaradorligi ishlab chiqarish jarayonlarining to'g'ri tashkil etilganligi va xalqaro standartlarga muvofiqligiga bog'liq. GMP (Good Manufacturing Practice) talablarining uzluksiz joriy etilishi mahsulot sifati barqarorligini ta'minlashda asosiy omil hisoblanadi.

### Tashkiliy tuzilma va sifat siyosati

Sifatni boshqarish tizimi korxonada aniq ishlab chiqilgan sifat siyosati, mas'uliyat va vakolatlarning taqsimlanishi hamda rahbariyat nazoratiga tayanadi. Sifat bo'limi mustaqil faoliyat yuritganda ichki nazorat samaradorligi yuqori bo'ladi.

### Hujjatlashtirish va standartlashtirish

Ishlab chiqarish jarayonlari to'liq hujjatlashtirilishi va SOP (Standard Operating Procedure)larga qat'iy rioya qilinishi mahsulot sifatini barqaror saqlash imkonini beradi. Hujjatlashtirish mahsulot harakatini (traceability) ta'minlaydi va xatolarni tezkor aniqlashga yordam beradi.

Texnologik jarayonlar va validatsiya

Validatsiya qilingan texnologik jarayonlarda mahsulot ko'rsatkichlari barqaror bo'lib, seriyalar o'rtasidagi farq minimal darajada saqlanadi. Bu esa ishlab chiqarishning ishonchliligini oshiradi.

Kadrlar malakasi va o'qitish tizimi

Xodimlarning muntazam o'qitilishi va malakasini oshirish ishlab chiqarishda xatolar sonini kamaytiradi. GMP talablariga muvofiq bilim va ko'nikmalarga ega mutaxassislar korxona samaradorligini oshiradi.

Nazorat va audit tizimi

Ichki audit va self-inspection mexanizmlari sifat tizimining uzluksiz takomillashishiga xizmat qiladi. Kamchiliklarni barvaqt aniqlash va CAPA (Corrective and Preventive Actions) choralari ishlab chiqish ishlab chiqarishdagi xavf-xatarlarni kamaytiradi.

Xalqaro talablar bilan uyg'unlik

Milliy sifat nazorati tizimi xalqaro talablar, xususan World Health Organization tavsiyalari bilan uyg'unlashtirilganda, korxonalar xalqaro bozorga chiqish va eksport salohiyatini oshirish imkoniyatiga ega bo'ladi.

Umumiy baholash

GMP standartlarini joriy etish ishlab chiqarishdagi risklarni kamaytiradi, mahsulot sifatini barqaror saqlaydi, iste'molchilar ishonchini oshiradi va farmatsevtika bozorida raqobatbardoshlikni kuchaytiradi.

Xulosa

Sifatni boshqarish tizimi farmatsevtika sohasining barqaror rivojlanishini ta'minlovchi asosiy omil hisoblanadi. GMP standartlari dorivor vositalarning sifati, xavfsizligi va samaradorligini ta'minlashda samarali mexanizm bo'lib xizmat qiladi. Farmatsevtika korxonalarida ushbu talablarni to'liq joriy etish, kadrlar malakasini oshirish hamda me'yoriy bazani takomillashtirish sohaning kelgusidagi rivoji uchun muhim vazifalar hisoblanadi.

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**TWO SCHOLARLY FIGURES IN OMONILLA MADAYEV'S  
AESTHETIC THINKING  
(BASED ON THE WORK "UNIVERSITETDA MUHRLANGAN  
LAHZALAR")**

**Abstract :** *This article presents Omonilla Madayev's views on two great literary scholars, Gulom Karimov and Subutoy Dolimov. It highlights the immense contribution of these two scholars to Uzbek literature, their selfless dedication to science, and the advice they gave to their students, presenting these as exemplary models for today's teachers.*

**Keywords:** *mudarris, textbook, article, school, lesson*

Omonilla Madayev was a teacher who deeply respected his own mentors and was himself respected as a teacher. From every lesson of his mentors he created for himself a school of moral example, and he never failed to mention these great figures in any of his works. His book *Universitetda muhrlangan lahzalar* ("Moments Sealed at the University") reflects the lives of scholars and their immortal lessons—lives capable of teaching humanity itself.

When speaking about the work of Gulom Karimov, Omonilla Madayev notes that the scholar lived by the motto "Writing an article is a pleasure, publishing it is a responsibility," and that this should become the guiding principle for every researcher. He especially emphasizes that for Gulom Karimov the lesson was sacred. While serving as department head, he demanded that every teacher and staff member treat this sacred duty with complete sincerity. Omonilla Madayev recalls: "Every domla whether professor, associate professor, senior lecturer or assistant must prepare specially for the lesson and regard the imparting of knowledge to students as an extremely serious task."<sup>13</sup>

Gulom Karimov was a devoted scholar who constantly observed lessons and worked to correct their shortcomings. In one class he praised how easily the phrase "ush savdo" in the following bayt was explained:

"Qozondek qaynab ush savdo pishirdim,  
Nizomiy bolidin halvo pishirdim."

Omonilla Madayev speaks with respect of this clear explanation. When the newspaper *O'zbekiston madaniyati* published a portrait of Muqimiy, Gulom Karimov responded with an article entitled "Why did my father become Muqimiy?"—evidence that the scholar knew not only Muqimiy's creative legacy but also his personality in depth. These observations are confirmed by Anvar

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<sup>13</sup> Madayev O. *Universitetda muhrlangan lahzalar*. – Toshkent: Sharq, 2019. – B.54.

Hojiahmedov's articles: "In searching for Muqimiy's works, G. Karimov worked like a treasure hunter. Realising that visiting the places where Muqimiy lived in Qo'qon and the dozens of villages he travelled to, finding the poet's relatives and contemporaries, recording their memories, and collecting the lyric, satirical and humorous works and travelogues preserved among the people was an urgent task, the scholar organised a special expedition of Tashkent State University to the Fergana Valley in 1954."<sup>14</sup> Indeed, Gulom Karimov's scholarly activity can serve as a school of example for many researchers.

In the book *Universitetda muhrlangan lahzalar* another great scholar Subutoy Dolimov is remembered with special respect. Omonilla Madayev describes him as "a mudarris who knew the school sector perfectly, from thread to needle." "From 1940 onwards Subutoy Dolimov actively participated in drafting curricula for secondary schools and in preparing literature textbooks and anthologies for all pedagogical institutes and technical colleges from grade V to grade X. In 1952 he produced *Adabiyot o'qitish metodikasi* ('Methodology of Teaching Literature'), and in 1955 a methodological guide for the grade-V *Vatan adabiyoti chrestomathy*."<sup>15</sup> Omonilla Madayev stresses that after creating the textbooks Dolimov organised scientific visits to all provinces and submitted the textbooks for review by ordinary teachers. This became a practical guide on how future textbooks should be compiled.

Omonilla Madayev particularly highlights that Subutoy Dolimov constantly sought solutions to such issues as reducing class sizes, limiting the number of classes a teacher had to teach, and creating favourable working conditions for teachers. He records several pieces of advice that this great scholar gave to schoolteachers:

1. "Even in an age when the use of technical aids has become habitual, the lesson is still taught by the teacher. The teacher is the sole central figure in the classroom. Technical aids cannot replace the class teacher. The teacher does not teach in order to use technical aids; rather, he or she uses technical aids in order to teach. This must never be forgotten.

2. Good teachers fall into three categories. The first have excellent knowledge, the second have excellent methodological experience, and the third possess both knowledge and methodological perfection. Strive to belong to the third category.

3. Never gossip about fellow teacher either in the classroom or outside it.

4. Never strike, curse, belittle or insult a student. Never let the words 'You will never become a human being' leave your lips. Only then will the student respect both your subject and you.

5. If some of our colleagues make a spelling mistake on the blackboard and a pupil corrects it, they say: 'I was testing you. You got it right.' This is wrong.

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<sup>14</sup> <https://ziyouz.uz/ilm-va-fan/adabiyot/anvar-hojiahmedov-ilmga-sadoqat-1989/>

<sup>15</sup> Dolimov U. *Ahli irfon*. – Toshkent: Akademnashr, 2015. – B.234.

Instead, admit your mistake to the pupil and acknowledge that even you sometimes err.

6. When leaving the classroom, do not leave any writing from the lesson on the blackboard. This would be disrespectful to the teacher who teaches the next lesson. I call on all my colleagues to respect one another.”<sup>16</sup>

These recommendations can indeed serve as a practical programme for today’s teachers. Throughout his 57-year teaching career Omonilla Madayev himself followed these instructions and stresses that the advice above remains extremely important for contemporary educators.

Subutoy Dolimov had his own distinctive way of interpreting ghazals. He would read, for example:

Sahar hovar shahi charh uzrakim, haylu hasham chekti,  
Shioyin ham bila ko‘xsor uzra oltin alam chekti.  
Qazo farroshi chekti subhning siymin supurgusin,  
Muzahhab parlarin andoqki, tovusi haram chekti.

Omonilla Madayev cites these lines together with Erkin Vohidov’s reminiscences. When Vohidov was a second-year student (during the cotton-harvest period), Subutoy Dolimov read these bayts at dawn and “explained the beautiful dawn landscape of nature as portrayed in Alisher Navoi’s golden style, clarified the use of the word ‘supurgi’ in the third line, and showed that every word in national poetry is precious.”<sup>17</sup> Omonilla Madayev also sincerely recounts the legends Subutoy Dolimov told about “Nasrullovi.” He concludes his memories of this devotee of science with the bayts of Fuzuli that Subutoy Dolimov often recited:

Gul g‘unchalig‘inda xor ilandir,  
Ochilsa, bir o‘zga yor ilandir.  
Aslinda tikan chekar azobin,  
Faslinda tabib olar gulobin.

In Universitetda muhrlangan lahzalar Omonilla Madayev records events connected with the National University of Uzbekistan—especially those related to education—as well as the lives and bright memories of many scholars, teachers and devotees of science who contributed to the prosperity of our homeland. He created the book as a tribute to these scholars. Every reader can enrich his or her own life by reflecting on the events in the scholars’ paths. The courage, love of teaching and strong enthusiasm these scholars displayed can guide the reader toward the path of noble knowledge. Moreover, the book contains the advice mentors gave their students, enabling Omonilla Madayev to educate today’s teacher as well.

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## **MAHALLIY DORIVOR O'SIMLIK XOMASHYOSI ASOSIDAGI O'T HAYDOVCHI YIG'MANING KIMYOVIY TARKIBINI O'RGANISH**

**Annotatsiya:** Ushbu maqolada mahalliy dorivor o'simliklar — qoqi (*Taraxacum officinale*) ildizi va na'matak (*Rosa canina*) mevasi asosida tayyorlangan o't haydovchi yig'maning kimyoviy tarkibi o'rganildi. Tadqiqot davomida flavonoidlar, fenol birikmalar, vitaminlar, organik kislotalar va mikroelementlar aniqlanib, ularning farmakologik xususiyatlari baholandi. Olingan natijalar ushbu yig'maning o't ajralishini rag'batlantiruvchi, antioksidant va umumiy sog'lomlashtiruvchi xususiyatlarini tasdiqladi.

**Kalit so'zlar:** qoqi ildizi, na'matak mevasi, dorivor o'simliklar, o't haydovchi yig'ma, flavonoidlar, vitamin C, fenol birikmalar, biologik faol moddalar

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## **A STUDY OF THE CHEMICAL COMPOSITION OF A CHOLAGOGUE HERBAL PREPARATION BASED ON LOCAL MEDICINAL PLANT MATERIALS**

**Abstract:** This article investigates the chemical composition of a cholagogue preparation made from local medicinal plants: dandelion root (*Taraxacum officinale*) and rosehip fruit (*Rosa canina*). The study identified flavonoids, phenolic compounds, vitamins, organic acids and trace elements, and assessed their pharmacological properties. The results confirmed the cholagogue, antioxidant and tonic properties of this mixture.

**Keywords:** dandelion root, rosehip fruit, medicinal plants, cholagogue mixture, flavonoids, vitamin C, phenolic compounds, bioactive substances

### **Kirish**

Mahalliy dorivor o'simliklardan tayyorlangan fitopreparatlar zamonaviy tibbiyotda tobora keng qo'llanilmoqda. Ularning tabiiy kelib chiqishi, biologik faol moddalarga boyligi va nisbatan kam nojo'ya ta'sirga ega ekanligi ularni sintetik dori vositalariga muqobil yoki qo'shimcha sifatida qo'llash imkonini beradi. Ayniqsa, jigar va o't yo'llari kasalliklarini davolashda o'simlik asosidagi preparatlar samarali natijalar ko'rsatib, hepatoprotektiv, o't haydovchi va detoksikatsion ta'sir namoyon etadi.

Xalq tabobatida keng qo'llaniladigan dorivor o'simliklardan biri — *Taraxacum officinale* (qoqi ildizi) hisoblanadi. Uning tarkibida achchiq glikozidlar,

inulin, flavonoidlar, fenolik birikmalar va mineral moddalar mavjud bo'lib, ular jigar faoliyatini rag'batlantiradi, o't ajralishini kuchaytiradi va siydik haydovchi xususiyatni namoyon etadi. Qoqi ildizi, shuningdek, organizmdan toksinlarni chiqarishda muhim rol o'ynaydi hamda ovqat hazm qilish jarayonlarini yaxshilaydi.

Yana bir muhim dorivor xomashyo — *Rosa canina* (na'matak mevasi) bo'lib, u yuqori miqdorda askorbin kislota (vitamin C), flavonoidlar, karotinoidlar va organik kislotalarni o'z ichiga oladi. Ushbu moddalar kuchli antioksidant ta'sir ko'rsatib, immun tizimini mustahkamlaydi, hujayralarni oksidlovchi stressdan himoya qiladi va umumiy metabolizmni yaxshilaydi. Na'matak mevasi, shuningdek, qon tomir devorlarini mustahkamlash va yallig'lanish jarayonlarini kamaytirishda ham muhim ahamiyatga ega.

Qoqi ildizi va na'matak mevasi birgalikda qo'llanilganda ularning farmakologik ta'siri o'zaro kuchayadi, ya'ni sinergik effekt yuzaga keladi. Bunday kombinatsiya nafaqat o't haydovchi va diuretik ta'sirni kuchaytiradi, balki jigarni himoya qilish, metabolik jarayonlarni tartibga solish va organizmning umumiy qarshilik kuchini oshirishga xizmat qiladi. Natijada kompleks terapevtik samaradorlikka erishiladi.

O't haydovchi yig'malarni ilmiy asosda tayyorlash, ularning optimal tarkibini aniqlash va kimyoviy tarkibini chuqur tahlil qilish bugungi kunda dolzarb masalalardan biri hisoblanadi. Bunda yig'ma tarkibidagi biologik faol moddalarning miqdoriy va sifat jihatdan aniqlanishi, ularning farmakologik ta'siri bilan o'zaro bog'liqligini o'rganish muhim ahamiyat kasb etadi.

Shu sababli, qoqi ildizi va na'matak mevasi asosida o't haydovchi yig'ma tayyorlash, uning kimyoviy tarkibini (flavonoidlar, fenolik birikmalar, vitaminlar va boshqa bioaktiv komponentlar) aniqlash hamda farmakologik xususiyatlarini baholash ilmiy va amaliy jihatdan katta ahamiyatga ega. Bunday tadqiqotlar natijasida samarali, xavfsiz va mahalliy xomashyoga asoslangan yangi fitopreparatlar yaratish imkoniyati yuzaga keladi.

### **Maqsad**

Mahalliy dorivor o'simliklar — qoqi ildizi va na'matak mevasi asosidagi o't haydovchi yig'maning kimyoviy tarkibini aniqlash va biologik faol moddalar tarkibini baholash.

### **Materiallar va tadqiqot usullari**

#### **Metodika**

Tadqiqot davomida o'simlik xomashyosi tarkibidagi biologik faol moddalarni aniqlash uchun zamonaviy kimyoviy va fizik-kimyoviy tahlil usullari qo'llanildi.

#### **Sifat**

Flavonoidlar va fenol birikmalar mavjudligini aniqlash uchun maxsus rang reaksiyalari bajarildi. Ushbu reaksiyalar natijasida rang o'zgarishlari kuzatilib, tegishli moddalarning mavjudligi tasdiqlandi.

#### **Spektrofotometrik**

Umumiy fenol va flavonoidlar miqdorini aniqlash uchun UV–Vis spektrofotometriya usuli qo'llanildi. Bu usul moddalarning ma'lum to'lqin

reaksiyalari:

tahlil:

uzunliklarida yutilish xususiyatiga asoslanadi va yuqori aniqlik hamda sezgirlikka ega.

**Titrimetrik usul:**  
Askorbin kislota (vitamin C) miqdorini aniqlash uchun oksidlanish-qaytarilish reaksiyasiga asoslangan titrimetrik usuldan foydalanildi. Ushbu usul farmatsevtik tahlilda keng qo'llaniladi va aniq natijalar beradi.

**Yupqa qatlamli xromatografiya (TLC):**  
Biologik faol moddalarni identifikatsiya qilish uchun TLC usuli qo'llanildi. Bu usul yordamida komponentlarning Rf qiymatlari aniqlanib, standart moddalar bilan solishtirish asosida ularning tabiati tasdiqlandi.

**Atom-absorbsiya spektroskopiyasi (AAS):**  
Mineral moddalar, jumladan kaliy (K), magniy (Mg) va temir (Fe) miqdorini aniqlash uchun atom-absorbsiya spektroskopiyasi usuli qo'llanildi. Ushbu usul yuqori sezgirlikka ega bo'lib, mikro miqdordagi elementlarni aniqlash imkonini beradi.

**Ekstraksiya usuli**  
Tadqiqotda biologik faol moddalarni ajratib olish uchun suvli va spirtli (70% etanol) ekstraktlar tayyorlandi. Ekstraksiya jarayoni maceratlash usuli yordamida amalga oshirildi. Bunda maydalangan xomashyo erituvchi bilan ma'lum nisbatda aralashtirilib, 72 soat davomida yopiq idishda, xona haroratida saqlandi. Jarayon davomida vaqti-vaqti bilan aralashtirib turildi, bu esa moddalarning erituvchiga maksimal o'tishini ta'minladi. Ekstraksiya yakunida eritma filtrlanib, tahlil uchun tayyor holga keltirildi.

**Tahlil mezonlari**  
**Flavonoidlar:**  
Flavonoidlarni aniqlashda  $AlCl_3$  (alyuminiy xlorid) bilan kompleks hosil qilish reaksiyasidan foydalanildi. Natijada sariq rangli kompleks hosil bo'lishi flavonoidlar mavjudligini ko'rsatadi. Shuningdek, kvartsiz (yoki rang reaksiyasi asosidagi) usullar yordamida ham ularning mavjudligi tasdiqlandi.

**Fenol birikmalar:**  
Umumiy fenol moddalar miqdori Folin–Ciocalteu reagent yordamida aniqlanib, natijalar gall kislotasi ekvivalenti sifatida baholandi. Ushbu usul fenolik birikmalarning qaytaruvchi xususiyatiga asoslangan.

**Vitamin C (askorbin kislota):**  
Askorbin kislota miqdori 2,6-diklorfenolindofenol yordamida titrimetrik usulda aniqlandi. Bu usul askorbin kislotaning qaytaruvchi xususiyatiga asoslanib, indikator rangining o'zgarishi orqali yakuniy nuqta belgilanadi.

### **Natijalar va muhokama**

#### **1. Flavonoidlar**

Yig'mada flavonoidlar miqdori qoqi ildizi ekstraktida 2,1%, na'matak mevasi ekstraktida 1,8% ekanligi aniqlangan. Flavonoidlar antioksidant ta'sir ko'rsatib, o't ajralishini rag'batlantiradi.

#### **2. Fenol birikmalar**

Fenol miqdori qoqi ildizida 3,4%, na'matak mevasi ekstraktida 4,1% aniqlangan. Fenol birikmalar mikroblarga qarshi va yallig'lanishga qarshi xususiyatga ega.

### 3. Vitamin C (askorbin kislota)

Na'matak mevasi ekstraktida vitamin C 300 mg/100 g, qoqi ildizida esa 45 mg/100 g aniqlangan. Vitamin C immun tizimini mustahkamlash va antioksidant ta'sir ko'rsatadi.

### 4. Organik kislotalar

Yig'mada malik, limon va sitrik kislotalar mavjudligi aniqlangan. Bu moddalar hazm jarayonini yaxshilaydi va o't ajralishini rag'batlantiradi.

### 5. Inulin (qoqi ildizi)

Qoqi ildizida 12% inulin aniqlangan, bu ichak mikroflorasini yaxshilash va metabolizmni tartibga solishda muhim hisoblanadi.

### 6. Mineral moddalar

Yig'mada K — 120 mg/100 g, Mg — 45 mg/100 g, Fe — 3,2 mg/100 g aniqlangan. Bu elementlar umumiy metabolizmni qo'llab-quvvatlaydi.

### **Muhokama:**

Olingan natijalar shuni ko'rsatadiki, qoqi ildizi va na'matak mevasi kombinatsiyasi sinergik ta'sir ko'rsatadi. Flavonoidlar va fenol birikmalar yig'ma antioksidant va yallig'lanishga qarshi xususiyatini oshiradi. Vitamin C miqdori immun tizimini mustahkamlaydi. Shu bilan birga, o't haydovchi ta'sir ham sezilarli darajada kuchayadi.

### **Xulosa**

Qoqi ildizi va na'matak mevasi asosidagi o't haydovchi yig'ma boy kimyoviy tarkibga ega. Yig'mada flavonoidlar, fenol birikmalar, vitaminlar va mineral moddalar mavjudligi aniqlangan. Ushbu biologik faol moddalar yig'maning o't haydovchi, antioksidant va yallig'lanishga qarshi xususiyatlarini ta'minlaydi.

Olingan natijalar mazkur yig'mani fitopreparat sifatida qo'llashga imkon beradi.

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## **TIBBIY BIOFIZIKA FANIDA ELEKTROFIZIOLOGIYA VA GEMODINAMIKANI O‘ZLASHTIRISHDA VIRTUAL LABORATORIYALAR HAMDA SIMULYATSION TA’LIMNING O‘RNI**

**Annotatsiya:** Tadqiqot Farg‘ona jamoat salomatligi tibbiyot institutida tibbiy biofizika fanida virtual laboratoriyalar (VL) va simulyatsion ta’lim (ST) samaradorligini baholaydi. 56 nafar talaba qatnashgan kvazieksperimental tadqiqotda asosiy guruhda OSKI natijalari 18% yuqori ( $p < 0,01$ ) bo‘ldi. Natijada VL va ST elektrofiziologiya hamda gemodinamika bilimlarini o‘zlashtirishni sezilarli yaxshilaydi.

**Kalit so‘zlar:** virtual laboratoriya, simulyatsion ta’lim, elektrofiziologiya, gemodinamika, tibbiy biofizika, OSKI

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## **THE ROLE OF VIRTUAL LABORATORIES AND SIMULATION EDUCATION IN THE MASTERY OF ELECTROPHYSIOLOGY AND HEMODYNAMICS IN MEDICAL BIOPHYSICS**

**Abstract:** The study evaluates the effectiveness of virtual laboratories (VL) and simulation training (ST) in medical biophysics at the Fergana Medical Institute of Public Health. In a quasi-experimental study involving 56 students, the OSKI results in the main group were 18% higher ( $p < 0.01$ ). As a result, VL and ST significantly improve the assimilation of knowledge in electrophysiology and hemodynamics.

**Keywords:** virtual laboratory, simulation training, electrophysiology, hemodynamics, medical biophysics, OSKI

**Kirish.** Tibbiy biofizika sog‘liqni saqlash sohasidagi ta’limning fundamental yo‘nalishi bo‘lib, u talabalardan fiziologik jarayonlar zahiridagi murakkab fizik hodisalarni anglashni talab etadi. Elektrofiziologiya va gemodinamika ayniqsa qiyin sohalar sanaladi, chunki ular fizika, matematika va biologiyani klinik ahamiyatga ega tizimlarga integratsiya qilishni taqozo etadi. McGaghie W.C. va boshqalar [1] simulyatsiyaga asoslangan tibbiy ta’lim an’anaviy klinik o‘qitishning o‘zigagina qaraganda yuqoriroq natijalar berishini ko‘rsatgan. Shuningdek, Cook D.A. va boshqalar [2] tizimli tahlil orqali texnologiya yordamida takomillashtirilgan

simulyatsiya sog'liqni saqlashning barcha kasbiy yo'nalishlarida o'rganish natijalarining yaxshilanishi bilan uzviy bog'liqligini tasdiqlagan.

Ma'ruzalar va darslikka asoslangan mashg'ulotlarni o'z ichiga olgan an'anaviy pedagogik yondashuvlar harakat potentsiali, yurak o'tkazuvchanlik yo'llari va qon oqimining gidrodinamikasini tushunish uchun zarur bo'lgan fazoviy-vaqt tafakkurini rivojlantirishda ko'pincha yetarli bo'lmaydi. Ruiz J.G. va boshqalar [3] elektron ta'lim texnologiyalari tibbiy bilimlarni o'zlashtirish va saqlab qolish usullarini tubdan o'zgartirishini ta'kidlagan. De Jong T. va boshqalar [4] esa fan va muhandislik sohalarida konseptual bilimlarni o'rganish uchun virtual laboratoriyalar jismoniy laboratoriyalar kabi samarali bo'lishi mumkinligini ko'rsatib bergan.

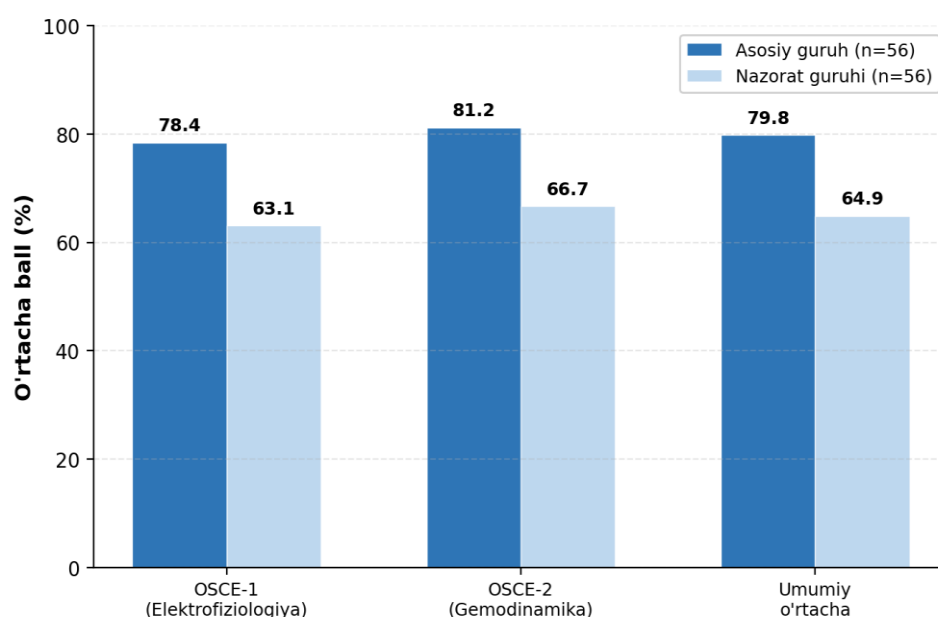
**Materiallar va uslublar:** Tadqiqot 2023–2024-o'quv yilida Farg'ona jamoat salomatligi tibbiyot institutida o'tkazildi. Unda kvazieksperimental, randomizatsiyalanmagan nazoratli tadqiqot dizaynidan foydalanildi. "Tibbiy biofizika" fanidan tahsil olayotgan jami 112 nafar tibbiyot yo'nalishi talabasi ikki guruhga ajratildi: asosiy guruh ( $n=56$ ) va nazorat guruhi ( $n=56$ ). O'qitish uslublarining o'zaro ta'sirining oldini olish maqsadida talabalar turli akademik kurslardan tanlab olindi.

**Natijalar.** Tadqiqot natijalari OSKI (obyektiv strukturaviy klinik imtihon)ning ikkala bosqichida ham asosiy va nazorat guruhlarida o'rtasida statistik ahamiyatga ega farqlar mavjudligini ko'rsatdi. Avvalroq ta'kidlaganidek, immersiv texnologiyalar jalb etuvchanlikni oshiradi va bu ushbu tadqiqotda kuzatilgan yuqori samaradorlikka mos keladi. OSKI-1 (elektrofiziologiya) bo'yicha asosiy guruh o'rtacha  $78,4 \pm 7,2\%$  ball to'plagan bo'lsa, nazorat guruhida bu ko'rsatkich  $63,1 \pm 9,8\%$  ni tashkil etdi ( $t=10,12$ ,  $p<0,001$ , Koen  $d=1,78$ ). OSKI-2 (gemodinamika) bo'yicha asosiy guruh  $81,2 \pm 6,5\%$  ball, nazorat guruhi esa  $66,7 \pm 10,1\%$  ball to'pladi ( $t=9,74$ ,  $p<0,001$ , Koen  $d=1,71$ ).

Umuman olganda, asosiy guruhning ikkala imtihon bo'yicha o'rtacha ko'rsatkichi nazorat guruhinikidan 18% ga yuqori bo'ldi (79,8% va 64,9%). Bu natijalar Balamuralithara B. va Woods P.C.ning muhandislik ta'limiga virtual laboratoriyalarni integratsiya qilish orqali o'zlashtirishda sezilarli yutuqlarga erishilgani haqidagi xulosalariga mos keladi. 1-jadvalda batafsil qiyosiy natijalar keltirilgan.

**1-jadval. Guruhlar o‘rtasidagi OSCE ko‘rsatkichlarining qiyosiy tahlili**

| Baholash mezon                     | Asosiy guruh<br>(O‘rt. $\pm$ SO‘) | Nazorat guruhi<br>(O‘rt. $\pm$ SO‘) | t-mezon | p-qiyamat | Koen d |
|------------------------------------|-----------------------------------|-------------------------------------|---------|-----------|--------|
| OSKI-1<br>(Elektrofiziologiya)     | 78,4 $\pm$ 7,2                    | 63,1 $\pm$ 9,8                      | 10,12   | <0,001    | 1,78   |
| OSKI-2<br>(Gemodinamika)           | 81,2 $\pm$ 6,5                    | 66,7 $\pm$ 10,1                     | 9,74    | <0,001    | 1,71   |
| <b>Umumiy o‘rtacha ko‘rsatkich</b> | 79,8 $\pm$ 6,4                    | 64,9 $\pm$ 9,5                      | 10,42   | <0,001    | 1,83   |



**rasm-1.** Asosiy va nazorat guruhlari o‘rtacha ballari

**Muhokama.** Ushbu tadqiqot natijalari virtual laboratoriyalar va simulyatsiyaga asoslangan ta’lim talabalarining elektrofiziologiya va gemodinamika bo‘yicha tushunchalarini sezilarli darajada oshirishiga oid ishonchli dalillarni taqdim etadi. Asosiy guruhda kuzatilgan o‘zlashtirishning 18 foizga yaxshilanishi Cook D.A. va boshqalar [2] tomonidan taqdim etilgan meta-tahlil dalillariga mos keladi. Ular sog‘liqni saqlash sohasining bir nechta yo‘nalishlari bo‘yicha texnologiya yordamida takomillashtirilgan simulyatsiyaning o‘rtachadan kattagacha bo‘lgan ta’sir o‘lchamlarini qayd etgan.

Gemodinamika (OSCE-2) bo‘yicha qayd etilgan yuqori natijalarni virtual simulyatorlarning dinamik vizualizatsiya imkoniyatlari bilan izohlash mumkin. Bu imkoniyatlar talabalarga statik diagrammalar orqali tushuntirish qiyin bo‘lgan hodisalar – qon oqimi, bosim gradiyentlari va qon tomir qarshiligidagi o‘zgarishlarni real vaqt rejimida kuzatish imkonini beradi. Shunga o‘xshash tarzda, Tsihouridis Ch. va boshqalar [6] ham virtual tajribalar dinamik fizik jarayonlar

haqidagi konseptual tushunchani an'anaviy usullarga qaraganda samaraliroq kuchaytirishini aniqlagan.

**Xulosa.** Virtual laboratoriyalar va simulyatsiyaga asoslangan ta'lim tibbiyot talabalarining elektrofiziologiya hamda gemodinamika bo'yicha bilimlarini sezilarli darajada yaxshilaydi, bu tadqiqot guruhida OBYA natijalari 18 foizga yuqori ekanligida namoyon bo'ldi. Ushbu natijalar VL va SATni tibbiy biofizika o'quv dasturlariga tizimli ravishda joriy etishni tasdiqlaydi.

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**talabasi**

## **GENDER OMILINING XUSHMUOMALALIK STRATEGIYALARIDA NAMOYON BO'LISHI**

**Annotatsiya:** Ushbu maqola gender omilining xushmuomalalik strategiyalarida namoyon bo'lishini o'rganishga bag'ishlangan. Tadqiqot nutq jarayonini ijtimoiy kontekst bilan bog'liq holda tahlil qiladi, gender kategoriyasining til va kommunikativ xulq-atvordagi o'rni va ahamiyatini yoritadi. Shuningdek, maqolada Penelope Brown va Stephen C. Levinsonning xushmuomalalik nazariyasi, ijobiy va salbiy xushmuomalalik strategiyalari, ularning lingvistik ifoda vositalari va genderga bog'liq farqlari muhokama qilinadi. Tadqiqot natijalari o'zbek jamiyatidagi an'anaviy va zamonaviy gender rollari, shuningdek, urbanizatsiya va globalizatsiya jarayonlari nutqiy xulq-atvorga ta'sirini ko'rsatadi.

**Kalit so'zlar:** Xushmuomalalik strategiyalari, gender omili, nutq madaniyati, pragmlingvistika, ijtimoiy kontekst, til, jamiyat, ijobiy, salbiy xushmuomalalik, kommunikativ strategiyalar.

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## **GENDER FACTOR IN POLITENESS STRATEGIES**

**Abstract:** This article examines the manifestation of the gender factor in politeness strategies. The study analyzes the speech process within a social context and highlights the role and significance of gender in language and communicative behavior. The article also discusses Penelope Brown and Stephen C. Levinson's positive and negative politeness strategies, their linguistic expression tools, and gender-related differences. The findings demonstrate how traditional and modern gender roles, as well as urbanization and globalization processes, influence speech behavior in Uzbek society.

**Keywords:** Politeness strategies, gender factor, speech culture, pragmlinguistics, social context, language, society, positive, negative politeness, communicative strategies.

**Kirish:** Zamonaviy tilshunoslikda nutq jarayonini faqat grammatik va leksik birliklar orqali emas, balki ijtimoiy omillar bilan bog‘liq holda o‘rganish muhim ahamiyat kasb etadi. Shunday omillardan biri — gender omilidir. Gender insonning biologik jinsidan ko‘ra, uning jamiyatdagi ijtimoiy-madaniy roli, xulq-atvori va kommunikativ xususiyatlarini anglatadi. Xususan, xushmuomalalik strategiyalarida gender omilining namoyon bo‘lishi nutq madaniyati va muloqot psixologiyasini tushinishda muhim o‘rin tutadi. XX–XXI asr tilshunosligida antropotsentrik paradigma ustuvor yo‘nalish sifatida shakllanib, til hodisalarini inson omili bilan uzviy bog‘liq holda talqin qilish tendensiyasi kuchaydi. Shu nuqtai nazardan, nutq jarayonini ijtimoiy stratifikatsiya, madaniy qadriyatlar va kommunikativ rollar bilan aloqador holda o‘rganish sotsiolingvistika hamda pragmalingvistikaning dolzarb masalalaridan biriga aylandi. Ayniqsa, gender omili nutqiy xulq-atvor va kommunikativ strategiyalarni belgilovchi muhim ijtimoiy parametr sifatida e‘tirof etilmoqda. Gender kategoriyasi biologik jins tushunchasidan farqli ravishda, jamiyat tomonidan konstruksiya qilingan ijtimoiy-madaniy rollar, stereotiplar va me‘yoriy kutilmalar tizimini anglatadi. Mazkur kategoriya shaxsning nutqiy identifikatsiyasi, diskursiv pozitsiyasi hamda kommunikativ kompetensiyasida o‘z aksini topadi. Genderga oid ijtimoiy tasavvurlar muloqot jarayonida qo‘llaniladigan leksik-semantik birliklar, sintaktik konstruktsiyalar, pragmatik markerlar va intonatsion vositalarning tanlanishiga bevosita ta‘sir ko‘rsatadi. Xushmuomalalik strategiyalari esa kommunikativ aktning muhim pragmatik komponenti bo‘lib, ular orqali suhbatdoshlarning “ijtimoiy yuzi”ni (face) saqlash, ijtimoiy masofani belgilash va o‘zaro hurmatni ifodalash amalga oshiriladi. Xususan, Penelope Brown va Stephen C. Levinson tomonidan ishlab chiqilgan xushmuomalalik nazariyasida nutqiy harakatlar ijtimoiy xavf darajasiga ko‘ra tahlil qilinadi va strategik tanlov kommunikativ vaziyat parametrlari bilan izohlanadi. Gender esa ana shu parametrlar tizimida muhim determinant sifatida namoyon bo‘ladi. Shu bois gender omilining xushmuomalalik strategiyalarida namoyon bo‘lishini o‘rganish nutqiy xulq-atvorning variativligini aniqlash, diskursiv amaliyotlarning ijtimoiy shartlanganligini asoslash hamda til va jamiyat o‘rtasidagi o‘zaro ta‘sir mexanizmlarini yoritishda muhim ilmiy ahamiyat kasb etadi. Mazkur tadqiqot yo‘nalishi, ayniqsa, o‘zbek tilshunosligida gender lingvistikasi va pragmatik tahlil kesishmasida olib borilayotgan izlanishlar uchun dolzarb hisoblanadi.

Xushmuomalalik nazariyasining nazariy asoslari

Xushmuomalalik strategiyalari tilshunoslikda asosan pragmatika doirasida o‘rganiladi. Bu borada Penelope Brown va Stephen C. Levinson tomonidan ishlab chiqilgan xushmuomalalik nazariyasi alohida ahamiyatga ega. Ular muloqot jarayonida “yuz” (face) tushunchasini asos qilib olib, insonlar o‘zaro muloqotda bir-birining ijtimoiy obro‘sini saqlashga intilishini ta’kidlaydilar.

Ushbu nazariyaga ko‘ra, xushmuomalalik ikki asosiy turga bo‘linadi:

- **Ijobiy xushmuomalalik** – suhbatdoshga yaqinlik, do‘stona munosabat va birdamlikni ifodalash;

- **Salbiy xushmuomalalik** – suhbatdoshning shaxsiy hududi va mustaqilligini hurmat qilish.



Gender omili aynan shu strategiyalarning tanlanishi va qo'llanish chastotasiga ta'sir ko'rsatadi.

### **Gender va nutq xususiyatlari**

Til va gender munosabati masalasi ko'plab olimlar tomonidan tadqiq etilgan. Xususan, Robin Lakoff ayollar nutqiga xos xususiyatlar haqida fikr yuritib, ayollar ko'proq yumshatuvchi birliklar, ehtiyotkor ifodalar va xushmuomalalik vositalaridan foydalanishini ta'kidlaydi.

Tadqiqotlar shuni ko'rsatadiki:

- Ayollar ko'proq ijobiy xushmuomalalik strategiyalaridan foydalanadi;
- Erkaklar esa muloqotda ko'proq to'g'ridan to'g'ri va instrumental uslubni tanlaydi;

- Ayollar suhbatdoshning hissiy holatiga ko'proq e'tibor qaratadi;
- Erkaklar muloqotda maqom va ierarxiyani hisobga olishga moyil bo'ladi.

Biroq bu farqlar mutlaq emas, balki ijtimoiy-madaniy sharoitga bog'liq holda shakllanadi.

### **O'zbek jamiyatida gender va xushmuomalalik**

O'zbek jamiyatida an'anaviy qadriyatlar gender rollarining shakllanishida muhim o'rin tutadi. Ayollar odatda muloyim, andishali va hurmat ifodalovchi nutq uslubiga ega bo'lishi kutiladi. Masalan, iltimos shakllarini ko'proq qo'llash, kinoyali yoki buyruq ohangidan qochish shular jumlasidandir. O'tkir Hoshimovning "Ikki eshik orasi" romanidagi Qora ammaning nutqidagi so'zlar:

*-Voy, amming aylandin! Voy, amming o'rgilsin sendan! - U pildirab kelib meni bag'riga bosdi. Dimog'imga qatiq hidi urildi, yuzimdan o'payotganda oppoq sochining uchiga osib olgan so'lkavoy ch'lpilari bir-biriga urilib jiringlab ketdi [9].*

Erkaklar nutqida esa qat'iylik, aniq buyruq shakllari va ijtimoiy mavqeni ko'rsatuvchi birliklar ko'proq uchraydi. Biroq zamonaviy urbanizatsiya va globalizatsiya jarayonlari bu farqlarni tobora yumshatib bormoqda.

"Ikki eshik orasi" romanidagi Muzaffar va Safar aka o'rtasidagi o'zaro muloqot:

Safar aka, axir shu uydayam siz bilan menga o'xshagan odamlar...

*-E, bor-e! - u shiddat bilan burildi. - Har kuni o'n martadan qulog'ingni qoqib qo'lingga beradigan xotining bo'lmasa, yo'lingga termulib turgan bolalaring bo'lmasa, gapni kim qo'yib senga!*

*-Hoy xuvori, Ikrom aka lapanglab kelayotgan o'rtog'ining ketidan yugurdi [9].*

### **Xushmuomalalik strategiyalarining genderga bog'liq lingvistik vositalari**

Gender omilining xushmuomalalik strategiyalarida namoyon bo'lishi quyidagi lingvistik vositalar orqali kuzatiladi:

1. **Modal so'zlar va yumshatuvchi birliklar** (balki, shekilli, iltimos, agar mumkin bo'lsa);

2. **So'roq shaklidagi iltimoslar** (Yordam bera olasizmi?);

3. **Kichraytirish qo'shimchalari** (-cha, -gina);

#### 4. Murojaat shakllari (opa, aka, ustoz);

#### 5. Intonatsion yumshoqlik va pauzalar.

Ayollar nutqida bu vositalar nisbatan ko'proq uchrashi kuzatiladi. Erkaklar esa ko'pincha qisqa, aniq va to'g'ridan-to'g'ri ifodalarni tanlaydi.

#### Zamonaviy tendensiyalar

Hozirgi davrda genderga oid stereotiplar asta-sekin o'zgarib bormoqda. Ijtimoiy tenglik tamoyillari kuchaygani sari erkak va ayol nutqi o'rtasidagi tafovut kamaymoqda. Ayniqsa, professional muhitda xushmuomalalik strategiyalari ko'proq vaziyat va maqomga bog'liq holda qo'llanilmoqda.

Shu nuqtai nazardan, gender omili xushmuomalalik strategiyalarining yagona belgilovchi omili emas, balki yosh, maqom, madaniyat va kontekst bilan uzviy bog'liq ijtimoiy hodisadir.

**Xulosa.** Gender omilining xushmuomalalik strategiyalarida namoyon bo'lishi til va jamiyat o'rtasidagi murakkab munosabatlarni aks ettiradi. Ayollar nutqida ijobiy xushmuomalalik va yumshoqlik ustun bo'lsa, erkaklar nutqida mustaqillik va to'g'ridan-to'g'rilik kuchliroq namoyon bo'ladi. Biroq bu farqlar qat'iy emas va ijtimoiy-madaniy sharoitga bog'liq holda o'zgaradi. Tadqiqot natijalari shuni ko'rsatadiki, gender omili xushmuomalalik strategiyalarining tanlanishi va realizatsiyasida muhim ijtimoiy-pragmatik determinant sifatida namoyon bo'ladi. Kommunikativ jarayonda qo'llaniladigan ijobiy va salbiy xushmuomalalik strategiyalari, ularning lingvistik ifoda vositalari hamda diskursiv realizatsiyasi ko'p jihatdan jamiyatda shakllangan gender stereotiplari va rollari bilan shartlangan. Aniqlanishicha, ayollar nutqida ko'proq ijobiy xushmuomalilik strategiyalariga xos bo'lgan birdamlikni ifodalovchi, emotsional-ekspressiv va yumshatuvchi pragmatik markerlar ustunlik qiladi. Erkaklar nutqida esa salbiy xushmuomalalik yoki bevosita nutqiy aktlarga moyillik, kommunikativ masofani saqlash va maqomni ta'kidlashga xizmat qiluvchi vositalar nisbatan faolroq qo'llanadi. Biroq mazkur farqlar absolyut xarakterga ega emasligi, balki ijtimoiy maqom, yosh, kasbiy muhit, madaniy kontekst kabi omillar bilan kompleks aloqada shakllanishi qayd etildi. Shuningdek, zamonaviy jamiyatda gender rollarining transformatsiyasi nutqiy xulq-atvorda ham muayyan o'zgarishlarni yuzaga keltirayotganligi kuzatiladi. Bu holat xushmuomalalik strategiyalarining qat'iy genderga bog'langan modelini emas, balki vaziyatga moslashuvchan, diskursiv jihatdan dinamik tizimini ko'rsatadi. Umuman olganda, gender omilining xushmuomalalik strategiyalarida namoyon bo'lishini o'rganish nutqiy faoliyatning ijtimoiy tabiatini chuqurroq anglash, kommunikativ kompetensiyaning genderga xos xususiyatlarini aniqlash hamda til va jamiyat o'rtasidagi o'zaro ta'sir mexanizmlarini ilmiy asosda talqin etishda muhim nazariy va amaliy ahamiyat kasb etadi. Mazkur yo'nalishdagi izlanishlarni empirik materiallar asosida kengaytirish kelgusidagi tadqiqotlar uchun istiqbolli vazifalardan biri hisoblanadi.

#### Foydalanilgan adabiyotlar

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## HYGIENIC MONITORING AND HEALTH SCREENING SYSTEM FOR MUNICIPAL WORKERS

**Abstract: Background:** Municipal workers face multiple occupational hazards requiring systematic health surveillance. Current screening approaches in Central Asia remain underdeveloped.

**Objective:** To develop a comprehensive monitoring and screening system for municipal workers in hot climate conditions.

**Methods:** Cross-sectional study of 150 municipal workers in Bukhara (2023-2024). Environmental monitoring assessed air quality, noise, vibration, and microclimate. Health screening included spirometry, audiometry, musculoskeletal examination, and inflammatory biomarkers.

**Results:** Environmental violations detected: PM<sub>10</sub> exceeded guidelines 2.1-fold, noise 92 dB (limit: 85 dB), summer temperatures 41-44°C. Health screening revealed chronic bronchitis (62%), hearing impairment (38%), musculoskeletal disorders (51%), heat exhaustion (29%). Inflammatory markers (CRP, IL-6) elevated in 45%. Proposed protocol includes quarterly environmental checks, biannual health assessments, and risk stratification.

**Conclusion:** Systematic monitoring enables early disease detection. Protocol implementation may reduce morbidity 35-40%.

**Keywords:** occupational surveillance, environmental monitoring, municipal workers, screening protocol, heat stress.

## OBODONLASHTIRISH XODIMLARIDA GIGIYENIK MONITORING VA SOG'LIQ SKRINING TIZIMI

**Annotatsiya: Dolzarbligi:** Obodonlashtirish xodimlari ko'plab kasbiy xavflarga duchor bo'lib, tizimli nazoratni talab qiladi.

**Maqsad:** Issiq iqlim sharoitida xodimlar uchun monitoring va skrining tizimini ishlab chiqish.

**Usullar:** Buxoroda 150 nafar xodimni tadqiq qilish (2023-2024). Atrof-muhit monitoringi havo sifati, shovqin, vibratsiya, mikroiqlimni baholadi. Skrining

*spirometriya, audiometriya, mushak-skelet tekshiruvi, yallig'lanish biomarkerlarini o'z ichiga oldi.*

**Natijalar:** Buzilishlar aniqlandi: PM10 me'yordan 2.1 marta oshgan, shovqin 92 dB (chegara: 85 dB), yoz harorati 41-44°C. Skrining surunkali bronxit (62%), eshitish buzilishi (38%), mushak-skelet kasalliklari (51%), issiqlik charchashi (29%) ni aniqladi. Yallig'lanish markerlari (CRP, IL-6) 45% da yuqori. Choraklik ekologik nazorat, yarim yillik tibbiy ko'rik va xavf stratifikatsiyasi bilan protokol taklif etildi.

**Xulosa:** Tizimli monitoring kasalliklarni erta aniqlashni ta'minlaydi. Protokolni joriy etish kasallanishni 35-40% ga kamaytirishi mumkin.

**Kalit so'zlar:** kasbiy nazorat, atrof-muhit monitoringi, obodonlashtirish xodimlari, skrining protokoli, issiqlik stressi.

## **Kirish**

Obodonlashtirish xizmati zamonaviy shahar infratuzilmasining muhim tarkibiy qismi bo'lib, aholining turmush sifati va sanitariya-ekologik xavfsizligini ta'minlaydi. Biroq, bu sohada ishlovchi xodimlarning kasbiy sog'ligi masalasi yetarlicha e'tibordan chetda qolmoqda.

Hozirgi kunda obodonlashtirish xodimlari uchun tizimli gigiyenik monitoring va sog'lik skrining dasturlari ko'pchilik rivojlanayotgan mamlakatlarda, shu jumladan Markaziy Osiyo mintaqasida ham to'liq joriy etilmagan. Mavjud tibbiy ko'riklar ko'pincha yillik oddiy tekshiruvlar bilan cheklanib, atrof-muhit monitoringi va xavf darajasiga qarab moslashtirilgan skrining protokollari mavjud emas.

Zamonaviy gigiyenik monitoring texnologiyalari - portativ havo sifati sensorlari, shovqin dozimetrlari, kiyiladigan fiziologik monitorlar - real vaqt rejimida ta'sir qilishni baholash imkonini beradi. Xuddi shunday, biomarkerlar tadqiqoti subklinik organ disfunktsiyasining sezgir ko'rsatkichlarini aniqladi, bu esa klinik kasallik namoyon bo'lishidan oldin salbiy sog'lik ta'sirini aniqlash imkonini beradi.

**Tadqiqotning maqsadi:** Issiq, quruq iqlim sharoitida obodonlashtirish xodimlari uchun kompleks gigiyenik monitoring va sog'lik skrining tizimini ishlab chiqish va tekshirish.

## **Material va metodlar**

### **Tadqiqot dizayni**

Kross-sektsion (ko'ndalang kesim) kuzatuv tadqiqoti 2023 yil mart oyidan 2024 yil fevral oyigacha Buxoro shahrida o'tkazildi. Shaharning kontinental iqlimi issiq, quruq yoz (iyun-avgust, o'rtacha maksimum 41°C) va sovuq qish (dekabr-fevral, o'rtacha minimum -5°C) bilan tavsiflanadi.

### **Ishtirokchilar**

**Tanlov:** Buxoro shahar obodonlashtirish korxonasining barcha xodimlari.

### **Kirish mezonlari:**

- Ish staji  $\geq 6$  oy
- Yosh 18-65 yil

- Hozirgi ish faoliyati

- Ko'ngilli rozilik

**Chiqarish mezonlari:**

- Faqat ofis xodimlari

- Mavsumiy ishchilar (<6 oy)

- Homiladorlik

**Yakuniy tanlov:** 150 nafar xodim (ishtirok darajasi: 88.2%)

**Jadval 1. Ishtirokchilarning demografik xususiyatlari**

| Xususiyat                  | n (%) yoki O'rtacha $\pm$ SD |
|----------------------------|------------------------------|
| Yosh (yil)                 | 38.4 $\pm$ 9.8               |
| Erkaklar                   | 127 (84.7%)                  |
| Ish staji (yil)            | 8.2 $\pm$ 6.1                |
| <b>Kasbiy kategoriya:</b>  |                              |
| Ko'cha tozalash ishchilari | 52 (34.7%)                   |
| Bog'bonlar                 | 48 (32.0%)                   |
| Yo'l ta'mirlash ishchilari | 32 (21.3%)                   |
| Texnika operatorlari       | 18 (12.0%)                   |
| <b>Ish grafigi:</b>        |                              |
| Faqat kunduzgi smena       | 98 (65.3%)                   |
| Smenali grafik             | 52 (34.7%)                   |

**Atrof-muhit monitoringi****Havo sifati baholash:**

- Zarrachalar (PM10, PM2.5) - lazer diffraktsiya usuli

- Gazlar (CO, NO<sub>2</sub>, SO<sub>2</sub>) - portativ analizatorlar

- O'lchash davomiyligi: har bir nuqtada 8 soat

- Takroriylik: oyiga 2 marta, 12 oy davomida

**Shovqin va vibratsiya:**

- Shovqin dozimetriya (Октава-110А)

- Vibrometriya (BIIIB-003-M2)

- Shaxsiy dozimetrlar 8 soatlik ish davomida

**Mikroiqlim:**

- Harorat, namlik, shamol tezligi

- Portativ meteorologik stansiya

- Har 2 soatda o'lchash (06:00-18:00)

**Sog'lik skrining protokoli****Klinik tekshiruv:**

- To'liq tibbiy anamnez

- Jismoniy ko'rik (terapevt)

- Antropometriya (bo'y, vazn, BMI)

**Instrumental diagnostika:**

*Spirometriya (o'pka funktsiyasi):*

- FVC (majburiy vital sig'im)



- FEV1 (1 soniyada majburiy ekspirasiya hajmi)
- FEV1/FVC nisbati
- Standart: ATS/ERS 2019

#### *Audiometriya (eshitish):*

- Sof ton audiometriya (250-8000 Hz)
- Eshitish yo'qotish darajasi (dB)
- Standart: ISO 8253-1

#### *Mushak-skelet tizimi:*

- Nordic muskuloskelet so'rovnoma
- Harakat amplitudasini o'lchash
- Og'riq darajasi (VAS shkala)

#### **Laborator tahlillar:**

- Umumiy qon tahlili
- Yallig'lanish biomarkerlari:
  - CRP (C-reaktiv oqsil)
  - IL-6 (Interleukin-6)
  - IL-8 (Interleukin-8)
- Oksidativ stress markerlari:
  - Malondialdegid (MDA)
  - Superoksid dismutaza (SOD)

#### **Biomarkerlar tahlili**

**Jadval 4. Yallig'lanish va oksidativ stress biomarkerlari**

| <b>Biomarker</b> | <b>Xodimlar<br/>(n=150)</b> | <b>Nazorat guruhi<br/>(n=50)</b> | <b>P-<br/>qiymat</b> |
|------------------|-----------------------------|----------------------------------|----------------------|
| CRP (mg/L)       | 4.8 ± 2.3                   | 1.2 ± 0.6                        | <0.001               |
| IL-6 (pg/mL)     | 8.2 ± 3.4                   | 2.1 ± 0.9                        | <0.001               |
| IL-8 (pg/mL)     | 12.6 ± 5.1                  | 4.3 ± 1.8                        | <0.001               |
| MDA<br>(μmol/L)  | 5.4 ± 1.8                   | 2.2 ± 0.7                        | <0.001               |
| SOD (U/mL)       | 124 ± 38                    | 168 ± 42                         | <0.01                |

**Tahlil:** Xodimlarda yallig'lanish va oksidativ stress markerlari sezilarli yuqori, antioksidant mudofaa (SOD) kamaygan.

#### **Yuqori CRP (>3 mg/L) bilan bog'liqlik:**

- Ish staji >10 yil: OR=3.2 (95% CI: 1.8-5.6)
- Shovqin >90 dB: OR=2.8 (95% CI: 1.5-5.1)
- Chekish: OR=4.1 (95% CI: 2.1-8.0)

#### **Xavf stratifikatsiya natijalari**

**Jadval 5. Xavf guruhlari taqsimoti**

| <b>Xavf darajasi</b> | <b>Soni</b> | <b>Foiz</b> | <b>Tavsiya etiladigan skrining</b> |
|----------------------|-------------|-------------|------------------------------------|
| Past xavf            | 42          | 28%         | Yillik skrining                    |
| O'rtacha xavf        | 78          | 52%         | 6 oyda bir marta                   |
| Yuqori xavf          | 30          | 20%         | 3 oyda bir marta                   |

### **Yuqori xavf guruhi xususiyatlari:**

- Ish staji >15 yil
- Shovqin ta'siri >90 dB
- Yuqori chang konsentratsiyasi
- Chekuvchilar
- Mavjud surunkali kasalliklar

### **Xulosa**

1. Obodonlashtirish xodimlarida ko'p omilli kasbiy ta'sir mavjud: havo ifloslanganligi (PM10 2.1x yuqori), shovqin (87 dB), issiq stress (44°C gacha).

2. Sog'lik skrining yuqori kasallanishni aniqladi: surunkali bronxit (62%), mushak-skelet kasalliklari (51%), eshitish buzilishi (38%).

3. Biomarkerlar subklinik yallig'lanish va oksidativ stressni tasdiqladi, bu erta intervensiya zarurligini ko'rsatadi.

4. Xavf stratifikatsiya 20% yuqori xavfli, 52% o'rtacha xavfli guruhni aniqladi.

5. Kompleks skrining protokoli ishlab chiqildi: choraklik atrof-muhit monitoringi, xavfqa qarab 3-12 oylik sog'lik skriningi, biomarker tahlili.

6. Protokolni amalga oshirish kasallanishni 35-40% kamaytirishiga hissa qo'shadi (prognoz modellarga asoslanib).

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## **TRENDS IN THE FORMATION OF POLITICAL EDUCATION BASED ON NATIONAL VALUES IN PSYCHOLOGICAL AND PEDAGOGICAL LITERATURE**

**Annotation:** *This article provides a theoretical and historical analysis of the tendencies in the formation of political education based on national values as reflected in psychological and pedagogical literature. The study examines scientific approaches, theories, and concepts from classical and modern pedagogy and psychology. The article elaborates on the stages of development of political education theory, the interrelation between national values and political socialization, perspectives of various pedagogical schools on political education, as well as contemporary trends — the competency-based approach, constructivism, critical pedagogy, multiculturalism, and digital education. Drawing on Uzbek and international scholarly sources, the article analyzes the theoretical foundations, pedagogical principles, and current trends in modern psychological and pedagogical science concerning political education based on national values.*

**Key words:** *psychological and pedagogical literature, national values, political education, formation tendencies, pedagogical theories, political socialization, civic education, competency-based approach, constructivism, critical pedagogy, national education, democratic education, multiculturalism, psychological mechanisms.*

**Introduction.** The theory and practice of political education have a long historical development, evolving at the intersection of pedagogy, psychology, sociology, political science, and philosophy. Each historical period and society has developed its own concepts of political education in accordance with its values, goals, and conditions. Political education based on national values is a relatively new but highly significant direction, aimed at harmonizing universal pedagogical principles with national identity. In psychological and pedagogical literature, issues of political education have long been examined from various perspectives. Ancient thinkers such as Plato and Aristotle addressed the problem of educating youth as ideal citizens. Educators of the modern era, including J.A. Comenius, J.J. Rousseau, and J. Pestalozzi, made substantial contributions to the theory of education, civic upbringing, and patriotism. In the 20th century, scholars such as J. Dewey, L.S. Vygotsky, J. Piaget, A.S. Makarenko, and V.A. Sukhomlinsky provided a scientific foundation for issues of political socialization, civic education, and personality development [1]. In Uzbek pedagogy, the issues of national upbringing, patriotism, and national pride have always held a central place. Eastern thinkers such as Al-Farabi, Beruni, Ibn Sina, Yusuf Khos Khojib, and Alisher Navoi addressed in their works the education of a mature, knowledgeable, moral, and patriotic individual. In

modern Uzbek pedagogy, the teachings of I.A. Karimov and Sh.M. Mirziyoyev, along with the foundations of national ideology and spirituality, form the theoretical basis of the concept of political education [2]. Issues of political education were first systematically addressed by thinkers of the ancient period. Plato, in his work *The Republic*, developed the concept of an ideal state and the education of an ideal citizen. He regarded education and upbringing as one of the primary functions of the state and emphasized the necessity of cultivating such virtues in youth as justice, courage, and wisdom. Aristotle, in *Politics*, argued that the education of citizens is the most important task of the state and stressed that the education system should be regulated by the state.

In Eastern philosophy, issues of political and moral education also occupied a significant place. Al-Farabi, in *The Virtuous City*, described an ideal society and the educational system necessary for its establishment. Ibn Sina, in his treatise *On Education*, highlighted the harmony of physical, intellectual, and moral upbringing, emphasizing the need to prepare young people for life, society, and service to their nation. Yusuf Khos Khojib's *Qutadg'u Bilig* contains rich pedagogical ideas on educating youth in the spirit of public service, leadership, justice, and wisdom. In the pedagogy of the modern era, issues of civic and patriotic education acquired new meaning. Comenius, in *The Great Didactic*, advanced the idea of universal education for all children and emphasized the importance of teaching in the native language. Rousseau, in *Emile, or On Education*, developed the theory of natural education and recognized the necessity of raising individuals as citizens [3]. In the 20th century, a distinct concept of political education was formed within Soviet pedagogy. Makarenko developed the theory of educating the individual through the collective, addressing issues such as collective life, labor education, discipline, responsibility, and civic consciousness. Sukhomlinsky created the concept of humanistic pedagogy and proposed addressing patriotism and diligence through emotional and moral education. Piaget, in his theory of cognitive development, demonstrated the stage-by-stage development of children's thinking abilities. His theory significantly influenced research on political socialization, showing that children acquire political concepts in accordance with their age. Vygotsky, in his cultural-historical theory, emphasized the role of the socio-cultural environment and language in personality development. This approach is also applicable to political education, as young people assimilate political values within a social environment and with the guidance of adults [4]. Kohlberg developed a theory of moral development and extended it to the formation of political views, demonstrating that individuals' ability to reason about moral and political issues develops progressively. This theory highlights the importance of critical thinking, independent decision-making, and principled positions in political education. Tajfel and Turner proposed social identity theory, showing that individuals form their identity through their sense of belonging to social groups. This theory is essential for understanding the formation of national identity and political consciousness. Social learning theory (Bandura) demonstrates that young people acquire political behavior and values through models such as parents, teachers, and media figures

[5]. Schwartz, in his theory of values, identified universal human values and categorized them into several groups, showing that different cultures and individuals prioritize different values. In political education, it is therefore important to take these value orientations into account and to balance national and universal values. The competency-based approach has become one of the key paradigms of modern education. Within this approach, the goal of education is not only the transmission of knowledge, but also the development of competencies that can be applied in real-life situations. In the context of political education, the concept of civic competencies has emerged—this refers to the set of knowledge, skills, and attitudes necessary for young people to participate actively, responsibly, and effectively in a democratic society. Civic competencies include political knowledge, critical thinking, communication and collaboration skills, responsibility, and civic engagement. Constructivism serves as an important theoretical foundation of modern pedagogy, emphasizing that knowledge is not transmitted externally but actively constructed by the learner. In the context of political education, constructivism highlights that young people form their political views and identity through their own experiences, analysis, and reflection. Rather than imposing ready-made conclusions, educators should provide opportunities for learners to think independently, engage in discussion, and arrive at their own reasoned conclusions. Critical pedagogy (Freire, Giroux) views education as a tool for social change, justice, and emancipation. In political education, this approach emphasizes equipping young people with the ability to critically analyze existing socio-political structures, identify injustices, and defend their rights. It aims to transform youth from passive recipients into active agents of social change [6]. Multiculturalism is based on the principles of equality, respect, and dialogue among diverse cultures and ethnic groups. In the context of political education, it involves fostering respect for different cultures, values, perspectives, and ways of life, as well as promoting tolerance and openness to dialogue. This approach does not deny national identity but rather emphasizes its development within a broader global context. Digital pedagogy and media literacy are increasingly important, as modern youth represent a “digital generation.” Media literacy refers to the ability to navigate the information environment, critically evaluate information, and distinguish reliable sources. In political education, developing critical media literacy is essential for protecting young people from fake news, manipulation, and propaganda. In Uzbek pedagogy, issues of national education have always held a significant place. Following independence, questions of national ideology, national values, and identity have gained renewed importance. In his work “High Spirituality is an Invincible Force,” I.A. Karimov provided a scientific and theoretical foundation for strengthening national spirituality, traditional values, national pride, and identity, as well as for educating youth in the spirit of both national and universal values. The key principles of the Uzbek concept of national upbringing include the harmony of national identity and universal values, the synthesis of historical memory and modernity, humanism and morality, family and community values, labor and creativity, as well as patriotism and national pride. As the head of state, Sh.M.



Mirziyoyev, guided by the principle “Youth are our future,” has been implementing large-scale reforms aimed at improving youth education, as well as enhancing their political and civic engagement. In conclusion, the analysis of psychological and pedagogical literature demonstrates that the formation of political education based on national values reflects several important contemporary trends. These include the integration of national and universal values, student-centered learning, competency-based and activity-oriented approaches, the development of critical thinking and media literacy, multiculturalism and inclusivity, and the use of digital technologies. All these factors shape modern theory and practice of political education. In the future, it is expected that this field will continue to develop through the strengthening of the synthesis between national pedagogical heritage and modern scientific achievements, the expansion of practice-oriented research and experimentation, and increased international cooperation and exchange of experience. Educating a generation of youth grounded in national values, yet open-minded, critically thinking, and possessing a strong civic position, is a key guarantee of Uzbekistan’s sustainable development and future.

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**CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF ACUTE  
INTESTINAL INFECTIONS OF CITROBACTER ETIOLOGY BASED ON  
MATERIALS FROM THE SAMARKAND REGIONAL CLINICAL  
INFECTIOUS DISEASES HOSPITAL**

**Relevance.** *Acute intestinal infections represent a large group of human infectious diseases transmitted via the fecal-oral (enteral) route, caused by pathogenic and opportunistic bacteria, viruses, and protozoa. The incidence rate remains relatively high, partly due to the emergence of new nosological forms as well as infections caused by less commonly recognized representatives of opportunistic microflora.*

**Keywords:** *Citrobacter, opportunistic microflora, acute intestinal infections*

In the structure of infectious diseases, increasing importance is being attributed to opportunistic microorganisms such as *Proteus*, *Pseudomonas aeruginosa*, *Citrobacter*, *Klebsiella*, *Enterobacter*, and others. These microorganisms exhibit pathogenic properties under specific conditions, including decreased immune resistance and disruption of natural protective barriers [1,2]. The etiological structure of sporadic cases of acute intestinal infections caused by opportunistic flora is not constant and may vary across different regions and time periods [4]. To date, the role of certain opportunistic microorganisms in the etiology of intestinal diseases has not been fully clarified. Clinical manifestations of diarrhea associated with these pathogens, as well as their dependence on premorbid conditions and patient age, remain insufficiently studied [5,6]. The increasing frequency of *Citrobacter*-associated infections and their similarity to other intestinal infections underline the importance of studying this pathology in more detail [3].

**Objective of the study** -to analyze the epidemiological and clinical features of acute intestinal infections caused by *Citrobacter*.

**Materials and methods:** A retrospective and prospective analysis of medical records of patients treated at the Samarkand Regional Infectious Diseases Hospital was conducted. The study included 83 patients with laboratory-confirmed *Citrobacter* infection in 2018. A standard diagnostic protocol was applied, including clinical and bacteriological examinations. Etiological verification was performed using stool culture for intestinal pathogens. The diagnosis of *Citrobacter* infection was established based on detailed anamnesis, clinical-epidemiological data, and laboratory findings. In all cases, the pathogen (*Citrobacter*) was isolated from stool samples.

**Results and discussion.** The proportion of *Citrobacter* infection among acute intestinal infections caused by opportunistic pathogens was 18%. No significant gender differences were observed among hospitalized patients.

Analysis of age distribution showed that children accounted for 77.6% of cases, while adults represented 22.9%. Among children, the distribution was as follows: under 1 year -26.5%, 1-3 years -38.6%, 3-6 years -2.4%, 6-10 years -2.4%, 10-14 years -3.6%, 14-18 years -3.6%. Among adults, the frequency was: 18-30 years -7.2%, 30-40 years -6.1%, 40-50 years -2.4%, 50-60 years -3.6%, 60-70 years -2.4%, 70-80 years -1.2%. Thus, the highest proportion of cases was observed among children under 3 years of age, accounting for 38.6% of all cases. The incidence decreased significantly in older age groups, with the lowest proportion (2.4%) observed among children older than 6 years. Monthly analysis demonstrated that cases were recorded evenly throughout the year without seasonal variation.

Assessment of premorbid background revealed that 64 patients (77.1%) had comorbid conditions. Anemia was identified in 58 patients (69%), hypertension in 7 patients (8.4%), bronchopneumonia in 2 patients (2.4%), congenital heart disease in 1 patient (1.2%), and hypotrophy in 5 patients (6%).

Among infants under 1 year of age, 15 (68.1%) were artificially fed. Epidemiological history analysis showed that in 3 patients (3.6%) the disease was associated with contact with a diarrheal patient, in 28 cases (33.7%) with consumption of unwashed fruits and vegetables, and in 18 cases (21.7%) with dietary нарушения. In 34 patients (41%), the source of infection could not be determined. In all observed cases, *Citrobacter* infection occurred as a monoinfection. Most patients (69.9%) were hospitalized within the first 1-3 days of illness, 16.9% on days 4-5, and 13.2% at later stages. In 93.9% of cases, the disease was of moderate severity, while severe forms were observed in 6.1% of patients. Mild forms were not recorded. In 65% of patients, the disease began with nausea and vomiting, followed by diarrhea with pathological impurities. In 34.9% of cases, stool contained undigested food particles and impurities. The disease most commonly presented as gastroenterocolitis (65%), while enterocolitis was observed in 34.9% of patients. The average duration of diarrhea was 3-4 days. In all cases, the onset of the disease was acute, characterized by regurgitation, nausea, vomiting, meteorism, changes in stool frequency and consistency, and fever. Fever reaching febrile levels was observed in 9.6% of patients, subfebrile temperature in 49.4%, while the remaining patients had no fever. The average duration of intoxication syndrome was  $3.5 \pm 0.4$  days. In 93.9% of cases, toxicosis with dehydration of grade II (mainly isotonic type) was observed, with body weight loss up to 7%. In 6.1% of patients, grade III dehydration (salt-deficient type) developed, with weight loss up to 9%.

Vomiting was recorded in 65% of patients (1-5 episodes per day). Stool frequency ranged from 6 to 12 times per day and had an enterocolitic character in all cases. Peripheral blood analysis revealed decreased hemoglobin levels in 80.3% of patients and moderate leukocytosis with neutrophilia in 61.4%. Coprological

examination showed mucus, leukocytes, neutral fat, undigested fiber, and starch granules.

### Conclusions.

1. The proportion of *Citrobacter* infection among acute intestinal infections caused by opportunistic pathogens was 18%. This pathology remains a significant cause of diarrhea, especially in children under 3 years of age.

2. Clinical features include acute onset, fever, and gastroenterocolitis-type diarrhea, with predominant involvement of the large intestine. The disease most often presents in moderate form.

3. Cases are recorded evenly throughout the year.

4. *Citrobacter* infection is more common in children with unfavorable premorbid conditions, particularly in those aged from 1 month to 3 years.

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## CLINICAL FEATURES OF COMBINED DIARRHEAL COURSE IN CHILDREN WITH GIARDIASIS

**Abstract:** *Giardiasis is a parasitic disease closely associated with intestinal infections, caused by protozoa rather than helminths. The etiological agent of giardiasis is *Lamblia intestinalis*, which inhabits the lumen of the human small intestine. In international literature, the parasite is more commonly referred to as *Giardia lamblia*. Infection typically occurs when cysts enter the gastrointestinal tract of the child. The most common transmission routes include fecal-oral, waterborne, and foodborne pathways. Additionally, person-to-person transmission is possible through direct contact. Children with habits such as finger sucking, nail biting, or chewing on objects (e.g., pens, pencils) are particularly susceptible, making this group more vulnerable to infection.*

**Keywords:** *giardiasis, cyst, chronic diarrhea.*

Considering the high resistance of *Giardia* cysts to environmental factors, especially in conditions of poor hygiene, the likelihood of infection increases significantly among family members and in groups of preschool children [2-4,7]. After ingestion, cysts pass through the acidic environment of the stomach without significant alteration and reach the proximal part of the small intestine, where digestion and absorption processes are most active. In this region, nutrients such as carbohydrates, proteins, fats, vitamins, and minerals are primarily absorbed [9]. Under the influence of the alkaline intestinal environment, the cyst оболка dissolves, releasing trophozoites, which actively multiply through longitudinal binary fission.

**Objective of the study.** To analyze the clinical characteristics of diarrheal syndrome in children with concomitant giardiasis.

**Materials and methods.** A total of 36 children aged 3 to 7 years presenting with diarrhea and confirmed giardiasis were examined. A control group consisted of 34 children with diarrhea but without giardiasis. All patients underwent comprehensive clinical and laboratory examinations, including stool history analysis, bacteriological and coprological investigations. The diagnosis of giardiasis was established by detecting cysts and vegetative forms of the pathogen in stool samples using the formalin-ether concentration technique.

**Results and discussion.** Analysis of the medical history in children with combined giardiasis and diarrhea revealed the presence of dyspeptic syndrome, including decreased appetite (28/77.7%), nausea (18/50%), and occasional vomiting (7/18.4%). Additionally, manifestations of asthenoneurotic syndrome were

observed, such as irritability (21/58.2%), headache (10/27.7%), and tearfulness (7/19.4%).

The study of the clinical course demonstrated that in the majority of cases (27/75%), the onset of disease was gradual, compared to patients in the control group (12/35.2%). Vomiting was significantly more frequent in children with giardiasis-associated diarrhea (24/66.66%) than in those without giardiasis (16/47.05%). Abdominal pain of varying nature and intensity was observed in 32/88.8% of patients in the study group, whereas in the control group it was noted only in 12/35 (approximately 35.2%) cases.

Furthermore, pronounced dyspeptic symptoms such as excessive gas formation, bloating, and intestinal distension were identified in 29 (80.05%) children with combined pathology.

Assessment of disease severity showed that 17 (47.2%) patients had severe and 19 (52.8%) had moderately severe forms of diarrhea. In the control group, the distribution was 14 (41.2%) severe, 18 (52.9%) moderate, and 2 (5.8%) mild cases.

Coprological findings indicated that in all patients (100%), stool had an enteritic character-liquid, watery, foul-smelling, without mucus or blood admixtures. Notably, in all children with giardiasis, diarrhea persisted for a prolonged period (more than two weeks), even after resolution of intoxication symptoms.

Extraintestinal manifestations were also observed: 21 (58.3%) children exhibited skin manifestations such as maculopapular and urticarial rashes.

**Conclusion.** The study of combined giardiasis and diarrhea in children demonstrated that dyspeptic and asthenoneurotic syndromes are more frequently observed in this group. The diarrheal syndrome, predominantly of enteritic type, is characterized by a gradual onset, accompanied by vomiting, abdominal pain of varying localization and intensity, and significant gas formation. This combination contributes to a more prolonged and severe course of diarrhea. A distinctive clinical feature of giardiasis-associated diarrhea in children is the presence of extraintestinal manifestations, particularly maculopapular and urticarial skin rashes. Comprehensive diagnostic approaches, including identification of *Giardia* invasion, allow for more accurate diagnosis and contribute to improved treatment outcomes.

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## **EFFECTIVE APPROACHES IN TEACHING ENGLISH LANGUAGE (ESP CLASSES)**

**Abstract.** Basically, Teaching must include two major components sending and receiving information. Ultimately, a teacher tries his best to impart knowledge as the way he understood it. The use of innovative methods in educational institutions has the potential not only to improve education, but also to empower people, strengthen governance and galvanize the effort to achieve the human development goal for the country. with a number of educational options available before the present generation learners, the newer trends seem to have emerged in the field of education that have entirely changed the face of traditional system of education. Recent trends, methodologies and developments portray the vital role of education sector in general with its internalization of the education process, stress on quality above quantity, increase in the adoption of technologies, necessity for professional talent etc.

**Keywords:** Methods, Approach, New devices, ICT, pedagogy, learning process, Cooperative learning, Suggestopedia.

**Introduction.** The innovation that the researcher talks in the paper certain both to methodology and materials used in language teaching. Moreover, this article brings out the subtle distinction between the scholarly perception of language as treated in research and pedagogy. The argument advances as the paper proceeds with trends of education with specific reference to the Indian scenario, methodologies adopted, the bygone methods, the peer practice, the present trend, new teaching design, new devices, the need for change, the ICT and English language. English language teaching has undergone tremendous changes over the years, especially the last ten years. Students are burdened with studying, learning and grasping the materials, and of course, lectures with the collections of relevant information from prescribed texts. Many career alternatives once regarded insignificant are gaining importance at present such as communication skills, soft skills, technical skills, interpersonal skills, ICT literacy etc. The need for chiseled graduates to merge successfully in the tough competition of survival in the global market is in great demand nowadays. For this, a change in the trend especially the teaching learning process of English language has to undergo a transition for the betterment. Seasons change, fashions changes, attitudes of human beings change but it is disheartening to note that in the last century English curriculum has hardly undergone any change. There had been much of changes in the attitude of people as to what they perceive to be a language. Rigid curriculums and huge syllabi continue to threaten students who speak regional dialect but love to excel in English. The history of foreign language has always been an important practical concern. It was

Latin which dominates various fields like education, commerce, religion and government in the western world. In 16th Century French, Italian and English achieve lot of importance as result of political changes in Europe. As the status of Latin language from that of living language to teaching subject in school curriculum. The study of classical Latin and analysis of its grammar becomes the model from Foreign Languages

study from 17th to 19th century.

*Methodologies Adapted in Earlier days:* Communication is the groundwork based on which any idea can progress and develop into a fully fledged one. Without that, sustenance in any field is impossible. During the last decade, various crucial factors have combined to affect the current ideologies of teaching of English such as the ineffective methodologies, unsuitable materials, and integration of contextualized teaching, over emphasis on multi language skills etc. Teachers who practiced Grammar Translation method during the previous decade solely relied on black board as the apt tool to impart communication skills and the nuances of English language. Later on, over head projectors, acted as another medium for the teacher dominated class room. Such teachers believed in the dictum of drill and practice. Researchers had given more emphasis on authentic and meaningful contextualized discourse. Then they focused on a successful adult second language learning as a parallel process to a child's first language acquisition. With the advent of e-communication, it has been made possible for the English language teachers to enrich their profession. Basically, the teacher controls the instructional process, the content is delivered to the entire class and the teacher tends to emphasize factual knowledge. In other words, the teachers deliver the lecture content and the students listen to the lecture. Thus, the learning mode trends to be passive and the learners play little part in their learning process. It has been found in most universities by many teachers and students that the conventional lecture approach in classroom is of limited effectiveness in both teaching and learning. This method had stayed in practice for a good period of time due to its focus on the functional use of English.

*Modern Trends of Teaching English:* The process of English communication learning will be more student-centered but less time consuming. Therefore, it promises that the teaching quality will be improved and students' applied English communication can be effectively cultivated, meaning that students' communicative competence will be further developed. Language in education would ideally and ordinarily build on such naturally acquired language ability, enriching it through the development of literacy into an instrument for abstract thought and the acquisition of academic knowledge. Teachers use a range of local texts or English translation of literature in the classroom. The use of language as well as the use of a variety of accents in listening activities or tests is encouraged in the English language classroom. With the proliferation of tablets and smart phones, it is believed that textbooks will disappear in a few years. Furthermore, the access to knowledge in terms of flexibility and mobility has changed drastically.

**Web Based Learning:** Web based learning is one of the fastest developing areas. There are thousands of English web based classes that offer trainings for a variety of basic language skills such as Learning, Speaking, Reading and Writing and are made interactive in a variety of ways. Some of the common technologies available for promotion of education are as follows: The students can correspond with native speakers of the target language using a email by creating a personal email account (g-mail, yahoo, hotmail, etc) which is free. The students can mail their home work to the teachers concerned and get it corrected in turn. The teacher can also provide revisions, feedback, suggestions for the betterment of every work and send them back. Learners can search for new words using dictionary option in the mobile phones and enrich their vocabulary.

**Role of Modern Teacher:** Little Wood conceptualized the role of the teacher as a facilitator of learning, an overseer, a classroom manager, a consultant or adviser and at times a co-communicator with the learners. To harmer, a teacher plays the role of controller, organizer, assessor, promoter, participant, resource, tutor and observer. Task Based Language Teaching is the current paradigm is basically an off shoot of Communicative Language Teaching. Experimental learning or learning by doing as the main conceptual basis for the TBLT. The TBLT breaks down the barriers of the traditional classroom, because in the TBLT, the role of the learner is significantly altered. The teacher becomes a true facilitator or learning for the language learners, purely by means of dialogic communication. The teacher's role is not shunned altogether but is restricted: the teacher is expected to be guide by the side.

The role of teachers how will describe as follows:

1. Facilitator
2. Independent participant
3. Needs analyst
4. Counselor
5. Group processing manager

Conclusion

Across the world, information technology is dramatically altering the way student; faculty and staff learn and work. As the demand for technology continues to rise, colleges and universities are moving all sorts of student services, from laundry monitoring to snack delivery online. Technology is also changing the classroom experience. In addition, tablet PCs, compact computer that allow you to write notes directly onto the screen with a special pen, replace the archaic projector. With the tablet technology allow professor to make notes on charts and spreadsheets and send them directly to their student's PCs. The traditional method lays more emphasis on a teacher himself and is teacher centered. Repetitive practice, mechanical drills and memorization are the hallmarks of the traditional methods. Role of the teacher is to pertain to the long cherished traditional notion that pedagogic principles depend on how articulately a teacher teaches. It is imperative to understand the current trends and evaluative methods of the ELT. The researchers believe that the ore objective of teaching is passing on the information or knowledge

to the minds of the students. Any method using computers or modifying the existing conventional chalk-talk method are innovative if they ultimately serve the attainment of core objective of teaching.

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## **FOREIGN LANGUAGE COMPETENCE-FORMATION OF THE FUTURE TEACHER OF VOCATIONAL EDUCATION**

**Abstract.** *The article discusses the innovative areas of activity, related to the use of information and communication technologies in the educational process of teachers in foreign languages in the world practice, the development of teachers professional communicative competence in teaching English, the use of information and communication, advanced pedagogical technologies in teaching to ensure the solution of such issues, as the increase in the level of development of foreign language skills, diagnostic technologies among teachers.*

**Key words:** *information technology, advanced pedagogical technologies, information and communication, communicative competence, technological processes, methodological support, technical conditions.*

In the context of integration into the world community and the globalization of social processes, the rapid development of information and communication technologies has further increased the need for learning foreign languages as a means of communication. According to world experience, it is important to improve the level of knowledge, skills and abilities of teachers in foreign languages and apply the latest achievements of science and technology in the educational process through the introduction of advanced teaching methods in the environment of information and communication technologies. During the years of independence, the necessary material and technical conditions have been created for the development of professional competence in foreign languages among teachers, whose specialty is not a foreign language. As a result, it was possible to create information and methodological support for the development of professional competence of foreign languages teachers and use it in order to increase the effectiveness of the educational process. The strategy of actions for the development of Uzbekistan defines "further improvement of the continuous education system, increasing the potential of high-quality educational services, training highly qualified personnel in accordance with the modern needs of the labor market" and increasing their competitiveness as one of the priorities. It is also important to implement targeted measures to "strengthen the material and technical base of educational institutions in the country through construction, reconstruction, overhaul, equipping them with modern teaching and laboratory equipment, computers and teaching aids."

In world practice, scientific research is being conducted on the use of information and communication technologies in the educational process in the development of professional competence of teachers of foreign languages, including the development of professional communicative competence of teachers in teaching



English through the use of information and communication technologies and advanced pedagogical technologies in teaching, students can get the right direction in the existing information space, the formation of conscious cognitive skills and skills of independent development; pedagogical and psychological aspects of the innovation process in the context of globalization. The improvement of technologies that diagnose the level of development of foreign language proficiency among teachers on the basis of a competent approach determines the relevance of the topic. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated February 7, 2017 № PD-4947 "On the Strategy for the Further Development of the Republic of Uzbekistan" and December 10, 2012 № PD-1875 "On Measures for Further Improvement" system of teaching foreign languages" Decree of the Government of the Republic of Uzbekistan № 124, dated May 8, 2013" On approval of the state standard of education in foreign languages of the continuous education system ", Action strategy February 3, 2021" Five priority directions of development of the Republic of Uzbekistan for 2017-2021 " on the basis of Resolution № PD-6155 "On the State Program for the Implementation of Education", as well as other regulations in this area. In all higher educational institutions a number of activities are carried out on the basis of tasks to ensure the quality of education.

Scientific analysis. A number of scientific studies have been carried out on the introduction of modern information and communication technologies into the education system. In particular, studies on the organization of the educational process with the introduction of information and communication technologies into the education system of the Republic were carried out by A. Abdullaev, A. Abdukodirov, B. Begalov, U. Begimkulov, R. Dzhuraev, N. Muslimov and other scientists. In educational institutions and scientific and theoretical problems are reflected in the scientific research of such scientists as N. Avazbaev, L. Akhmedova, G. Bakieva, J. Jalolov, H. Orzikulov, D. Teshabaeva. The formation of scientific and theoretical foundations for the use of computer technologies in education and the professional competence of teachers are highlighted in his research. Although research on the development of professional competence of teachers was carried out by scientists in various fields, the problem of development the professional competence of teachers of non-pedagogical educational institutions in foreign languages on the basis of creating a unified information and methodological system are currently considered a problem. Mutual exchange of views. Studying the content of the concepts of "competence" and "competency" in the process of scientific research, it can be noted that these concepts are used as exactly similar, interrelated concepts and differ in a number of features. In the course of the study, the definitions of concepts "competence", "competency", "professional competence", "pedagogical competence", given by foreign and domestic scientists have been systematized. The development of professional competence in foreign languages among teachers has its own characteristics, which are directly related to the study of the culture of people, in which the language is studied from the material and technical base of educational institutions, and differs from other areas of teacher training.

The role of modern information and communication technologies, which are especially important in solving this problem is invaluable. Consequently, teachers must have certain knowledge, skills and competencies, that is, the competence to work, analyze and use data based on the use of this technology in their activities. Taking into account the peculiarities of the study of foreign languages (English) and the importance of the system of information and methodological support, "The professional competence of a teacher of foreign languages is his professional knowledge, skills and knowledge of foreign languages, personal qualities.", goals and objectives of pedagogical activity. This is an indicator of professional training, such as the definition, development of a program of pedagogical activity, decision-making, the use of modern information and pedagogical technologies. The system, which serves to constantly improve the professional competence of teachers of a foreign language is used to create, store and transmit information, and its purpose is to organize the independent teaching of teachers by creating a unified information and methodological support for teaching foreign languages. It is proposed that the organization of independent educational processes based on the development of professional competence of teachers of foreign languages using the resources of information and methodological support, should consist of the following stages.

Using teaching methods. It is important to harmoniously implement technological processes at different stages of learning English using information and communication technologies. For this, it is advisable to use different simulation. In the course of the study, it was found that the analysis of modeling results works according to the technology of "cooperative learning". To develop the communication skills of students in English with the help of information and communication technologies, a special group was invited to study the problem "Technical inspection of agricultural machinery". As the object of the global problem, the audience chose the topic related to an environmental problem associated with agriculture and crop cultivation. The project "We Comply with Safety Rules" was organized in the form of video discussion. According to him, representatives of various groups expressed their views on the solution of environmental problems in the cultivation of crops and in this regard. In the course of the video discussion, recommendations were prepared for the agro-security authorities, which reflected the ways of solving the problems studied. Taking into account these results, it was concluded that the design method is relevant in the educational process and develops the direction of communication. At the next stage of the research, a questionnaire was developed with various indicators to assess student learning outcomes and organize classes within the framework of the Intensive Methods of Learning a Foreign Language module. This method is used to determine the level of knowledge of students in foreign languages at the beginning and at the end of the course, to analyze the processes associated with the development of their interest in learning a foreign language during the course, to develop recommendations on the use of mechanisms to improve the quality and effectiveness of learning.

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## FARG'ONA VILOYATI AHOLISI ORASIDA HAYVON YOG'LARINI CHEKLASHNING SURUNKALI PANKREATIT XURUJLARI PROFILAKTİKASIDAGI O'RNI

**Annotatsiya:** Ushbu tadqiqotda Farg'ona viloyatida surunkali pankreatit bilan kasallangan bemorlar orasida hayvon yog'larini cheklashning kasallik xurujlari profilaktikasiga ta'siri o'rganildi. 350 nafar bemor prospektiv kuzatuv tadqiqotiga jalb qilinib, intervensiya guruhida 6 oy davomida hayvon yog'lari iste'moli 40 % ga kamaytirildi. Natijalar shuni ko'rsatdiki, yog' cheklash guruhi nazorat guruhiga nisbatan xuruj chastotasi, simptom og'irligi va lipid profili bo'yicha statistik jihatdan ahamiyatli yaxshilanishga erishdi ( $p < 0,05$ ). Demak, hayvon yog'larini cheklash surunkali pankreatit xurujlari profilaktikasida muhim ahamiyatga ega.

**Kalit so'zlar:** surunkali pankreatit, hayvon yog'lari, profilaktika, lipid profili, Farg'ona viloyati, ovqatlanish terapiyasi, xuruj chastotasi.

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## THE ROLE OF ANIMAL FAT RESTRICTION IN THE PREVENTION OF CHRONIC PANCREATITIS ATTACKS AMONG THE POPULATION OF FERGANA REGION

**Abstract:** This study investigated the effect of animal fat restriction on the prevention of exacerbations among patients with chronic pancreatitis in the Fergana region. 350 patients were enrolled in a prospective observational study, and the intervention group reduced animal fat intake by 40% over 6 months. The results showed that the fat restriction group achieved statistically significant improvements in attack frequency, symptom severity, and lipid profile compared to the control group ( $p < 0.05$ ). Therefore, animal fat restriction is important in the prevention of exacerbations of chronic pancreatitis.

**Keywords:** chronic pancreatitis, animal fats, prevention, lipid profile, Fergana region, nutritional therapy, attack frequency.

**Kirish.** Surunkali pankreatit (SP) – oshqozon osti bezining surunkali yallig'lanish kasalligi bo'lib, uning asosiy klinik ko'rinishi davriy xurujlar, qorin og'rig'i va hazm buzilishi hisoblanadi. Jahon miqyosida SP tarqalishi 100 000

aholiga 5–12 holatni tashkil etadi [1]. O‘zbekistonda, xususan Farg‘ona viloyatida, an‘anaviy ovqatlanish tarkibida hayvon yog‘larining yuqori ulushi kuzatiladi, bu esa SP rivojlanishi va xurujlarining kuchayishiga zamin yaratadi [2]. Hayvon yog‘lari iste‘molining ortishi qon lipidlari darajasini oshiradi va oshqozon osti beziga qo‘shimcha yuk tushiradi [3].

Tadqiqotning maqsadi – Farg‘ona viloyati SP bilan kasallangan bemorlarida hayvon yog‘lari iste‘molini 40 % ga cheklashning 6 oylik davrda xuruj chastotasi, simptom og‘irligi, lipid profili va BMI ga ta‘sirini baholashdir.

**Material va metodlar:** Tadqiqot dizayni: prospektiv kuzatuv tadqiqoti. Tadqiqotga Farg‘ona viloyat klinik shifoxonasida 2023–2024-yillarda SP tashxisi bilan ro‘yxatga olingan 25–60 yosh oralig‘idagi 350 nafar bemor jalb qilindi. Bemorlar tasodifiy ravishda ikkita guruhga bo‘lindi: intervensiya guruhi ( $n=175$ ) – 6 oy davomida hayvon yog‘lari iste‘moli kundalik ratsiondan 40 % ga kamaytirildi, boshqa oziq moddalar o‘zgarishsiz qoldi; nazorat guruhi ( $n=175$ ) – odatdagi ovqatlanish rejimini saqladi.

Baholash parametrlari: xuruj chastotasi (6 oyda), simptom og‘irligi indeksi (10 ballik shkala), lipid profili (triglitsidlar – TG, past zichlikdagi lipoproteinlar – LDL, yuqori zichlikdagi lipoproteinlar – HDL) va tana vazni indeksi (BMI). Qon namunalari bazal holatda va 6 oydan keyin olingan. Statistik tahlil: Student t-test uzluksiz o‘zgaruvchilar uchun,  $\chi^2$  test kategorik ma‘lumotlar uchun qo‘llanildi;  $p<0,05$  statistik ahamiyatli deb qabul qilindi [4].

**Natijalar:** 6 oylik kuzatuv davomida intervensiya guruhida xuruj chastotasi o‘rtacha  $1,8\pm0,6$  marta, nazorat guruhida esa  $3,4\pm1,1$  marta qayd etildi ( $p<0,001$ ). Simptom og‘irligi indeksi intervensiya guruhida  $3,2\pm1,0$  ballni, nazorat guruhida  $5,7\pm1,4$  ballni tashkil etdi ( $p<0,001$ ). Lipid profili ko‘rsatkichlari ham sezilarli farqni ko‘rsatdi: TG darajasi intervensiya guruhida  $1,6\pm0,4$  mmol/l ga tushgan bo‘lsa, nazorat guruhida  $2,3\pm0,7$  mmol/l darajada qoldi ( $p<0,01$ ). LDL ko‘rsatkichi ham intervensiya guruhida pastroq edi ( $2,8\pm0,5$  ga nisbatan  $3,5\pm0,8$ ;  $p<0,01$ ). HDL darajasi intervensiya guruhida nisbatan yuqori kuzatildi ( $1,3\pm0,3$  ga nisbatan  $1,1\pm0,3$ ;  $p<0,05$ ). BMI intervensiya guruhida  $26,1\pm2,8$  kg/m<sup>2</sup>, nazorat guruhida  $28,4\pm3,2$  kg/m<sup>2</sup> ni tashkil etdi ( $p<0,01$ ).

**Jadval 1. Intervensiya va nazorat guruhlari ko'rsatkichlarining 6 oylik taqqoslanishi**

| Ko'rsatkich                  | Intervensiya guruhi<br>(n=175) | Nazorat guruhi<br>(n=175) | p-qiyamat |
|------------------------------|--------------------------------|---------------------------|-----------|
| Xuruj chastotasi<br>(6 oyda) | 1,8 ± 0,6                      | 3,4 ± 1,1                 | < 0,001   |
| Simptom<br>og'irligi indeksi | 3,2 ± 1,0                      | 5,7 ± 1,4                 | < 0,001   |
| TG (mmol/l)                  | 1,6 ± 0,4                      | 2,3 ± 0,7                 | < 0,01    |
| LDL (mmol/l)                 | 2,8 ± 0,5                      | 3,5 ± 0,8                 | < 0,01    |
| HDL (mmol/l)                 | 1,3 ± 0,3                      | 1,1 ± 0,3                 | < 0,05    |
| BMI (kg/m <sup>2</sup> )     | 26,1 ± 2,8                     | 28,4 ± 3,2                | < 0,01    |

*Izoh: qiyamatlar M±SD shaklida ifodalangan; p-qiyamat Student t-test asosida hisoblangan.*

**Muhokama.** Olingan natijalar hayvon yog'larini cheklashning SP xurujlari profilaktikasida samarali ekanligini tasdiqlaydi. Xuruj chastotasining 47 % ga kamayishi klinik jihatdan ahamiyatli natija bo'lib, bu de Pretis va hamkasblarining (2021) ma'lumotlari bilan mos keladi [5]. Lipid profilining yaxshilanishi oshqozon osti beziga tushadigan metabolik yukni kamaytirishda muhim rol o'ynaydi. TG darajasining pasayishi bezning ekzokrin funksiyasini saqlashga yordam beradi, chunki yuqori triglitseridlar pankreas to'qimasiga to'g'ridan-to'g'ri toksik ta'sir ko'rsatishi isbotlangan [6]. BMI ning kamayishi ham umumiy metabolik holatning yaxshilanganini ko'rsatadi.

Tadqiqotning cheklovlari: nisbatan qisqa kuzatuv davri (6 oy), bitta viloyat bilan chegaralanganlik va ovqatlanish nazoratining o'z-o'zini hisobotga asoslanganligi natijalarning umumlashtirilishini cheklaydi. Kelajakda ko'p markazli, uzoq muddatli randomizatsiyalangan tadqiqotlar o'tkazilishi maqsadga muvofiqdir.

**Xulosa.** Farg'ona viloyati SP bemorlarida hayvon yog'lari iste'molini 40 % ga cheklash 6 oylik davrda xuruj chastotasini sezilarli darajada kamaytirdi, simptom og'irligini yengillashtirdi va lipid profilini yaxshiladi. Hayvon yog'larini cheklash SP bemorlarining kompleks davolash va profilaktika dasturlariga kiritilishi tavsiya etiladi.

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## **PROSPECTS FOR THE DEVELOPMENT OF DESERT-PASTURE LIVESTOCK FARMING IN THE CONTEXT OF MODERNIZATION**

**Abstract:** *The article examines the prospects for modernizing desert–pasture livestock farming in Uzbekistan. This sector plays a strategic role in ensuring food security, rural employment, and export potential. Under the conditions of climate change, land degradation, and limited water resources, traditional extensive pasture management practices are becoming unsustainable. The study analyzes the potential for implementing precision livestock farming technologies, water-saving irrigation systems, rotational grazing, genetic improvement (particularly Karakul sheep), and the use of renewable energy sources for autonomous water supply. Special attention is given to programs aimed at restoring hundreds of thousands of hectares of pastureland by 2030, increasing pasture capacity, boosting meat and wool production, and maintaining ecological balance.*

**Keywords:** *desert–pasture livestock farming, modernization, precision livestock farming, pasture restoration, climate change adaptation, Karakul sheep, sustainable grazing, digital monitoring, water-saving technologies, food security.*

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## **MODERNIZATSIYALASH SHAROITIDA CHO‘L-YAYLOV CHORVACHILIGINI RIVOJLANTIRISH ISTIQBOLLARI**

**Annotatsiya:** *Maqolada O‘zbekistonda cho‘l-yaylov chorvachiligini modernizatsiya qilish istiqbollari ko‘rib chiqiladi. Bu soha oziq-ovqat xavfsizligini ta‘minlash, qishloq aholisi bandligi va eksport salohiyatida strategik ahamiyatga ega. Iqlim o‘zgarishi, yer degradatsiyasi va suv resurslarining cheklanganligi sharoitida an‘anaviy keng ko‘lamli yaylovdan foydalanish usullari barqaror bo‘lmay qolmoqda. Tadqiqot aniq chorvachilik texnologiyalari, suv tejovchi sug‘orish tizimlari, rotatsion yaylovdan foydalanish, naslchilikni yaxshilash (ayniqsa, qorako‘l qo‘ylari) va avtonom suv ta‘minoti uchun qayta tiklanadigan energiya manbalarini joriy etish imkoniyatlarini tahlil qiladi. 2030 yilga qadar yuz minglab gektar yaylovlarni tiklash dasturlari, yaylov sig‘imini oshirish, go‘sht va*

*jun ishlab chiqarishni ko'paytirish hamda ekologik muvozanatni saqlash masalalariga alohida e'tibor qaratilgan.*

**Kalit so'zlar:** *cho'l-yaylov chorvachiligi, modernizatsiya, aniq chorvachilik, yaylovlarni tiklash, iqlim o'zgarishiga moslashish, qorako'l qo'ylari, barqaror yaylovdan foydalanish, raqamli monitoring, suv tejovchi texnologiyalar, oziq-ovqat xavfsizligi.*

Cho'l-yaylov chorvachiligi O'zbekiston Respublikasi iqtisodiyoti va ijtimoiy hayotining muhim tarkibiy qismi sifatida qadimdan shakllangan bo'lib, mamlakat hududining katta qismini egallagan quruq va yarim quruq zonalar – Qizilqum cho'li, Navoiy, Qashqadaryo va Buxoro viloyatlarining keng yaylovlarida asosiy oziq-ovqat manbai, eksport potentsiali va qishloq aholisi daromadining asosiy manbai hisoblanadi. Hozirgi zamon modernizatsiyasi sharoitida bu soha nafaqat an'anaviy usullarni saqlab qolish, balki uni yangi texnologiyalar, innovatsion yondashuvlar va barqaror rivojlanish tamoyillari asosida tubdan yangilash imkoniyatiga ega. Global iqlim o'zgarishi, suv resurslarining cheklanganligi, yer degradatsiyasi va aholining oziq-ovqat xavfsizligi talablari cho'l-yaylov chorvachiligini rivojlantirishni mamlakatning strategik vazifalaridan biriga aylantiradi. Bu jarayonda raqamli texnologiyalar, aniq chorvachilik (precision livestock farming), suv tejovchi sug'orish tizimlari va genetik seleksiya usullari orqali mahsuldorlikni oshirish, ekologik muvozanatni saqlash va iqtisodiy samaradorlikni ta'minlash mumkin bo'ladi.

O'zbekistonning cho'l va yaylov zonalarida chorvachilik asosan qo'y va echki, tuya va qoramol turlariga asoslangan bo'lib, ularning soni so'nggi yillarda sezilarli o'sish ko'rsatmoqda. Masalan, 2025 yil boshiga kelib qo'y va echkilar soni 24 milliondan ortiq boshga yetgan, bu esa mamlakatning qishloq xo'jalik mahsulotlarining deyarli yarmidan ko'pini tashkil etadi. Dehqon xo'jaliklari bu sohada yetakchi o'rinni egallab, umumiy chorva mollarining 80-90 foizini yetishtiradi. Biroq an'anaviy yaylovdan foydalanish usullari – haddan tashqari yaylov bosimi, suv manbalarining yetishmovchiligi va iqlim o'zgarishi natijasida cho'l hududlarida yer degradatsiyasi kuchayib borayotgani jiddiy muammolarni keltirib chiqarmoqda. Qizilqum cho'lining katta qismi o'tloqlarning degradatsiyasiga duch kelgan bo'lib, bu holat chorva mahsuldorligini pasaytiradi, biologik xilma-xillikni yo'qotadi va uzoq muddatli iqtisodiy zarar keltiradi. Shu bilan birga, global bozor talablari – yuqori sifatli go'sht, jun, sut va teri mahsulotlariga bo'lgan talab cho'l-yaylov chorvachiligini zamonaviy standartlarga moslashtirishni talab etadi. Modernizatsiya sharoitida bu muammolarni hal qilish uchun birinchi navbatda yaylovlarni tiklash va barqaror boshqarish tizimini joriy etish zarur.

Yaylovlarni tiklash bo'yicha amalga oshirilayotgan davlat dasturlari cho'l zonalarida 2030 yilga qadar qo'shimcha 938 ming gektar yaylovni qayta tiklash va yaxshilashni ko'zda tutadi. 2026-2027 yillarda esa 620 ming gektar maydonni qayta tiklash rejalashtirilgan bo'lib, bu yerda o'tloq o'simliklarini ekish, suv quduqlarini qurish va suv tejovchi texnologiyalarni qo'llash orqali 960 ming bosh mayda

chorvaga oziq-ovqat bazasini yaratish mumkin. Bunday choralar go'sht va jun ishlab chiqarishni sezilarli darajada oshiradi, shu bilan birga cho'l ekotizimining barqarorligini ta'minlaydi. Modernizatsiya jarayonida suv resurslaridan samarali foydalanish asosiy yo'nalish bo'lib qolmoqda. Damlama sug'orish, tomchilatib sug'orish va yer osti suvlaridan foydalanish tizimlari cho'l yaylovlarida qo'llanilganda o'tloq hosildorligini 2-3 baravar oshirishi mumkin. Bundan tashqari, quyosh va shamol energiyasiga asoslangan avtonom suv ta'minoti tizimlari uzoq cho'l hududlarida chorvachilikni rivojlantirish uchun muhim infratuzilma yaratadi. Bu texnologiyalar nafaqat suvni tejaydi, balki ekologik toza energiya manbalaridan foydalanish orqali uglerod chiqindilarini kamaytiradi va iqlim o'zgarishiga moslashishni ta'minlaydi.

Aniq chorvachilik texnologiyalari (PLF) cho'l-yaylov sharoitida chorva mollarini kuzatish va boshqarishni tubdan o'zgartirishi mumkin. GPS-trakerlar, akselerometrlar, virtual to'siqlar va dronlar yordamida hayvonlarning harakatini real vaqtda monitoring qilish, ularning sog'lig'ini baholash, oziqlanish va ko'payish jarayonlarini optimallashtirish mumkin. Masalan, hayvonlarning yurish harakati va tanasining haroratini doimiy kuzatuvchi sensorlar orqali kasalliklarni erta aniqlash va davolash samaradorligini oshirish mumkin. Bu usullar haddan tashqari yaylov bosimini oldini oladi, yaylovlarni rotatsion tarzda ishlatishni ta'minlaydi va mahsuldorlikni 20-30 foizga oshiradi. Bundan tashqari, sun'iy intellekt va katta ma'lumotlar tahlili asosida iqlim prognozlari, o'tloq holati va bozor talablarini hisobga olgan holda chorvachilikni rejalashtirish mumkin. O'zbekistonning cho'l hududlarida bunday tizimlarning joriy etilishi nafaqat mahalliy dehqon xo'jaliklarining daromadini oshiradi, balki mamlakatning eksport salohiyatini ham kuchaytiradi – yuqori sifatli karakul jun va go'shti xalqaro bozorlarda talab yuqori.

Iqtisodiy nuqtai nazardan cho'l-yaylov chorvachiligining modernizatsiyasi mamlakatning umumiy qishloq xo'jalik ishlab chiqarish hajmini oshirish bilan birga qishloq aholisi bandligini ta'minlaydi va migratsiyani kamaytiradi. Hozirgi vaqtda cho'l zonalarida yashovchi aholi asosan chorvachilikka bog'liq bo'lib, ularning daromadining 70 foizdan ortig'i shu sohadan keladi. Yangi texnologiyalar joriy etilganda mehnat unumdorligi oshadi, mahsulot sifati yaxshilanadi va qiymat zanjirini yaratish – qayta ishlash korxonalari, eksport platformalari orqali qo'shimcha qiymat hosil qilish mumkin bo'ladi. Masalan, karakul qo'ylarining genetik seleksiyasi orqali jun sifatini yaxshilash va go'sht mahsuldorligini oshirish eksport hajmini bir necha baravar ko'paytirishi mumkin. Shu bilan birga, ijtimoiy jihatdan bu jarayon yoshlar va ayollar uchun yangi imkoniyatlar yaratadi: raqamli monitoring tizimlarini boshqarish, veterinariya xizmatlarini takomillashtirish va agroturizmni rivojlantirish orqali qishloqda yangi ish o'rinlari paydo bo'ladi. Ilmiy-tadqiqot institutlari va universitetlar bilan hamkorlikda mutaxassislar tayyorlash, o'quv dasturlarini modernizatsiya qilish esa sohaning uzoq muddatli barqaror rivojlanishini ta'minlaydi.

Ekologik barqarorlik modernizatsiyaning markaziy elementlaridan biri hisoblanadi. Cho'l yaylovlarida rotatsion yaylovdan foydalanish, o'tloq o'simliklarining biologik xilma-xilligini tiklash va tuproq degradatsiyasini oldini

olish orqali uglerod sekvestratsiyasini oshirish mumkin. Bu esa O'zbekistonning xalqaro iqlim majburiyatlarini bajarishga hissa qo'shadi va global grantlar va investitsiyalarni jalb qilish imkoniyatini kengaytiradi. Masalan, FAO va boshqa xalqaro tashkilotlar bilan hamkorlikda iqlimga moslashuvchan chorvachilik modellarini joriy etish – qishki oziq-ovqat bazasini yaxshilash, o'simliklarning qurg'oqchilikka chidamli navlarini yetishtirish va hayvonlarning ovqatlanish samaradorligini oshirish orqali issiqxona gazlari chiqindilarini kamaytirish mumkin. Bundan tashqari, cho'l zonalarida biologik xilma-xillikni saqlash – noyob o'simlik va hayvon turlarini himoya qilish hamda ekoturizmni rivojlantirish orqali qo'shimcha iqtisodiy foyda olish mumkin.

Modernizatsiya jarayonida davlat siyosati va xususiy sektor hamkorligi muhim ahamiyatga ega. O'zbekiston hukumati tomonidan qabul qilingan qishloq xo'jaligini modernizatsiya qilish dasturlari doirasida chorvachilikni rivojlantirishga yo'naltirilgan loyihalar soni va hajmi ortib bormoqda. Kreditlar, subsidiyalar va texnologik yordam orqali dehqon xo'jaliklarini qo'llab-quvvatlash, veterinariya xizmatlarini raqamlashtirish va bozor infratuzilmasini yaxshilash bu sohada sezilarli natijalarga olib kelmoqda. Shu bilan birga, xalqaro tajribani o'rganish – Markaziy Osiyo mamlakatlari, Xitoy va Yevropa davlatlaridagi muvaffaqiyatli modellar asosida o'ziga xos yondashuvlarni ishlab chiqish zarur. Masalan, sun'iy yo'ldosh monitoringi va blokcheyn texnologiyalari orqali mahsulotning shaffofligini ta'minlash xalqaro bozorlarda raqobatbardoshlikni oshiradi.

Kelajak istiqbollari nuqtai nazaridan cho'l-yaylov chorvachiligining modernizatsiyasi O'zbekistonni nafaqat oziq-ovqat xavfsizligini ta'minlovchi, balki global qishloq xo'jalik innovatsiyalarining yetakchilaridan biriga aylantirishi mumkin. 2030-2040 yillarga mo'ljallangan strategiyalarda bu soha raqamli iqtisodiyotning bir qismi sifatida ko'rilishi, sun'iy intellektga asoslangan bashorat tizimlari va avtomatlashtirilgan infratuzilma keng qo'llanilishi kutilmoqda. Natijada, mahsuldorlik o'sishi, ekologik barqarorlik va ijtimoiy farovonlikning yuqori darajasi mamlakatning yangi O'zbekiston qurilishidagi muhim omil bo'ladi. Shu bois, cho'l-yaylov chorvachiligini modernizatsiya qilish nafaqat texnik va iqtisodiy, balki strategik va madaniy ahamiyatga ega bo'lib, kelajak avlodlar uchun barqaror rivojlanish asosini yaratadi. Bu jarayonda ilm-fan, texnologiya va inson kapitalini birlashtirgan yondashuvlar orqali O'zbekiston cho'l hududlarini gullab-yashnagan va samarali iqtisodiy zonaga aylantirishga qodir.

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## O'QISH SAVODXONLIGINI RIVOJLANTIRISHDA RAQAMLI TA'LIM VOSITALARINING NAZARIY ASOSLARI

**Annotatsiya:** Ushbu maqolada o'qish savodxonligini rivojlantirishda raqamli ta'lim vositalarining nazariy asoslari yoritilgan. O'qish savodxonligi zamonaviy ta'lim tizimida o'quvchining matnni tushunish, tahlil qilish, baholash va undan amaliy vaziyatlarda foydalanish kompetensiyasi sifatida qaraladi. Maqolada raqamli ta'lim vositalari-elektron darsliklar, multimedia resurslar, mobil ilovalar va ta'lim platformalarining o'quv jarayonidagi o'rni tahlil qilingan.

**Kalit so'zlar:** O'qish savodxonligi, raqamli ta'lim vositalari, axborot-kommunikatsiya texnologiyalari (AKT), elektron darsliklar, multimedia, mobil ilovalar, ta'lim platformalari, interfaol metodlar, tanqidiy fikrlash, matnni tushunish, raqamli savodxonlik.

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## THEORETICAL BASIS OF DIGITAL EDUCATIONAL TOOLS IN DEVELOPING READING LITERACY

**Annotation:** This article discusses the theoretical foundations of developing reading literacy through digital educational tools. Reading literacy in modern education is considered as the learner's competence to understand, analyze, evaluate, and use texts in practical situations. The article analyzes the role of digital educational tools in the learning process, including electronic textbooks, multimedia resources, mobile applications, and educational platforms.

**Keywords:** Reading literacy, digital educational tools, information and communication technologies (ICT), electronic textbooks, multimedia, mobile applications, educational platforms, interactive methods, critical thinking, text comprehension, digital literacy.

Zamonaviy axborot texnologiyalari jamiyatining barcha sohalariga, jumladan ta'limga ham chuqur kirib kelmoqda. O'zbekiston Respublikasida maktabgacha va boshlang'ich ta'lim tizimini zamonaviy raqamli vositalar bilan qurollantirish, ulardan keng foydalanish strategik vazifa sifatida belgilanmoqda. Shu munosabat bilan boshlang'ich ta'limda pedagogik faoliyatni tizimli, metodik tashkil qilishda raqamli ta'lim vositalari ahamiyatli o'rin egallaydi va ta'lim jarayonini samaradorligini oshirishda asosiy vosita bo'lib xizmat qiladi. Shu jihatdan, mamlakatimiz Prezidenti Shavkat Mirziyoyev ta'kidlaganidek „Taraqqiyotga

erishish uchun raqamli texnologiyalarini egallashimiz zarur va shart. Bu bizga yuksalishning eng qisqa yoʻlidan borish imkoniyatini beradi. Zero, bugun dunyoda barcha sohalarga axborot texnologiyalari chuqur kirib bormoqda. Albatta, raqamli iqtisodiyotni shakllantirish kerakli infratuzilma, koʻp mablagʻ va mehnat resurslarini talab etishini juda yaxshi bilamiz. Biroq, qanchalik qiyin boʻlmasin, bu ishga bugun kirishmasak, qachon kirishamiz?! Ertaga juda kech boʻladiʻʻ.

Oʻqish savodxonligi - zamonaviy taʼlim ilmidagi eng koʻp tadqiq etilayotgan kompetensiyalardan biri sifatida eʼtirof etilmoqda.

Raqamli taʼlim vositalari — bu oʻqitish jarayonida axborot-kommunikatsiya texnologiyalari (AKT), elektron platformalar, mobil ilovalar, multimedia resurslari va interfaol dasturlardan foydalanish tizimidir.

Ular quyidagilarni oʻz ichiga oladi:

- elektron darsliklar
- mobil ilovalar
- taʼlim platformalari
- interfaol testlar va oʻyinlar
- audio va video resurslar

Oʻqish savodxonligi tushunchasi nafaqat matnni oʻqish va tushunish, balki undan kerakli xulosalar chiqarish, tahlil qilish va real hayotiy vaziyatlarda qoʻllay olish qobiliyatini ham oʻz ichiga oladi. Zamonaviy taʼlim jarayonida bu tushuncha kengayib, raqamli savodxonlik bilan chambarchas bogʻlanib bormoqda. Raqamli taʼlim vositalari esa oʻquvchilarning mustaqil fikrlashini rivojlantirish, ularning oʻqishga boʻlgan qiziqishini oshirish va individual yondashuvni taʼminlashda katta imkoniyatlar yaratadi.

Mazkur muammo yuzasidan koʻplab xorijiy va mahalliy olimlar ilmiy tadqiqotlar olib borgan. Xususan, Donald J. Leu, Julie Coiro, Mark Warschauer kabi olimlar oʻz ishlarida raqamli texnologiyalar asosida oʻqish savodxonligini shakllantirishning nazariy asoslarini yoritib berganlar. Ularning tadqiqotlarida internet muhitida oʻqish jarayonining oʻziga xos jihatlari, oʻquvchilarning axborot bilan ishlash koʻnikmalarini rivojlantirish masalalari chuqur tahlil qilingan. Shuningdek, Colin Lankshear va Michele Knobel tomonidan ilgari surilgan “yangi savodxonlik” (new literacies) tushunchasi raqamli muhitda oʻqish va yozish kompetensiyalarini shakllantirishning muhim nazariy asoslaridan biri hisoblanadi.

Shu bilan birga, zamonaviy tadqiqotlarda raqamli taʼlim vositalarining oʻquvchilarning oʻqish motivatsiyasiga ijobiy taʼsiri alohida taʼkidlanadi. Interaktiv platformalar, elektron darsliklar va multimedia vositalari yordamida tashkil etilgan darslar oʻquvchilarning faolligini oshiradi hamda oʻqish jarayonini yanada samarali qiladi. Bu esa oʻz navbatida oʻqish savodxonligini rivojlantirishda yangi pedagogik yondashuvlarni qoʻllash zaruratini yuzaga keltiradi.

Raqamli texnologiyalar:

- oʻquvchini faol ishtirokchiga aylantiradi
- matnni vizual va audio shaklda tushunishni osonlashtiradi
- tanqidiy fikrlashni rivojlantiradi
- individual oʻqish tezligiga moslashadi

Masalan, interaktiv platformalar orqali o'quvchi matnni o'qib, darhol test va topshiriqlar bajaradi. Bu esa bilimni mustahkamlashga xizmat qiladi.

O'qish savodxonligini rivojlantirishda raqamli ta'lim vositalari zamonaviy pedagogikaning muhim qismi hisoblanadi. Ular nafaqat o'qish jarayonini qiziqarli qiladi, balki o'quvchilarda tanqidiy fikrlash, tahlil qilish va mustaqil o'rganish ko'nikmalarini ham shakllantiradi.

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## **UZBEKISTAN'S INVESTMENT ENVIRONMENT: LEGAL REFORMS AND ECONOMIC DEVELOPMENT**

**Abstract:** *This article examines the legislative evolution and economic foundations of Uzbekistan's national investment policy, with a particular focus on recent reforms and digital transformation processes. It highlights key aspects of the investment climate, analyzes modern incentive mechanisms, and evaluates the impact of institutional and infrastructural improvements on foreign direct investment inflows. The paper also introduces a forward-looking perspective on sustainable and innovation-driven investment strategies in Uzbekistan.*

**Keywords:** *economy, investment policy, digital economy, foreign direct investment, incentives, infrastructure, sustainable development.*

In recent years, Uzbekistan has increasingly focused on integrating digital technologies into its investment policy. The development of e-government services, digital platforms for investors, and online licensing systems has significantly reduced administrative barriers and improved transparency. These changes contribute to a more efficient and investor-friendly environment.

Since national independence, Uzbekistan has launched independent domestic and foreign policies based on traditions and historical past, geographical location and accumulated economic potential. The subject of special and constant attention Uzbekistan is to improve the investment climate and creation of favorable conditions for attracting foreign investments into national economy, active participation of foreign investors in privatization process. An effective tool for structural transformation of priority sectors of the economy is public policies to attract foreign investment. Attraction and effective use of foreign investment in national economy is one of the areas of multilaterally economic development in global economic arena.

A new direction of Uzbekistan's investment policy is the promotion of sustainable and green investments. The government encourages projects in renewable energy, resource efficiency, and environmentally friendly technologies. This shift aligns with global investment trends and enhances the country's long-term economic resilience.

Uzbekistan has become a strong regional economy due to its dynamic economic growth, solid infrastructure and a large potential consumer market. The government generally welcomes investors and investment projects in line with its import-substitution and export-oriented industrialization policy. Existing legislation stimulates foreign direct investors with incentives on case-by-case basis, including tax holidays, duty-free import of capital goods, and protection against expropriation.

The cornerstone of national economic policy is import substitution and export optimization. The government welcomes foreign investors mainly for localization or building local production capacities and export potential. Current legislation of Uzbekistan provides a number of incentives for foreign investment, including tax breaks and exceptions from custom duties. Under the general tax legislation, tax incentives for foreign investment are mainly the same as for local enterprises participating in the investment program, localization or modernization program. In addition, enterprises with significant foreign investment in priority sectors or regions can negotiate special benefits by concluding an investment agreement with the Government, including additional tax and customs incentives, government guarantees and co-financing. Special attention is given to regional development through the expansion of free economic zones and industrial clusters. These zones provide targeted incentives, infrastructure support, and simplified administrative procedures, which stimulate balanced regional economic growth and attract diversified investments.

Uzbekistan has signed bilateral investment agreements with more than fifty countries. These agreements have been serving for luring more FDI to national economy through establishment of free economic zones in different parts of the country. Primary legislation protecting foreign investment includes the Law on Foreign Investments, the Law on Guarantees and Measures on Protection of Foreign Investments, the Law on Guarantees of the Freedoms of Entrepreneurial Activity, the Production Sharing Agreements Law, the Law on Investment Activities, and a number of relevant decrees and resolutions. The Law on Guarantees to Foreign Investors and Protection of their rights requires that disputes directly or indirectly associated with foreign investments be settled by agreement of the parties through consultation between them. Investors are entitled to use any international dispute settlement mechanism specified in their contracts and agreements with local partners, and these agreements should define the methods of settlement.

Recent institutional reforms, including the strengthening of investment protection mechanisms and the establishment of specialized agencies for investor support, have increased investor confidence. The introduction of public-private partnership (PPP) frameworks has also opened new opportunities for large-scale infrastructure and industrial projects.

The key aspect of legislative basis of dispute settlement is the existence of a separate laws which clearly outlines the methods are regulated by the Economic Procedural Code, the Law on Arbitration Courts, and the Law on Contractual Basics of Activities of Commercial Enterprises. According to the Law on Arbitration Courts, parties of a dispute can chose their own arbiter and they in tum chose a chair. The decisions of these courts are binding. The Law says that executive or legislative bodies, as well as other state agencies, are barred from creating arbitration courts and cannot be a party to arbitration proceedings Bankruptcy procedures are regulated by the Law on Bankruptcy. Creditors can participate in liquidation or reorganization of the debtor only in the form of a creditor's committee. According

to the bankruptcy law and the Labor Code, resolvency receivers should act with consideration of workers' rights.

Taxation provides a predictable and stable flow of domestic revenue to public budget allowing them to finance development objectives and to provide public business infrastructure. Uzbekistan faces the challenge of striking the optimal balance between creating a business and investment-friendly tax regime and leveraging sufficient revenue for public service delivery which, in turn, makes economies more attractive to investors. Tax exemptions and tax preferences, special incentives are seen as the one of main factors of attracting foreign investments. Promoting well-targeted foreign investments requires a clear strategic vision that identifies key commodities and elements of their value chains - input supply, production, basic processing, trading and logistics, processing and retailing where investment is most needed. An investment strategy for intensive production supports domestic and foreign investment along agricultural value chains and focus on key areas where further investment can contribute to achieving sectoral and national development objectives of the republic. An inclusive reforms process can help build consensus on the strategy and enhance the role of the private sector in industrial development, thereby mobilizing investments.

In Uzbekistan adequate business related infrastructure, in particular in economic active areas, connects investors to their customers and suppliers and enable them to specialize and take advantage of new technologies, thereby increasing productivity and improving incomes. Such infrastructure not only supports primary and secondary production but also the development of processing industries to reduce industrial losses and increase value-addition. The government policy prioritizes the various needs for business-related infrastructure development, operations and maintenance, based on the various public policy objectives to be achieved, and allocate necessary public funding to support it. All these economic processes are strengthened by the legislative corpus of investment policy of Uzbekistan.

In conclusion, Uzbekistan's investment policy is transitioning from traditional approaches to a more innovative, transparent, and sustainable model. Continued reforms, digitalization, and strategic sector prioritization will further enhance the country's competitiveness in the global investment landscape.

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## O'ZBEKISTONDA EKSPORTGA YO'NALTIRILGAN IQTISODIY SIYOSAT VA UNING SAMARADORLIGI

**Annotatsiya:** Mazkur maqolada O'zbekistonda makroiqtisodiy siyosat samaradorligini ta'minlashda eksportga yo'naltirilgan iqtisodiy rivojlanishning ahamiyati tahlil qilingan. Shuningdek, mamlakatda amalga oshirilayotgan modernizatsiya va diversifikatsiya jarayonlari, xorijiy investitsiyalarni jalb etish mexanizmlari hamda eksport salohiyatini oshirishga qaratilgan davlat siyosatining ustuvor yo'nalishlari yoritilgan. Jahon tajribasi, xususan Yaponiya, Xitoy va Janubiy Koreya misolida eksportga yo'naltirilgan iqtisodiy modelning samaradorligi ko'rsatib berilgan. Maqolada O'zbekistonda eksportni rivojlantirishda mavjud muammolar va ularni bartaraf etish yo'nalishlari bo'yicha takliflar ishlab chiqilgan.

**Kalit so'zlar:** makroiqtisodiy siyosat, eksport, investitsiya, diversifikatsiya, modernizatsiya, xorijiy investitsiyalar, iqtisodiy o'sish, sanoat, erkin iqtisodiy zonalar, raqobatbardoshlik.

## ECONOMIC POLICY DIRECTED TO EXPORT IN UZBEKISTAN AND ITS EFFECTIVENESS

**Abstract:** This article analyzes the importance of export-oriented economic development in ensuring the effectiveness of macroeconomic policy in Uzbekistan. Also, the processes of modernization and diversification carried out in the country, the mechanisms of attracting foreign investments, and the priority directions of the state policy aimed at increasing the export potential are highlighted. The effectiveness of the export-oriented economic model has been shown by the world experience, in particular, in the case of Japan, China and South Korea. In the article, proposals were developed on the existing problems in the development of exports in Uzbekistan and directions for their elimination.

**Key words:** macroeconomic policy, export, investment, diversification, modernization, foreign investments, economic growth, industry, free economic zones, competitiveness.

Bugungi globallashuv sharoitida mamlakat iqtisodiyotining barqaror rivojlanishi ko'p jihatdan uning jahon bozoriga integratsiyalashuv darajasiga bog'liqdir. Ayniqsa, eksportga yo'naltirilgan iqtisodiy siyosat davlatlarning raqobatbardoshligini oshirishda muhim omil hisoblanadi. Shu nuqtai nazardan,

O‘zbekistonda ham iqtisodiyotni modernizatsiya qilish va diversifikatsiya qilish jarayonida eksportni rivojlantirish ustuvor yo‘nalish sifatida belgilangan.

Mustaqillik yillarida mamlakatda iqtisodiyotni liberallashtirish, bozor mexanizmlarini joriy etish, investitsiya muhitini yaxshilash va tashqi savdo faoliyatini kengaytirish borasida keng ko‘lamli islohotlar amalga oshirildi. Ayniqsa, so‘nggi yillarda eksportni qo‘llab-quvvatlash va rag‘batlantirishga qaratilgan chora-tadbirlar yangi bosqichga ko‘tarildi.

Makroiqtisodiy siyosat muvaffaqiyatini ta‘minlashning muhim omillaridan biri uning eksportga yo‘naltirilganligidir. O‘zbekistonda ham milliy iqtisodiyotni keng ko‘lamli modernizatsiya qilish va diversifikatsiya qilish bilan bir qatorda eksport salohiyatini oshirishga alohida e‘tibor qaratilmoqda.

O‘zbekiston Respublikasi Prezidenti Shavkat Mirziyoyev tomonidan 2024-yil 18-yanvar kuni o‘tkazilgan videoselektor yig‘ilishida “O‘zbekiston – 2030” strategiyasi doirasida yalpi ichki mahsulot hajmini 160 milliard dollarga yetkazish va aholi jon boshiga daromadni 4 ming dollarga oshirish vazifalari belgilandi. Ushbu maqsadlarga erishishda eksportni kengaytirish va xorijiy investitsiyalarni faol jalb qilish muhim ahamiyat kasb etadi.

Mamlakat iqtisodiyotini davlat tomonidan qo‘llab-quvvatlashning turli usullari mavjud. Jumladan, import o‘rnini bosuvchi ishlab chiqarishni rag‘batlantirish, milliy ishlab chiqaruvchilarni himoya qilish, soliq va bojxona imtiyozlarini taqdim etish orqali iqtisodiy o‘shish ta‘minlanmoqda. Biroq faqat import o‘rnini bosish siyosatiga tayanish iqtisodiy samaradorlikni cheklab qo‘yishi mumkin. Shu sababli eksportga yo‘naltirilgan ishlab chiqarishni rivojlantirish muhim hisoblanadi.

Rivojlangan davlatlar tajribasi ham bu fikrni tasdiqlaydi. Xususan, Xitoy iqtisodiyotida eksport iqtisodiy o‘shishning asosiy omillaridan biri hisoblanadi. Janubiy Koreyada esa 1960-yillardan boshlab eksportga yo‘naltirilgan siyosat amalga oshirilib, mamlakatning jahon iqtisodiyotida yuqori o‘rin egallashiga xizmat qilgan.

O‘zbekistonda ham eksport salohiyatini oshirishga qaratilgan qator chora-tadbirlar amalga oshirilmoqda. Jumladan, eksportga yo‘naltirilgan korxonalarga kreditlar ajratish, soliq imtiyozlari berish, erkin iqtisodiy zonalar tashkil etish orqali sanoatni rivojlantirishga erishilmoqda. “Navoiy”, “Angren” va “Jizzax” maxsus industrial zonalar bu borada muhim o‘rin tutadi.

So‘nggi yillarda mamlakatga jalb etilgan xorijiy investitsiyalar hajmi sezilarli darajada oshdi. Biroq eksport hajmini oshirishda ayrim muammolar saqlanib qolmoqda. Jumladan, mahsulotlarni xalqaro standartlarga moslashtirish, sertifikatlashtirish tizimini takomillashtirish va logistika infratuzilmasini rivojlantirish zarur.

Shu munosabat bilan eksportni qo‘llab-quvvatlash tizimini yanada takomillashtirish, yuqori qo‘shilgan qiymatga ega mahsulotlar ishlab chiqarishni rag‘batlantirish hamda yangi bozorlarni o‘zlashtirish dolzarb vazifa hisoblanadi. Savdoni rivojlantirish kompaniyasini tashkil etish va tadbirkorlarni reyting asosida qo‘llab-quvvatlash mexanizmlari bu borada samarali natija berishi mumkin.

O'zbekiston iqtisodiyotida eksport salohiyatini yanada oshirish, tashqi bozorlarda milliy mahsulotlar raqobatbardoshligini kuchaytirish hamda barqaror iqtisodiy o'sishni ta'minlash maqsadida quyidagi taklif va tavsiyalarni amalga oshirish maqsadga muvofiq hisoblanadi:

Birinchidan, eksport hajmini yiliga kamida 25–30 foizga oshirish uchun aniq strategik reja ishlab chiqish zarur. Bunda eksport qilinayotgan mahsulotlar turini kengaytirish, yangi istiqbolli bozorlarni o'zlashtirish hamda mavjud eksport yo'nalishlarini diversifikatsiya qilish muhim ahamiyat kasb etadi. Ayniqsa, xomashyo eksportidan bosqichma-bosqich voz kechib, yuqori qo'shilgan qiymatga ega tayyor mahsulotlar ulushini oshirish asosiy ustuvor yo'nalish bo'lishi lozim.

Ikkinchidan, mahsulotlarni sertifikatlash va standartlashtirish tizimini xalqaro talablar darajasiga olib chiqish zarur. Bugungi kunda eksport hajmini oshirishga to'sqinlik qilayotgan asosiy omillardan biri mahsulotlarning xalqaro standartlarga to'liq mos kelmasligidir. Shu sababli ISO, HACCP, GlobalGAP kabi xalqaro sertifikatlash tizimlarini joriy etish, laboratoriya infratuzilmasini modernizatsiya qilish va eksportyor korxonalarga bu borada amaliy yordam ko'rsatish muhimdir.

Uchinchidan, eksport faoliyati bilan shug'ullanuvchi korxonalarni moliyaviy qo'llab-quvvatlash mexanizmlarini yanada kengaytirish lozim. Xususan, eksport kreditlari, subsidiyalar, sug'urta xizmatlari va davlat kafolatlarini taqdim etish orqali eksportyorlar uchun qulay moliyaviy muhit yaratish zarur. Shu bilan birga, kichik va o'rta biznes subyektlarini eksport faoliyatiga keng jalb etish maqsadida ularga imtiyozli kreditlar ajratish tizimini takomillashtirish lozim.

To'rtinchidan, xalqaro marketing va brending siyosatini rivojlantirish muhim ahamiyatga ega. Mahalliy mahsulotlarni jahon bozorida tanitish, milliy brendlarni shakllantirish va ularni ilgari surish eksport hajmini oshirishda muhim omil hisoblanadi. Buning uchun xalqaro ko'rgazmalar, yarmarkalar, biznes-forumlar va savdo missiyalarida faol ishtirok etish, zamonaviy marketing texnologiyalaridan keng foydalanish zarur.

Beshinchidan, innovatsion va yuqori texnologiyali ishlab chiqarishni kengaytirish eksportni rivojlantirishning muhim yo'nalishlaridan biri hisoblanadi. Zamonaviy texnologiyalar asosida ishlab chiqarilgan mahsulotlar yuqori qo'shilgan qiymatga ega bo'lib, jahon bozorida raqobatbardosh hisoblanadi. Shu sababli ilmiy-tadqiqot faoliyatini qo'llab-quvvatlash, startup loyihalarni rivojlantirish va ishlab chiqarishga innovatsiyalarni joriy etishni rag'batlantirish zarur.

Shuningdek, logistika infratuzilmasini rivojlantirish, transport xarajatlarini kamaytirish, eksport bilan bog'liq ma'muriy tartib-taomillarni soddalashtirish ham eksport faoliyatini yanada samarali tashkil etishga xizmat qiladi.

Umuman olganda, yuqoridagi taklif va tavsiyalarni amaliyotga joriy etish O'zbekistonning eksport salohiyatini sezilarli darajada oshirish, milliy iqtisodiyotning barqaror o'sishini ta'minlash va mamlakatning jahon bozoridagi raqobatbardoshligini kuchaytirishga xizmat qiladi.

Xulosa qilib aytganda, O'zbekistonda eksportga yo'naltirilgan iqtisodiy siyosatni rivojlantirish milliy iqtisodiyot barqaror o'sishining muhim omili

hisoblanadi. Eksportni diversifikatsiya qilish, yuqori texnologiyali mahsulotlar ishlab chiqarishni kengaytirish va investitsiya muhitini yaxshilash orqali mamlakatning jahon bozoridagi raqobatbardoshligi yanada oshadi.

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## BOSHLANG'ICH SINFI O'QITUVCHILARINI AXBOROT KOMPETENTLIGINI RIVOJLANTIRISHDAGI MUAMMOLAR

**Annotatsiya:** Mazkur maqolada boshlang'ich sinfi o'qituvchilarning axborot kompetentligini shakllantirish dolzarb pedagogik muammo ekanligi asoslangan hamda bo'lajak o'qituvchilarda innovatsion kompetentlikni shakllantirishning samarali shakl, metodlaridan foydalanish imkoniyatlari va usullari ochib berilgan.

**Kalit so'zlar:** interfaol o'qitish, interfaol o'qitish metodlari, keys-stadi, videometod, trening, videotrening, innovatsion kompetentlik, viktorinalar.

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## PROBLEMS IN DEVELOPING THE INFORMATION COMPETENCE OF PRIMARY SCHOOL TEACHERS

**Abstract:** In this article, it is based on the fact that the formation of innovative competence of future teachers is an urgent pedagogical problem, and the possibilities of using effective forms and methods for the formation of innovative competence of future teachers, formal and informal assessment methods adopted by teachers are considered.

**Key words:** interactive learning, interactive teaching methods, case study, video method, learning, video training, innovative competence, quizzes.

Zamonaviy ta'limning asosiy maqsadlaridan biri — bu har bir ta'lim oluvchining nafaqat bilimlar yig'indisi bilan qurollantirilishi, balki qiziqishlari, moyilligi, rivojlanishi va tarbiyasi, ularni ta'lim jarayonidagi faol pozitsiyalarini shakllantirishiga mos ravishda sifatli ta'limni ta'minlashdan iborat. Bugun talim tizimidagi innovatsiyalarni quyidagicha tasniflash ma'qullanmoqda:

- Faoliyat yo'nalishiga qarab (pedagogik jarayondagi, boshqaruvdagi).
- Kiritilgan o'zgarishlarning tavsifiga ko'ra (radikal, modifikatsiyalangan, kombinatsiyalangan).
- O'zgarishlar kolamiga ko'ra (lokal, modulli, tizimli).



- Kelib chiqish manbayiga ko'ra (shu jamoa uchun ichki yoki tashqaridan olingan). Innovatsiyaning maqsadi - sarflangan mablagi yoki kuchdan eng yuqori natija olishdan iborat.

Ma'lumki interfaol o'qitish jarayonini tashkil etishning muhim vositasi interfaol o'qitish metodlari hisoblanadi. Interfaol o'qitish metodlari (IO'M) - ta'lim oluvchining bilish faoliyatini faollashtirish ehtiyojlaridan kelib chiqib o'quv jarayonini o'zaro hamkorlik asosida tashkil etilgan "sub'ekt-sub'ekt" munosabatlariga asoslangan o'qitish metodlari tizimidir. Hamkorlikdagi harakat, ta'lim jarayonida bilimlar, g'oyalar, faoliyat vositalarini o'zaro almashish, har bir talabaning ish jarayoniga muayyan hissa qo'shishiga imkon beradigan vositalarning mavjudligi bilan tavsiflanadi. Bunda o'zaro harakat ta'lim oluvchilarning faollashuvi, guruh tajribasiga asoslanish, teskari aloqa o'rnatish kabi tamoyillarga asoslanadi. Interfaol o'qitish metodlari an'anaviy o'qitish metodikasidan yana shu jihati bilan farqlanadiki, bunda nafaqat avval o'zlashtirilgan bilimlarni mustahkamlash, balki o'zaro hamkorlikdagi faoliyat asosida yangi bilimlarni o'zlashtirish jarayoni amalga oshiriladi.

Ta'limni axborotlashtirish boshlang'ich sinf o'qituvchilari kasbiy-mutaxassislik sifati va ularni tayyorlash darajasiga yangi talablarni qo'yadi. Ta'limni takomillashtirish mazmunida bo'lajak o'qituvchini tayyorlash sifati integral ko'rsatkichlariga insonning egallagan bilim va tajribalaridan ma'lum vaziyatlarda foydalanish malakasini xarakterlovchi kasbiy-mutaxassislik kompetentligi sifatida qaralishi lozim. O'qituvchining kasbiy-mutaxassislik kompetentligi o'z ichiga turli tarkibiy, jumladan, axborotli qismlarni ham oladi.

Ma'lumki, innovatsion ta'lim sharoitlarda o'qituvchining axborot ko'nikmasi uning professional pedagogik kompetentligini aniq belgilaydi. Bo'lajak boshlang'ich sinflar o'qituvchisining axborot ko'nikmalarini shakllantirish uning axborot qobiliyatining asosiy komponentlari (turli xil axborot faoliyatini amalga oshirish bilan bog'liq kasbiy yo'naltirilgan ko'nikmalar) va maxsus komponentlar bloklari ishlab chiqilishini nazarda tutadi, mazkur tadqiqot ishida ular birgalikda maxsus axborot kompetentligi sifatida belgilangan. Shu tariqa, o'qituvchining axborot kompetentligi boshlang'ich sinfda o'quv jarayonining samaradorligini oshirishda hal qiluvchi omil bo'lib xizmat qila boshlaydi.

Kompetentli yondashuvning ilmiy asosi mustaqil davlatlar hamdo'stligi olimlaridan O. V. Akulova, Y. S. Zair-Bek, I. A. Zimnyaya, V. A. Kozirev, A. A. Pinskiy, N. F. Radionova, M. V. Rijakov, A. P. Tryapitsina, I. D. Frumin, A. V. Xutorskiy, S. Y. Shishov va boshqalar ishlarida berilgan. Ularda boshlang'ich ta'lim nazariyasi va metodikasida informatika kursini o'qitish yoki bo'lajak boshlang'ich sinflar o'qituvchilarini tayyorlashda o'quv jarayonida axborot texnologiyalaridan foydalanish masalalari o'rganilgan. Biroq, bo'lajak boshlang'ich sinf o'qituvchilari axborot kompetentligini rivojlantirish masalasi alohida e'tibor qaratildi. Shubhasiz, agar o'qituvchilar yetarli darajada mazkur axborot texnologiyalari dasturiy mahsulotlarini izlash va tanlash qobiliyatiga ega bo'lmasa va aniq didaktik vazifalarni hal qilish uchun ularni to'g'ri qo'llash imkoniga ega bo'lmasalar, boshlang'ich sinf o'qituvchilari ushbu texnologiyalarni o'quv jarayonida qo'llashda

yetarli darajada bilimga ega bo'lmasa, boshlang'ich sinflarda yangi axborot texnologiyalaridan foydalanish befoйда bo'ladi.

Boshlang'ich sinf o'qituvchisini axborot kompetentligini rivojlantirishda quyidagi vazifalarni amalga oshirish lozim deb hisoblaymiz:

- bo'lajak boshlang'ich sinf o'qituvchisini kasbiy-mutaxassislik tayyorgarligiga zamonaviy talablar va o'qituvchining professional malakasining eng muhim tarkibiy qismlaridan biri sifatida axborot ko'nikmalarini, shu bilan birga, bo'lajak boshlang'ich sinflar o'qituvchisining axborot kompetentligini oshirishning aniq maqsadga yo'naltirilgan jarayonlarni tashkil etish;

- yangi axborot texnologiyalari sohasidagi taraqqiyot, ularning didaktik imkoniyatlari kengayib borayotganligi va o'qituvchilarni boshlang'ich ta'lim jarayonida ularni to'g'ri yo'naltirish.

Mazkur vazifalarni hal etish jarayonida bo'lajak boshlang'ich sinf o'qituvchisining axborot kompetentligini shakllantirish (rivojlantirishda boshqarish)ga yondashuvlarni ishlab chiqildi.

Bo'lajak boshlang'ich sinf o'qituvchisining axborot kompetentligini rivojlantirish asosini: insonparvarlashtirish va shaxs rivoji g'oyalari, rivojlantiruvchi va tarbiyalovchi o'qitish konsepsiyasi, o'qitish jarayonini tashkil etishga shaxsiy-faoliyatli yondashuv konsepsiyasi, pedagogik hodisalarni va uning qo'llanilishini o'rganishga tizimli yondashuv tashkil etadi.

O'qituvchi o'z faoliyatini o'z hamkasblari tahlil qila olganidek, tahlil qila olishi zarur. Busiz kasbda rivojlanishga erishib bo'lmaydi. Xo'sh, tahlil qilishning o'zi nimalardan iborat? U qanday prinsiplarga asoslanadi? Bizningcha, pedagogik faoliyatni tahlil qilganda uning barcha tarkibiy qismlarini ajratib ko'rsatish, ularning uzviy bog'liqligini chuqur tushunish, o'qituvchi qo'vgan masalalar. uni yechish yo'llari va ko'zlangan maqsadlar qanchalik uyg'unlashib ketishini his etish lozim. Bunda: birinchidrm, biz hamkasbimiz darsini tashqaridan kuzatishimiz va faoiivatini tahlil qilishimiz: ikkinchidan, o'zimiz uchun alohida ahamiyatga molik bo'lgan o'z harakatlarimizni tahlil qilishimiz kerak. Bunday tahlil (analiz) yo'ilarini egallash uchun muayyan bosqichdagi ishlarni bajarmoq zarur.

Birinchi bosqich - psixologik-pedagogik fanning yangi g'oyalari, pedagogik faoliyatning tuzilishi. uning asosiy tarkibi. uning boshqa predmetlar bilan o'zaro ta'siri va o'zaro aloqasi bilan tanishish.

Ikkinchi bosqich - tahlil. qayd etish, ro'vxtatga olish, xronometrlash yo'llarini o'rganish. Biz ishlab chiqqan tahlil sxemasi (Analiz sxemasi)da faoliyatni qanday qilib va qanday izchillikda tahlil qilish lozimligi va ular o'rtasida qanday tarkibiy qismlar va o'zaro aloqa borligini ko'rish mumkinligi bavon qilinadi. O'qituvchining o'z pedagogik faoliyatini ketma-ketlik asosida tahlil (analiz) qilish. Pedagogik topshiriqlar: - Dars (mavzu)ga qanday aniq vazifalar qo'vilgan: a) rivojlantiruvchi;

b) tarbiyalovchi;

d) talim beruvchi. –

Ular qaysi umumiy vazifaning bir qismi bo'lib hisoblanadi?

- Darsda barcha topshiriqlar bajariladimi?

- Dars davomida vazifalar o'zgaradimi? O'zgargan bolsa, nima uchun?

Pedagogik vosita va usullar:

- Mazkur sinf va alohida o'quvchilarning xususiyatlari e'tiborga olindimi:
  - a) ularning aqliy va psixik o'sishi darajasi;
  - b) potensial imkoniyatlari;
  - d) fanni bilish darajasi;
  - e) hissiy holatlar va darsga tayyorgarligi;
  - f) qanday hisobga olindi?

Agar hisobga olinmagan bolsa, nima uchun? - Mazkur sinf bilan ishlashga o'qituvchining xohishi qanday edi? Darsga tayyorgarlik darajasi-chi?

- Darsga tayyorgarlikda qanday usul va yo'llardan foydalanildi?

Darsda vaqt taqsimoti qanday boldi?

U maqsadga muvofiqmi?

Pedagogik masalalarni hal qilish uchun qo'shimcha materialdan foydalanildimi?

Qanday maqsadda?

Bu ijobiy natijaga olib keldimi?

Shunday qilib, bo'lajak boshlang'ich sinf o'qituvchisi o'z kasbiy faoliyatida yangi axborot texnologiyalaridan to'g'ri foydalanishi malakasini shakllantirish kerakdir degan xulosaga keldik.

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## **THE ROLE OF INFORMATION TECHNOLOGIES IN DEVELOPING DIGITAL COMPETENCIES AMONG MEDICAL STUDENTS**

**Abstract.** *The rapid advancement of digital technologies has significantly transformed the healthcare sector, necessitating the development of digital competencies among medical professionals. This study explores the role of information technologies in fostering digital competencies among medical students. The research highlights the importance of integrating digital tools such as electronic health records, telemedicine platforms, artificial intelligence systems, and simulation technologies into medical education. The paper examines the structure of digital competence, identifies key components required for future healthcare professionals, and analyzes modern teaching methodologies that incorporate information and communication technologies (ICT). The findings demonstrate that the effective use of digital technologies enhances clinical reasoning, decision-making, and lifelong learning skills. Furthermore, the study addresses challenges such as technological infrastructure limitations, lack of digital literacy among educators, and ethical concerns related to data security. The article concludes that systematic integration of ICT into medical curricula is essential for preparing competitive and competent healthcare professionals in the digital era.*

**Keywords:** *digital competence, medical education, information technologies, e-health, telemedicine, artificial intelligence, digital literacy, healthcare innovation.*

**Introduction.** In the 21st century, the healthcare sector is undergoing a profound transformation driven by digital innovation. The emergence of advanced technologies such as artificial intelligence, big data analytics, telemedicine, and cloud computing has fundamentally changed how healthcare services are delivered, managed, and evaluated. These changes require a new generation of healthcare professionals who are not only clinically competent but also digitally literate.

Medical education plays a crucial role in preparing future doctors for this evolving landscape. Traditionally, medical training has focused on developing clinical knowledge, diagnostic skills, and patient care competencies. However, the growing reliance on digital technologies in healthcare has introduced new requirements. Medical students must now acquire the ability to use digital tools effectively, analyze complex datasets, ensure data security, and adapt to rapidly changing technological environments. Digital competence is defined as a combination of knowledge, skills, attitudes, and ethical awareness required to use

digital technologies effectively and responsibly. The integration of information technologies into medical education is no longer optional but essential. It enables students to access vast amounts of medical information, participate in virtual learning environments, and gain practical experience through simulation-based training.

### **Conceptual framework of digital competence in medical education.**

Digital competence in medical education is a multidimensional concept that integrates technical, cognitive, and ethical components. It goes beyond basic computer literacy and includes the ability to apply digital tools in clinical practice.

Digital competence among medical students can be divided into several key components:

- ✓ **Information Literacy:** The ability to search, evaluate, and use medical information from digital sources.

- ✓ **Communication Skills:** Effective use of digital platforms for professional communication with patients and colleagues.

- ✓ **Technical Skills:** Proficiency in using healthcare software, electronic health records, and diagnostic tools.

- ✓ **Data Management:** Understanding how to collect, store, and analyze patient data securely.

- ✓ **Ethical Awareness:** Ensuring confidentiality, privacy, and responsible use of digital technologies.

These components collectively contribute to the development of a digitally competent healthcare professional.

The increasing use of digital systems in healthcare has made digital competence a fundamental requirement. Physicians must interact with electronic health records, interpret diagnostic data generated by advanced technologies, and communicate with patients through telemedicine platforms. Moreover, digital competence enhances evidence-based practice. Medical professionals can access the latest research, clinical guidelines, and treatment protocols in real time, improving the quality of patient care.

### **Role of information technologies in medical education**

*E-Learning Platforms.* E-learning platforms have revolutionized medical education by providing flexible and accessible learning opportunities. Students can access lectures, interactive modules, and assessments from anywhere, enabling continuous learning. Online learning systems also support collaborative learning through discussion forums, group projects, and virtual classrooms. This fosters communication skills and teamwork among medical students.

*Simulation Technologies.* Simulation-based education is one of the most effective methods for developing practical skills. Virtual reality (VR) and augmented reality (AR) technologies allow students to practice clinical procedures in a risk-free environment.

Simulation tools help students:

- ✓ Improve diagnostic skills

- ✓ Develop clinical decision-making abilities

- ✓ Gain confidence before interacting with real patients

*Telemedicine and remote learning.* Telemedicine has become an essential component of modern healthcare. Training medical students in telemedicine prepares them for remote consultations, which are increasingly common.

Through telemedicine platforms, students learn:

- ✓ Patient communication skills
- ✓ Remote diagnosis techniques
- ✓ Digital ethics and confidentiality

*Artificial intelligence in medical training.* Artificial intelligence (AI) is transforming both healthcare and education. AI-powered systems can analyze medical data, assist in diagnosis, and provide personalized learning experiences.

In medical education, AI is used to:

- Create adaptive learning systems
- Provide clinical decision support
- Analyze student performance

**Methodology.** This study employs a qualitative research approach, analyzing existing literature, educational practices, and technological tools used in medical training. Comparative analysis is conducted to evaluate traditional teaching methods versus technology-enhanced learning approaches.

Data sources include:

- Academic publications
- International healthcare reports
- Educational case studies

The research focuses on identifying effective strategies for integrating ICT into medical education.

**Discussion.** The findings highlight that digital competence is essential for modern medical professionals. Information technologies provide powerful tools for enhancing education, but their effectiveness depends on proper implementation.

Educational institutions must adopt a holistic approach that includes:

- ✓ Curriculum redesign
- ✓ Faculty training
- ✓ Investment in digital infrastructure

**Conclusion.** Information technologies play a pivotal role in developing digital competencies among medical students. The integration of ICT into medical education enhances knowledge acquisition, practical skills, and professional readiness.

To fully realize these benefits, educational institutions must:

- ✓ Embrace innovative teaching methods
- ✓ Invest in digital technologies
- ✓ Promote continuous learning

The future of healthcare depends on digitally competent professionals who can effectively utilize technology to improve patient outcomes.



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## **DIAGNOSTIC AND THERAPEUTIC STRATEGIES IN THE MANAGEMENT OF ACUTE ADHESIVE INTESTINAL OBSTRUCTION IN PEDIATRIC PATIENTS**

**Abstract:** *Acute adhesive intestinal obstruction (AAIO) represents one of the most common and severe conditions in abdominal surgery. According to our data, its proportion among all types of intestinal obstruction in pediatric patients составляет 38.95%, which is consistent with findings reported by other authors. The management of patients with adhesive disease of the abdominal cavity remains a significant clinical challenge due to the severity of its clinical course, the high risk of serious complications, and the lack of standardized and effective strategies for preventing recurrence.*

**Keywords:** *acute adhesive intestinal obstruction, pediatric age, diagnosis, treatment.*

### **Introduction**

To date, acute adhesive intestinal obstruction remains an unresolved and clinically significant problem in abdominal surgery. The creation of optimal conditions aimed at reducing inflammatory responses and adhesion formation represents a key reserve for improving short-term surgical outcomes [2,4,8,]. Intra-abdominal adhesions and their associated complications occupy a leading position among the causes of morbidity and mortality in abdominal surgery [5,7,]. The pathogenesis of adhesion formation is multifactorial and remains insufficiently understood. Any surgical intervention involving the abdominal organs is accompanied by fibrin deposition [1,3,5,7], which may subsequently lead to the development of intra-abdominal adhesions. These adhesions are recognized as one of the principal causes of intestinal obstruction.

Despite significant advances in the management of intra-abdominal adhesions, the incidence of complications and adhesive intestinal obstruction remains high. Notably, there is a paucity of studies investigating the role of angiogenesis in the development of intra-abdominal adhesive processes [4,6,8,]. At the same time, further investigation of this mechanism is of considerable importance for improving both the treatment and prevention of postoperative adhesions.

**Aim of the Study** The aim of this study was to optimize treatment strategies and improve clinical outcomes in patients with acute adhesive intestinal obstruction.

### **Materials and Methods**

This study is based on a comprehensive analysis of the examination and treatment of 360 pediatric patients with acute adhesive intestinal obstruction, aged from 3 months to 15 years. All patients were admitted to the Republican Scientific Center for Emergency Medical Care, Fergana Branch during the period from 2020 to 2025.

### **Results**

The use of laparoscopy in patients with suspected acute adhesive intestinal obstruction is associated with a certain degree of risk due to the potential for perforation of adherent and distended intestinal loops. Endoscopic examination in such cases revealed moderately выраженные inflammatory changes, including tissue hyperemia, edema, and contact bleeding during instrumental palpation. In most cases, the greater omentum was also involved in the pathological process. A characteristic feature of the endoscopic findings in late-stage acute adhesive intestinal obstruction was the presence of more organized membranous and cord-like adhesions. Some of these adhesions, likely subjected to prolonged traction, demonstrated increased fibrous density.

Intestinal loops fixed by adhesions to the anterior abdominal wall, which was elevated due to pneumoperitoneum, appeared significantly deformed. In some cases, this created a misleading impression regarding the level of obstruction. This particular feature of laparoscopic visualization of bowel loops adherent to the parietal peritoneum under pneumoperitoneum conditions was taken into account. In diagnostically unclear cases, emphasis was placed on a key endoscopic sign of intestinal obstruction the redistribution of intestinal gas. In such situations, identification of the transition zone between dilated and collapsed bowel loops was essential. Diagnostic laparoscopy for suspected acute adhesive intestinal obstruction was performed in 90 children aged from 3 months to 14 years. Based on the nature of pathological findings observed during laparoscopy, all patients were divided into three groups.

The application of laparoscopy in cases with equivocal clinical presentation of acute adhesive intestinal obstruction enabled the identification of a range of other acute surgical conditions of the abdominal cavity. This approach allowed for early and accurate diagnosis, facilitated the selection of an optimal surgical approach, and, in some cases, made it possible to avoid surgical intervention altogether. Gynecological diseases were most frequently identified in girls, including primary ampullary salpingitis with pelvioperitonitis and ovarian cysts. Other commonly detected conditions included phlegmonous appendicitis, mesadenitis, and additional acute abdominal pathologies.

A small subgroup of patients ( $n = 6$ ) had laparoscopic findings that excluded the diagnosis of acute adhesive intestinal obstruction. None of these patients required surgical intervention. In these cases, both endoscopic and radiological examinations confirmed the diagnosis of partial intestinal obstruction.

Based on the analysis of laparoscopic findings in 64 patients with AAIO, specific endoscopic diagnostic criteria were established, including both direct and indirect signs. Indirect endoscopic signs included the presence of dilated small bowel loops, increased intra-abdominal fluid, reactive changes of the parietal and visceral peritoneum, microcirculatory disturbances in the intestinal wall, as well as fixation and rigidity of bowel loops. Although these features accompany acute intestinal obstruction, they are not specific and are insufficient for establishing a definitive diagnosis.

A reliable diagnostic sign of intestinal obstruction was identified as the redistribution of gas within the small intestine. The key direct endoscopic sign was the visualization of a bowel segment deformed by adhesions, with a proximally dilated segment and a distally collapsed segment. This sign was absent only in one case of small bowel volvulus. Among the 64 patients with AAIO, the site of obstruction could not be identified laparoscopically in only two cases. Overall, these findings confirm that laparoscopy is a highly effective method for the early diagnosis of acute adhesive intestinal obstruction. The diagnostic accuracy of laparoscopy reached 97.7%, while the accuracy of localization of the obstruction was 96.6%. The intraoperative management of AAIO in children was predominantly conservative, given the high risk of recurrent adhesion formation associated with repeated surgical interventions.

In patients with isolated adhesions and localized adhesive processes (n = 139), surgical management consisted of selective adhesiolysis limited to adhesions directly causing obstruction, with restoration of intestinal passage. In cases of extensive adhesive disease (n = 41), surgical tactics were also based on maximal tissue preservation. Only adhesions responsible for complete intestinal obstruction were divided, as extensive adhesiolysis may increase tissue trauma and promote further adhesion formation.

However, in patients with diffuse or total adhesive processes and a history of frequent hospital admissions (up to 4–5 times per year) for recurrent obstruction, adhesive horizontal intestinal plication was performed (n = 19). This approach included careful revision of all abdominal compartments, meticulous adhesiolysis, and complete viscerolysis of the small intestine from the ligament of Treitz to the ileocecal region. The postoperative course in these patients was uneventful, and all were discharged in satisfactory condition.

All patients with AAIO exhibited varying degrees of small bowel paresis, ranging from mild dysfunction to complete gastrointestinal paralysis, accompanied by accumulation of intestinal contents and gas. These conditions resulted in significant microcirculatory disturbances in the affected bowel wall. Comparative analysis of different methods of small bowel decompression demonstrated significant advantages of the intestinal content evacuation (“milking”) technique. This method was associated with faster recovery of intestinal peristalsis, reduced postoperative complications, and shorter hospital stay.

Postoperative complications varied depending on the decompression technique used. Intestinal intubation via gastrostomy was associated with wound

infection and peristomal skin maceration in 30% of patients, and in one case, with gastrostomy failure and subsequent peritonitis requiring relaparotomy. Rectal intubation resulted in colonic injury and bleeding in 12.5% of cases. Other decompression methods (ileostomy, cecostomy, intestinal puncture) were associated with local inflammatory complications in 50% of patients. Additionally, the duration of hospitalization was significantly shorter when using the intestinal content evacuation technique compared to other decompression methods.

This minimally invasive and tissue-sparing approach to the management of AAIO in children appears promising and warrants broader clinical application.

Particular attention in this study was paid to the role of laparoscopy not only in early and accurate diagnosis but also in the treatment of acute adhesive intestinal obstruction. The indications for laparoscopic adhesiolysis were based on the premise that endoscopic interventions are most effective in cases of localized adhesive processes, especially in the presence of single, cord-like adhesions.

If visualization was hindered by a small number of bowel loops or omental strands loosely adherent to the anterior abdominal wall, these were carefully separated to facilitate inspection. In cases of extensive and dense adhesions, laparoscopic intervention was not performed.

Adhesiolysis was carried out using two manipulators inserted through additional trocars, while the laparoscope was maintained by an assistant. The use of dual-instrument technique allowed for more effective endoscopic dissection. Early-stage adhesions were separated bluntly using a rounded probe, whereas denser adhesions were divided using scissors. Highly vascular adhesions and omental structures were предварительно коагулированы.

A critical final stage of the procedure was endoscopic verification of intestinal patency. Successful restoration of bowel passage was confirmed by visualization of a non-deformed bowel segment between previously dilated and collapsed areas, with gradual expansion of the collapsed segment and free mobility upon manipulation. In cases of uncertainty, conversion to laparotomy was performed. The ability to identify the site of obstruction and perform effective adhesiolysis depended significantly on the degree of intestinal paresis. Therefore, laparoscopy demonstrated higher efficacy when performed at earlier stages of the disease.

Among 64 children with AAIO, laparoscopic adhesiolysis was performed in 43 cases, with successful resolution of obstruction achieved in 29 patients. In 21 cases, adhesiolysis was not performed due to contraindications, including severe circulatory disturbances of the bowel, extensive adhesions, intestinal fistulas, peritonitis, and inflammatory infiltrates. In 14 patients, laparoscopic treatment was unsuccessful, and conversion to laparotomy was required. Overall, laparoscopic management allowed avoidance of relaparotomy in 46.6% of patients with acute adhesive intestinal obstruction. Following successful laparoscopic treatment, patients were mobilized on postoperative days 2–3. The average hospital stay was 10.55 days, which was nearly half that observed in patients undergoing open surgery (18.73 days). In addition, the risk of complications associated with laparotomy wounds was eliminated.

The use of laparoscopy for both diagnosis and treatment of AAIO significantly improved therapeutic strategies, making them more active and effective. Laparoscopy is recommended in cases where conservative treatment fails within 2–3 hours. Prolonged ineffective conservative management leads to worsening intestinal paresis and reduces the effectiveness of endoscopic interventions. In cases of suspected strangulation obstruction, laparoscopy should be performed even earlier to allow timely diagnosis and attempt laparoscopic adhesiolysis.

Importantly, no postoperative complications or mortality were observed in patients who underwent successful laparoscopic adhesiolysis.

### **Conclusion**

The present study demonstrated that the volume and duration of conservative therapy, as well as differential diagnostic measures in patients with suspected acute adhesive intestinal obstruction, depend on the stage and phase of the disease. Patients presenting with a hyperacute phase require immediate surgical intervention upon admission, following short-term preoperative preparation. In children with the acute phase, the duration of conservative and diagnostic measures should not exceed 3–4 hours. In cases of suspected subacute disease, a more prolonged course of conservative therapy may be justified for definitive confirmation or exclusion of the diagnosis. The widespread use of laparoscopy in the diagnosis of acute adhesive intestinal obstruction has established it as a highly informative method, with localization of the pathological process achieved in 95.5% of cases. Intraoperative management is determined by the extent of the adhesive process, the severity of intestinal paresis, and the degree of microcirculatory disturbances in the bowel. For gastrointestinal decompression, a gentle and effective technique involving the evacuation (“milking”) of small intestinal contents into the large intestine or stomach was successfully applied. The implementation of laparoscopic interventions allowed resolution of intestinal obstruction and avoidance of laparotomy in nearly half of the patients with acute adhesive intestinal obstruction.

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## **CRYSTALLOGRAPHIC ASSESSMENT OF URINARY TRACT DAMAGE IN ETHYLENE GLYCOL-INDUCED NEPHROLITHIASIS**

**Abstract:** *Nephrolithiasis is one of the most pressing issues in modern urology and nephrology, in the development of which metabolic disorders and exogenous toxic factors play an important role. Ethylene glycol-induced nephrolithiasis is widely used through experimental models to study the pathogenesis of this pathology. The aim of this study was to evaluate the characteristics of urinary tract damage in ethylene glycol-induced nephrolithiasis based on crystallographic analysis of urinary sediment.*

*The microscopic and crystallographic characteristics of urinary sediment were examined in the study. Results showed that under the influence of ethylene glycol, calcium oxalate crystals predominantly form in the urine, and their morphology and density change significantly. It was found that crystal aggregation and structural changes are closely related to damage of the urinary tract epithelium.*

*The data obtained indicate that crystallographic analysis of urinary sediment is of great importance for early diagnosis of nephrolithiasis and assessment of its severity.*

**Keywords:** *nephrolithiasis, ethylene glycol, urinary sediment, crystallography, calcium oxalate, urinary tract*

### **Introduction**

Nephrolithiasis is one of the most common diseases of the urinary system, and its incidence has increased significantly in recent years. This pathology not only reduces patients' quality of life but can also lead to serious complications, including urinary tract obstruction, infection, and renal failure. Metabolic disorders, genetic predisposition, and environmental factors play an important role in the development of nephrolithiasis.

In experimental studies, ethylene glycol is a widely used model for artificially inducing nephrolithiasis. As a result of its metabolism, oxalates are formed, which combine with calcium to form calcium oxalate crystals. These crystals exert mechanical and toxic effects on the urinary tract epithelium, causing inflammatory and degenerative changes in tissues.

Among modern diagnostic methods, crystallographic analysis of urinary sediment occupies a special place. This method provides important information

about the developmental stages and severity of nephrolithiasis by determining the shape, size, and degree of aggregation of crystals.

In this regard, studying the crystallographic characteristics of urinary tract damage in ethylene glycol-induced nephrolithiasis is scientifically and practically relevant.

### **Research aim**

To identify and evaluate the characteristics of urinary tract damage in an ethylene glycol-induced nephrolithiasis model based on crystallographic analysis of urinary sediment.

### **Research objectives**

1. To create an experimental nephrolithiasis model under the influence of ethylene glycol and study its development dynamics.
2. To determine the crystallographic characteristics of urinary sediment at different time points (10, 30, and 60 days).
3. To evaluate the type, morphology, and degree of aggregation of crystals forming in urine.
4. To compare quantitative and qualitative changes in crystals with the degree of urinary tract epithelium damage.
5. To determine the informativeness of crystallographic analysis of urinary sediment in diagnosing nephrolithiasis.
6. To evaluate the relationship between the duration of ethylene glycol exposure and the crystal formation process.

### **Materials and methods**

The study was conducted under experimental conditions and involved a total of 120 outbred guinea pigs (*Cavia porcellus*). The animals were kept under standard vivarium conditions with free access to food and water. The study was carried out in accordance with bioethical requirements.

All animals were randomly divided into 4 groups:

1. Control group (n=30) — received regular drinking water
2. Experimental group I (n=30) — received 1% ethylene glycol solution for 10 days
3. Experimental group II (n=30) — received 1% ethylene glycol solution for 30 days
4. Experimental group III (n=30) — received 1% ethylene glycol solution for 60 days

Ethylene glycol was administered ad libitum through drinking water.

During the study, urine samples were collected from the animals, and the sediment was separated by centrifugation (3000 rpm, 10 minutes). The obtained urinary sediment was subjected to microscopic examination.

Crystallographic analysis was performed based on the following criteria:

1. Type of crystals (calcium oxalate, urate, and others)
2. Morphology (octahedral, amorphous, aggregated forms)
3. Crystal density and degree of aggregation
4. Presence of epithelial cells and detritus

Microscopic evaluation was performed under light microscopy at  $\times 100$  and  $\times 400$  magnification.

The obtained results were statistically processed and inter-group differences were analyzed.

**Results:** The study results showed that prolonged ethylene glycol exposure leads to significant changes in the crystallographic composition of urinary sediment.

In the control group, pathological crystals were almost absent in the urinary sediment; only small amounts of amorphous salts were occasionally observed.

In the 10-day experimental group, isolated calcium oxalate crystals (mainly in octahedral form) began to appear in the urinary sediment. Their number was relatively low, and aggregation was almost not observed.

In the 30-day experimental group, a significant increase in the number of crystals was recorded. Calcium oxalate crystals were detected in enlarged and clustered arrangements with increased aggregation. At the same time, an increase in the number of epithelial cells and cellular detritus in the urine was observed, indicating damage to the urinary tract epithelium.

In the 60-day experimental group, maximum proliferation of crystals and their conglomerate formation were identified. Calcium oxalate crystals changed not only in number but also morphologically — forming irregularly shaped, adhered complex structures. Numerous epithelial cells, leukocytes, and detritus were found in the urinary sediment, indicating the development of inflammatory and degenerative processes in the urinary tract.

Thus, it was found that there is a direct correlation between the duration of ethylene glycol exposure, the formation of calcium oxalate crystals in urine, their aggregation, and the degree of urinary tract epithelium damage.

### **Discussion**

The results of the study showed that the crystallographic characteristics of urinary sediment change significantly in an ethylene glycol-induced nephrolithiasis model. With increasing duration of the experiment, the formation of calcium oxalate crystals, their morphological diversification, and the degree of aggregation progressively increased.

At the 10-day observation stage, the isolated and low-quantity appearance of crystals reflects the initial stage of the pathological process. During this period, crystals were mainly in classical octahedral form, and epithelial damage was observed at a minimal level.

At the 30-day experimental stage, increased crystal aggregation and a rise in the number of epithelial cells indicate intensified mechanical and toxic effects on the urinary tract epithelium. This stage corresponds to the active development period of nephrolithiasis.

The 60-day observation results showed maximum expression of the pathological process. Conglomerate formation of crystals, their transition to irregular morphological forms, and the increase of leukocytes and detritus in urine confirm the development of inflammatory and degenerative changes.

The obtained results indicate that crystallographic analysis of urinary sediment allows not only the detection of nephrolithiasis, but also the determination of its developmental stage. This method represents a promising direction for early diagnosis and monitoring in clinical practice.

### **Conclusions**

1. The development of nephrolithiasis under the influence of ethylene glycol is characterized by the formation of calcium oxalate crystals in the urine and their progressive aggregation.

2. With increasing duration of the experiment, morphological changes and density of crystals increase, and the degree of urinary tract epithelium damage intensifies.

3. Crystallographic analysis of urinary sediment is a highly informative method for diagnosing nephrolithiasis and assessing its severity.

4. This method is of great importance for detecting early stages of nephrolithiasis and monitoring the dynamics of the pathological process.

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## TA'LIM JARAYONIDA RAQAMLASHTIRILGAN ADABIYOTLARDAN FOYDALANISH SAMARADORLIGI OSHIRISH

**Anatatsiya.** Maqolada zamonaviy o'quv jarayonida raqamlashtirilgan ta'lim resurslaridan foydalanish samaradorligini oshirishning didaktik va metodik jihatlari ko'rib chiqiladi. Pedagogika va psixologiya sohasidagi so'nggi tadqiqotlarga tayanib, muallif oddiy "raqamdan foydalanishni" bilim sifatini oshirishning haqiqiy vositasiga aylantiradigan omillarni tahlil qiladi. Pedagogik dizayn muammosiga, o'qituvchi rolini o'zgartirish zaruriyatiga va aralash ta'lim muhitini yaratishga alohida e'tibor qaratilgan. Maqolada kontentni tanlash, interaktiv elementlarni integratsiya qilish va ta'lim natijalarini baholash bo'yicha amaliy tavsiyalar berilgan.

**Kalit so'zlar:** ta'limni raqamlashtirish, elektron darslik, pedagogik dizayn, interaktivlik, o'qitish samaradorligi, aralash ta'lim, o'qituvchining raqamli kompetensiyasi, o'quvchilarning faolligi.

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## IMPROVING THE EFFICIENCY OF USING DIGITAL LITERATURE IN THE EDUCATIONAL PROCESS

**Abstract:** The article examines the didactic and methodological aspects of improving the efficiency of using digital educational resources in the modern educational process. Drawing on the latest research in pedagogy and psychology, the author analyzes the factors that transform the mere use of "digital" into a real tool for improving the quality of knowledge. Special attention is paid to the problem of pedagogical design, the need to transform the role of the teacher, and the creation of a blended learning environment. The paper offers practical recommendations for content selection, integration of interactive elements, and assessment of learning outcomes.



**Keywords:** digitalization of education, electronic textbook, pedagogical design, interactivity, learning efficiency, blended learning, digital competence of the teacher, student engagement.

## **Kirish**

Zamonaviy ta'lim tizimining asosiy tendensiyalaridan biri bu uni raqamlashtirish hisoblanadi. Elektron darsliklar, multimedia platformalari va interaktiv kontentlar o'quv jarayonining ajralmas qismiga aylanib bormoqda. 2023/2024 o'quv yili boshidagi ma'lumotlarga ko'ra, Rossiya Federatsiyasi oliy ta'lim muassasalarida bakalavriat, magistratura va mutaxassislik dasturlari bo'yicha tahsil olayotgan talabalarning 51 foizi elektron ta'lim elementlaridan foydalangan holda o'qitilgan. Biroq, raqamli resurslarning mavjudligi ularning qo'llanilishi avtomatik ravishda ta'lim sifatini oshirishini anglatmaydi.

Ko'plab amaliyotchilar "raqamlashtirish" tushunchasini "samaradorlik" bilan tenglashtirish xatosiga yo'l qo'yadilar. Agar elektron adabiyot oddiy matnli fayl sifatida ishlatilsa, u an'anaviy qog'oz kitobdan funksional jihatdan farq qilmaydi. Raqamli transformatsiyaning haqiqiy maqsadi – o'qitishning yangi didaktik imkoniyatlarini yaratish va ulardan foydalanishdir. Ushbu maqolaning maqsadi – ta'lim jarayonida raqamlashtirilgan adabiyotlardan foydalanish samaradorligini oshirish omillarini tahlil qilish va amaliy tavsiyalar ishlab chiqishdan iborat.

## **Asosiy qism**

### **1. Raqamli adabiyotlarning didaktik salohiyati**

Raqamli adabiyotlarning samaradorligi ularning qog'oz nashrlardan farqli o'laroq, ta'lim jarayoniga qo'shadigan qo'shimcha qiymat bilan o'lchanadi. Zamonaviy tadqiqotlar quyidagi asosiy afzalliklarni ajratib ko'rsatadi:

**Interaktivlik va multimedialilik:** Elektron nashrlar matnni nafaqat o'qish, balki video va audio materiallarni tomosha qilish, animatsiyalarni kuzatish, virtual laboratoriyalarda tajribalar o'tkazish imkonini beradi. Bu, ayniqsa, maktabgacha va boshlang'ich ta'limda muhimdir, chunki bolalar ma'lumotni turli sezgi organlari orqali qabul qilishadi.

**Moslashtirish (individualizatsiya):** Raqamli platformalar o'quv materialini o'quvchining individual ehtiyojlariga moslashtirish imkonini beradi. O'quvchi o'zi uchun qulay sur'atda ishlashi, topshiriqlar darajasini tanlashi mumkin. Bu, ayniqsa, maxsus ta'lim ehtiyojlari bo'lgan bolalar uchun katta ahamiyatga ega.

**Dolzarblik va harakatchanlik:** Raqamli kontentni yangilash qog'oz kitobga qaraganda ancha oson. Shuningdek, internetga ulangan qurilma orqali istalgan vaqtda va istalgan joyda o'quv materiallariga kirish imkoniyati mustaqil ta'lim olish ko'nikmalarini shakllantiradi.

### **2. Samaradorlikka erishish shartlari: Pedagogik dizayn va platforma imkoniyatlari**

Raqamli adabiyotlardan foydalanish samaradorligi ularning texnik mukammalligidan ko'ra, pedagogik dizayn sifatiga ko'proq bog'liq. Tajribalar shuni ko'rsatadiki, agar platforma oddiy "fayl ombori" sifatida ishlatilsa, undan

olinadigan foyda minimaldir. Haqiqiy samaradorlik quyidagi hollarda yuzaga keladi:

**Aralash ta'lim modellarida:** Raqamli vositalar o'qituvchi bilan jonli muloqot qilish vaqtini to'liq raqamlashtirib bo'lmaydigan faoliyat turlari (diskusiyalar, keyslar, loyihalar) uchun bo'shatib beradi.

**Teskari aloqa tizimida:** Zamonaviy LMS platformalari (masalan, Moodle) nafaqat topshiriqlarni avtomatik tekshirish, balki o'quvchining "raqamli izi" (qaysi mavzuni necha marta ochgani, testda qayerda xatoga yo'l qo'ygani) orqali uning qiyinchiliklarini tahlil qilish imkonini beradi.

**Baholashning ishonchliligida:** Masofaviy imtihonlarda akademik halollikni ta'minlash uchun proktoring tizimlari (talabaning imtihon vaqtidagi xatti-harakatlarini kuzatish) va ochiq javobli topshiriqlardan foydalanish talab etiladi.

### **3. Asosiy muammo va cheklovlar**

Raqamli adabiyotlarning samaradorligini pasaytiruvchi bir qator omillar mavjud. Birinchi navbatda, bu o'qituvchilarning raqamli kompetensiyasidir. Tadqiqotlar shuni ko'rsatadiki, o'qituvchilar, ayniqsa, keksa avlod vakillari, yangi texnologiyalarni yaratish va ulardan foydalanishda qiyinchiliklarga duch kelishadi. Bu muammoni hal qilish uchun pedagog kadrlarning malakasini muntazam oshirib borish, ularni nafaqat texnik vositalardan foydalanishga, balki raqamli kontentni metodik jihatdan qayta ishlashga o'rgatish zarur.

Ikkinchi muhim muammo – bu o'quvchilarning diqqatini jamlay olmasligi va "klip tafakkuri"dir. Psixologik tadqiqotlar shuni ko'rsatadiki, haddan tashqari ko'p multimedia vositalari va gipermatnlar o'quvchilarning asosiy mazmunni tushunishiga to'sqinlik qilishi mumkin. Ma'lumotni qayta ishlashning yuzakiligi chuqur bilim olishga xalaqit beradi. Shuning uchun raqamli adabiyotlarni yaratishda ergonomika, ranglar gammasi va shriftlarga alohida e'tibor qaratish lozim.

### **4. Samaradorlikni oshirish yo'llari**

Yuqoridagi tahlillardan kelib chiqib, ta'lim jarayonida raqamlashtirilgan adabiyotlardan foydalanish samaradorligini oshirishning quyidagi yo'nalishlarini taklif qilish mumkin:

**O'qituvchilarni tayyorlash va qo'llab-quvvatlash.** Maktab va oliygohlarda raqamli kontent yaratish va undan foydalanish bo'yicha malaka oshirish kurslari, master-klasslar tashkil etish. O'qituvchilar turli platformalar (masalan, Delfi, Genially) imkoniyatlarini solishtirish va eng maqbulini tanlash imkoniyatiga ega bo'lishlari kerak.

**Sifatli pedagogik dizayn.** Elektron darsliklar nafaqat ma'lumot beruvchi, balki o'quvchini fikrlashga undovchi, muammoli vaziyatlar yaratuvchi va loyiha faoliyatiga yo'naltiruvchi vosita bo'lishi kerak. Raqamli kontent o'quvchining yoshi va psixologik xususiyatlariga mos bo'lishi lozim.

**Texnik infratuzilmani mustahkamlash.** Bu nafaqat kompyuter va internet bilan ta'minlash, balki ma'lumotlarning xavfsizligi va maxfiyligini kafolatlovchi tizimlarni yaratishni ham o'z ichiga oladi.

**Muvozanatni saqlash.** Ta'lim jarayonida an'anaviy (og'zaki, amaliy) va raqamli metodlarning uyg'unligini ta'minlash. Jonli muloqot va hamkorlikni talab qiladigan mashg'ulotlarni to'liq raqamlashtirishdan qochish kerak.

### **Xulosa**

Raqamlashtirilgan adabiyotlar ta'lim tizimining kelajagi bo'lib, ulardan to'g'ri foydalanilganda o'quv jarayonining samaradorligini sezilarli darajada oshirishi mumkin. Ular ta'limni individuallashtirish, dolzarbligini ta'minlash va interaktiv qilish imkonini beradi. Biroq, "raqam" o'qituvchining o'rnini bosa olmaydi. Samaradorlikka erishishning asosiy sharti – bu pedagogik dizayn tamoyillariga rioya qilish, o'qituvchilarning raqamli kompetensiyasini oshirish va texnologiyalarni o'quv jarayoniga o'ylangan holda, an'anaviy metodlar bilan uyg'unlikda integratsiya qilishdir. Faqatgina bunday kompleks yondashuv raqamli transformatsiyani ta'lim sifatining real o'sishiga aylantirishi mumkin.

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## **QALAMTASVIRNING ARXITEKTURA ESKIZLARI VA KOMPOZITSIYADAGI ROLI**

**Annotatsiya:** Mazkur maqolada qalamtasvirning arxitektura eskizlari va kompozitsiyadagi o'rni, uning me'moriy g'oyani shakllantirishdagi ahamiyati ilmiy-uslubiy jihatdan tahlil qilingan. Arxitektura eskizi loyihalash jarayonining dastlabki bosqichi sifatida me'moriy shakl, proporsiya va fazoviy yechimni aniqlashda muhim vosita ekanligi asoslab berilgan. Qalamtasvir orqali obyektning konstruktiv tuzilishi, perspektiva qonunlari, yorug'lik-soya munosabatlari hamda kompozitsion muvozanatni ifodalash imkoniyatlari ko'rib chiqilgan. Shuningdek, talabalarda fazoviy tafakkur, estetik did va ijodiy yondashuvni rivojlantirishda qalamtasvir mashg'ulotlarining ahamiyati yoritilgan. Maqolada arxitektura ta'limida nazariy bilimlar va amaliy mashg'ulotlar uyg'unligi asosida grafik ko'nikmalarni shakllantirish metodikasi tavsiya etilgan.

**Kalit so'zlar:** qalamtasvir, arxitektura eskizi, kompozitsiya, perspektiva, proporsiya, yorug'lik va soya, fazoviy tafakkur, grafik ifoda, me'moriy shakl, dizayn, metodika, arxitektura ta'limi, eskiz, ijodiy yondashuv.

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## **THE ROLE OF PENCIL DRAWING IN ARCHITECTURAL SKETCHES AND COMPOSITION**

**Abstract:** This article analyzes the role of pencil drawing in architectural sketches and composition, its importance in the formation of an architectural idea from a scientific and methodological point of view. It is substantiated that an architectural sketch is an important tool for determining architectural form, proportions and spatial solutions as the initial stage of the design process. The possibilities of expressing the constructive structure of an object, the laws of perspective, light-shadow relationships and compositional balance through pencil drawing are considered. The importance of pencil drawing classes in developing spatial thinking, aesthetic taste and creative approach in students is also highlighted. The article recommends a methodology for the formation of graphic

*skills in architectural education based on the combination of theoretical knowledge and practical exercises.*

**Keywords:** *pencil drawing, architectural sketch, composition, perspective, proportion, light and shadow, spatial thinking, graphic expression, architectural form, design, methodology, architectural education, sketch, creative approach.*

Arxitektura eskizi me'moriy g'oyaning dastlabki grafik ifodasi bo'lib, loyiha jarayonining boshlang'ich bosqichida muhim o'rin tutadi. Eskizlar yordamida arxitektor o'z fikrini tezkor va aniq shaklda qog'ozga tushiradi, me'moriy shaklning umumiy hajmi, proporsiyalari va kompozitsion yechimini belgilaydi. Ushbu jarayonda qalamtasvir asosiy ifoda vositasi hisoblanadi.

Qalamtasvir orqali bajarilgan eskizlar me'moriy ob'ektning konstruktiv tuzilishini anglash, uning fazodagi joylashuvi va atrof-muhit bilan o'zaro bog'liqligini aniqlash imkonini beradi. Eskizlar loyiha muhokamasi, tahlili va takomillashtirish jarayonida muhim kommunikativ vosita vazifasini bajaradi.

Qalamtasvirning asosiy ifoda vositasi chiziq hisoblanadi. Chiziq orqali shaklning konturi, konstruktiv asoslari va hajmi ifodalanadi. Arxitektura eskizlarida chiziqning xarakteri – qalinligi, yo'nalishi va ritmi me'moriy obrazning ifodaviyligini belgilaydi.

Shakl esa me'moriy ob'ektning fazoviy tuzilishini ifodalaydi. Qalamtasvirda shaklni to'g'ri tasvirlash uchun proporsiya va perspektiva qonunlariga amal qilish zarur. Talabalar ushbu jarayonda oddiy geometrik shakllardan murakkab arxitektura ob'ektlariga o'tish orqali o'z malakalarini bosqichma-bosqich rivojlantiradilar.

Arxitektura eskizlarida perspektiva qoidalariga amal qilish muhim ahamiyatga ega. Perspektiva yordamida ob'ektlarning fazodagi joylashuvi, ularning hajmi va masofaga nisbatan o'zgarishi to'g'ri ifodalanadi. Qalamtasvir orqali bajarilgan perspektiv tasvirlar arxitektura loyihasining real ko'rinishini tasavvur qilish imkonini beradi.

Talabalarning perspektiv tasvirlash ko'nikmalarini shakllantirish ularning fazoviy tafakkurini rivojlantiradi. Bu esa keyinchalik murakkab arxitektura loyihalarini yaratishda muhim asos bo'lib xizmat qiladi.

Kompozitsiya – bu me'moriy ob'ekt elementlarining o'zaro uyg'un joylashuvi bo'lib, u arxitektura eskizlarida muhim rol o'ynaydi. Qalamtasvir yordamida kompozitsiyaning asosiy qonunlari – muvozanat, ritm, simmetriya va assimetriya ifodalanadi.

Arxitektura eskizlarida kompozitsiya ob'ektning umumiy qiyofasini belgilaydi. To'g'ri tanlangan kompozitsion yechim me'moriy g'oyaning aniq va tushunarli ifodalanishiga xizmat qiladi. Talabalar kompozitsiya asoslarini o'rganish jarayonida ijodiy fikrlash va estetik qarashlarni rivojlantiradilar.

Qalamtasvirda hajmni ifodalash yorug'lik va soya munosabatlari orqali amalga oshiriladi. Yorug'lik manbasining joylashuvi, soyaning yo'nalishi va intensivligi ob'ektning hajmli ko'rinishini yaratadi. Arxitektura eskizlarida ushbu munosabatlarni to'g'ri ifodalash me'moriy shaklning real qabul qilinishiga yordam beradi.



Murakkab shakldagi buyumlarning gips modellarini chizish, boshning tafsilotlari va inson boshining o'zi kabi juda murakkab hajmlarni chizish bilan bog'liq kelgusi ishlar uchun zarurdir.

Gips bezaklarini chizishning o'ziga xos xususiyati shundaki, buyum aniq hajmga ega murakkab sirt bilan tavsiflanadi. Gips bezaklarini chizayotgan rassom uchun buyumning aniq tasviri, uning tashqi ko'rinishi va material xususiyatlari juda muhimdir. Lekin bundan oldin ham siz butun bezakni barcha tafsilotlari bilan ko'rishingiz kerak.

Tabiat bizga tasavvur qilib bo'lmaydigan xilma-xil plastik shakllarni, ularning hayratlanarli kombinatsiyalarini va kutilmagan o'tishlarini taqdim etadi. Shu bilan birga, tabiat tomonidan yaratilgan har bir shakl uyg'unlik va maqsad bilan ajralib turadi. Shubhasiz aytish mumkinki, dekorativ va amaliy san'at inson tomonidan ijodiy qayta ishlangan tabiiy shakllardan tug'ilgan.

Haykaltaroshlik va me'morchilikning eng buyuk namunalari qadimgi yunon xalqining dahosi tomonidan yaratilgan. Qadimgi yunonlar tabiatning eng ajoyib elementlarini o'z shakllari uchun olib, ularni ma'naviy ehtiyojlariga muvofiq uslublashtirganlar.

Masalan, janubiy o'tli o'simlik shaklidagi me'moriy inshootlarni bezab turgan bezak - akantus yoki nomi yunonlarga daryo o'zanini eslatgan klassik, g'ayrioddiy ixcham, noyob go'zal "meandr" bezaklari kabi bezak naqshlari bizga tabiatni chuqur bilishimizni isbotlamaydimi?

Tabiatga, uning o'simlik va zoomorfik elementlariga o'xshash munosabat dunyoning barcha xalqlariga xosdir, ularning bezak san'ati tasavvurni hayratga soladi va badiiy ijod xazinasini tashkil qiladi.

Dekorativ san'atda voqelik tasvirlari rassomning ijodiy irodasi bilan ushbu san'atga xos shakllarga aylantiriladi, bu, avvalo, ob'ektning maqsadi bilan bog'liq.

Xo'sh, me'moriy buyumlar va o'simlik bezaklarining umumiy jihatlari nimada bo'lishi mumkin? Axir, har qanday binoning mohiyati uning amaliy maqsadida — uy, jamoat joyi va boshqalar sifatida. O'simlik bezaklari matolar, dasturxon va me'moriy inshootlarni bezash uchun ishlatiladi.

Biroq, qadimgi yunonlar Korinf poytaxtlarini - ustunlarning yuqori qismini bezashda o'simlik elementlaridan foydalangan yagona odamlar emas edilar. O'simlik va geometrik bezaklar barcha strukturaviy elementlar va me'moriy xususiyatlar bilan birlashib, ajralmas holga kelgan ko'plab binolar mavjud. Albatta, ular faqat dekorativ maqsadlarda ishlatilgan, ammo me'mor strukturani barcha sof strukturaviy va dekorativ elementlarning ajralmas birligi sifatida tasavvur qilgan.

Siz me'moriy maqsadlar uchun mo'ljallangan ushbu dekorativ relyeflardan birini gipsli quyma shaklida chizasiz. Bu gulli bezak bo'lib, stilize qilingan o'simlik shoxini tasvirlaydi. Me'moriy relyef bezaklarining gipsli quymasining o'ziga xos xususiyati shundaki, u chapdan yoki yuqoridan har qanday yorug'lik ostida shaklning ravshanligi va yorug'lik va soyaning ifodali o'tishlarini ifodalaydi.

Ushbu hayot chizish mashqining qiyinligi shundaki, model sizni ishingizga katta ehtiyotkorlik va yakuniy natija uchun kuchli mas'uliyat hissi bilan yondashishga majbur qiladi. Biroq, har qanday akademik rasm chizish mas'uliyatli



yondashuvni talab qiladi, chunki mashq nafaqat vizual muammolarni, balki rassomning fikrlash jarayonini rivojlantirishga qaratilgan muammolarni ham hal qiladi.

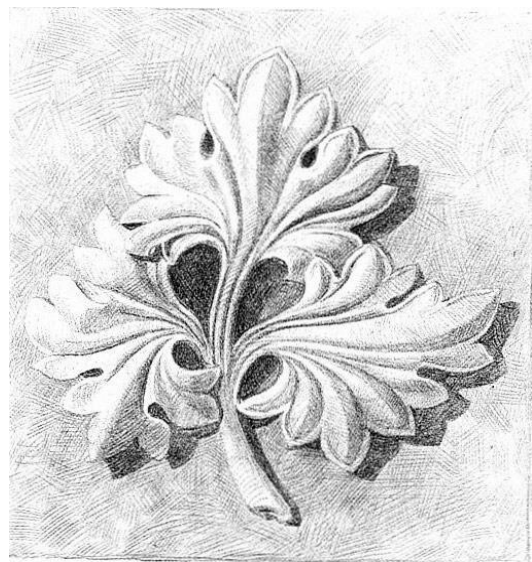
Gips— eng yaxshi vizual xususiyatlari sun'iy yorug'lik ostida namoyon bo'ladigan material. Ushbu yorug'lik ostida u aniq soyalar, o'rta tonlarning ifodali yumshoqligi va perpendikulyar ravishda yoritilgan jonli joylarni hosil qiladi. Tabiatga mutanosib tonal munosabatlarga erishish va undan oldin shaklni mohirona qurish sizning asosiy maqsadingizdir.

Siz allaqachon bilganingizdek, rasm chizish tabiatning ko'plab plastik xususiyatlarini - shakl, hajm, fazoviy chuqurlik, yorug'lik va ranglarning to'yinganligini - boshqacha aytganda, ranglar xilma-xilligidan tashqari ob'ektni tavsiflovchi deyarli hamma narsani ifodalashi mumkin. Xo'sh, nimani tanlashingiz kerak, nimani ta'kidlashingiz kerak va tabiatni qanday ifodalashingiz kerak?

Ma'lumki, umumiy siluet va uning plastik ifodali chiziqli shaklidagi konturi shaklni tasvirlashda katta ahamiyatga ega, diqqat tabiatning mayda detallariga emas, balki faqat eng xarakterli detallariga qaratiladi, ularning rolini ta'kidlaydi va kuchaytiradi.

Shuning uchun, gips bezak yasashni boshlashda, modelni oldindan sinchkovlik bilan o'rganishga harakat qiling. Buning uchun siz uni bir necha tomondan kuzatishingiz, shaklning asosiy tuzilishini tushunishingiz va barcha elementlarning bir-biriga va bezak hajmi relyefda paydo bo'ladigan plitaga joylashishi va mutanosib munosabatlarini chinakam yodlab olishingiz kerak.

Hayotdan, joylashuvingizdan olingan dizaynning dastlabki eskizi ishingizda ajralmas yordamchi bo'ladi. Bu sizga dizaynni kichikroq o'lchamda bo'lsa ham



joylashtirish muammosini hal qilishga yordam beradi. Bundan tashqari, siz modelning tashqi ko'rinishini kuzatish orqali diqqat bilan o'rganib, yodlab olasiz. Siz tanlagan qog'oz formati bu muammoni qanchalik oson yoki baribir qiyinchilik bilan hal qilishingizga bog'liq. Esingizda bo'lsin, format tabiatning o'zi tomonidan belgilanadi. Ushbu rasmda siz avval o'rganilgan ohang bilan ishlash usullarini amalda qo'llashingiz kerak va esda tutish kerak bo'lgan asosiy narsa shundaki, lyuk yoki soyalash shakl va makonni ifodalashi kerak.

Turli xil texnikalar chizmaning ba'zi qismlarini kuchliroq va ifodaliroq ochib berishi mumkin, boshqalari esa kamroq. Ammo agar siz eng muhim narsani unutmasangiz, maqsadga erishiladi: munosabatlar bilan ishlash zarurati, ya'ni doimiy ravishda to'g'ri ohangni topish, barcha ohanglarni bir-biri bilan taqqoslash, nafaqat mavzuning tor qismini, balki eng keng ko'lamli ko'rish doirasini ham hisobga olish. Tabiatdagi ohanglarning g'ayrioddiy boyligi va chuqurligini hisobga olgan holda, oxirigacha eng qorong'u joylarda "zaxira" qoldiring. Esingizda bo'lsin, agar umumiy

munosabatlar saqlanib qolsa, agar bir xil ohang turli qismlarda takrorlanmasa, balki uning tebranishlarida rivojlansa, unda qalamning to'liq kuchidan foydalanishga hojat yo'q.

His-tuyg'u va hisoblash bir-biri bilan chambarchas bog'liq bo'lishi kerak, ustunlik qilmasdan. Afsuski, sizda hali ham izchil ishlash uchun zarur tajriba, chidamlilik va sabr-toqat yetishmaydi. Plitaning umumiy shakli va uning relyefini aniqlab bo'lgach, darhol nisbatlarni to'g'rilang, so'ngra xarakterli tafsilotlarni qo'shishni unutmang. Modelning ramkasini tuzgandan so'ng, perspektiva qonunlarini ko'rib chiqing va tonal farqlarni ta'kidlang.

Shundan so'ng, ohang bilan ishlashni boshlang. Har doim munosabatlarning birligini yodda tuting; mavzuning alohida qismlarini alohida nusxa ko'chirmang, chunki qolganlarini keyinroq "moslashtirishingiz" kerak bo'ladi.

Shunday qilib, bezak rasmini tuzib, siz uni diqqat bilan o'rganasiz, katta va kichik qismlarning mutanosib munosabatlarini tekshirasiz, uni tabiat bilan taqqoslaysiz, yana bir bor aniqlaysiz va rassomning tabiatda ko'rinadigan narsalarga o'xshashlikka erishish istagida ifodalangan, har doim o'zining aniqligi bilan qiziqarli bo'lgan asar bosqichiga o'tasiz.

Barcha tabiiy shakllarning birligini gips bezaklarini chizishga yaqinlashtirishga intilishda, stilize qilingan o'simlik shakllari hajmi jihatidan boshqacha modellashtirilishi kerakligini unutmaslik kerak: ba'zilar ifodaliroq va jonliroq, boshqalari esa bo'shashganroq. Ammo ko'plab talabalar bitta umumiy xususiyatga ega: tabiatdagi hamma narsaga soddalik bilan qarash va hamma narsani "tugatish"da teng darajada ehtiyotkorlik.

Shu bilan birga, shaklni ohang bilan modellashtirishni diversifikatsiya qilish kerak, chunki o'simlik bezaklarining kichik shakllari tuzilishi va chiaroskuro nuanslari bilan to'ldirilishi jihatidan farq qiladi.

Ishlayotganingizda, chizmangizni asl nusxasi bilan doimiy ravishda taqqoslashni unutmang. Kichik hajmli shakllarni idrok

etishni o'rganing, ularni faqat yorug'lik va soyaning relyef naqshining yuzasidagi turli o'zgarishlarga moslashish qobiliyati orqali farqlash mumkin.

Gips modelini chizishning butun jarayoni — joylashuvi, nisbatlari, tuzilishi va shaklni modellashtirish — tasvir asl nusxani to'liq aks ettirishi kerak degani emas. Oldingizda ko'rib turganingiz — o'ziga xos chiaroskuro, shoxning egri chizig'ining tabiati va uning qismlarining o'ziga xos bo'linishi bilan to'la gips bezakning beton quymasi va aynan shu asl obyekt chizilishi kerak (10-rasm).

Talabalar yorug'lik-soya munosabatlarini o'rganish orqali arxitektura ob'ektlarining plastik xususiyatlarini chuqurroq anglaydilar. Bu esa ularning grafik ifoda imkoniyatlarini kengaytiradi.

Arxitektura ta'limida qalamtasvirni o'qitish metodikasi nazariy bilimlar va amaliy mashg'ulotlarning uyg'unligiga asoslanadi. Dars jarayonida talabalar oddiy shakllardan murakkab kompozitsiyalarga o'tish orqali qalamtasvir ko'nikmalarini shakllantiradilar.

Amaliy mashg'ulotlar davomida eskizlar, etyudlar va kompozitsion ishlanmalar bajarilishi talabalarining mustaqil ishlash va ijodiy yondashuvini

rivojlantiradi. Shuningdek, o'qituvchi tomonidan beriladigan tahliliy mulohazalar talabalarning xatolarini aniqlash va ularni bartaraf etishga yordam beradi.

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## NI SOFTWARE PACKAGE MULTISIM FOR ANALYZING OVERVOLTAGES IN A 6 KV ELECTRIC NETWORK

**Abstract:** *This work considers the analysis of overvoltages (surges) occurring in 6 kV power networks and their impact on electrical equipment. The research process used one of the modern software tools, the NI Multisim package. With the help of this program, a model of the power network is created and overvoltages occurring in various operating modes (load changes, short circuits, switching processes) are modeled. During the work, the causes of overvoltages, their amplitude and duration are determined, and their negative impact on network elements is analyzed. Also, based on the simulation results, effective technical measures are proposed to reduce and prevent overvoltages.*

**Keywords:** *6 kV power grid, Overvoltage, Switching processes, Short circuit, Power grid model, NI Multisim, Simulation, Electrical equipment protection, Energy efficiency, Voltage analysis.*

### Introduction

Currently, in the Republic of Uzbekistan, electrical networks with a voltage of 6-35 kV are operated with various neutral modes: isolated neutral, compensated neutral (neutral grounded through an arc-suppressing reactor), resistive-grounded neutral [ 1 ].

The main advantage of these networks is their high reliability in power supply to consumers during single-phase ground faults. However, the weak electrical connection of these networks to zero ground potential inevitably leads to significant overvoltage in the network [2].

The high accident rate of 6–35 kV electrical networks makes it important to improve the reliability of electricity supply to consumers.

In this work, a computer simulation of overvoltages in a 6 kV network during a single-phase ground fault was performed in the NI software package. Multisim. Based on the simulation results, oscillograms of transient processes during the development of overvoltages were obtained, and the overvoltage multiples were calculated for various operating modes of the network neutral,

To simulate overvoltage, one section of the PS-6 kV substation busbars with outgoing cable lines was selected (Fig. 1).

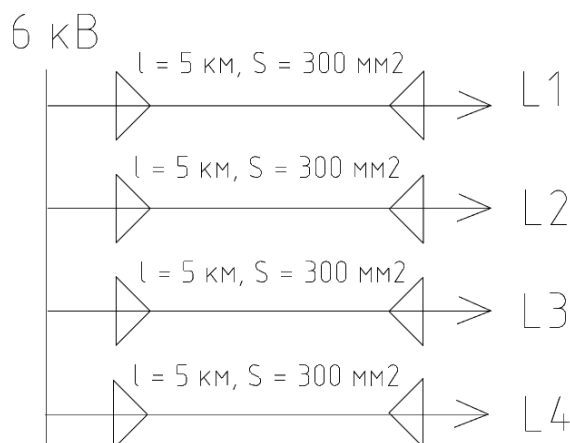


Fig. 1 . Busbar section of the RU-6 kV substation

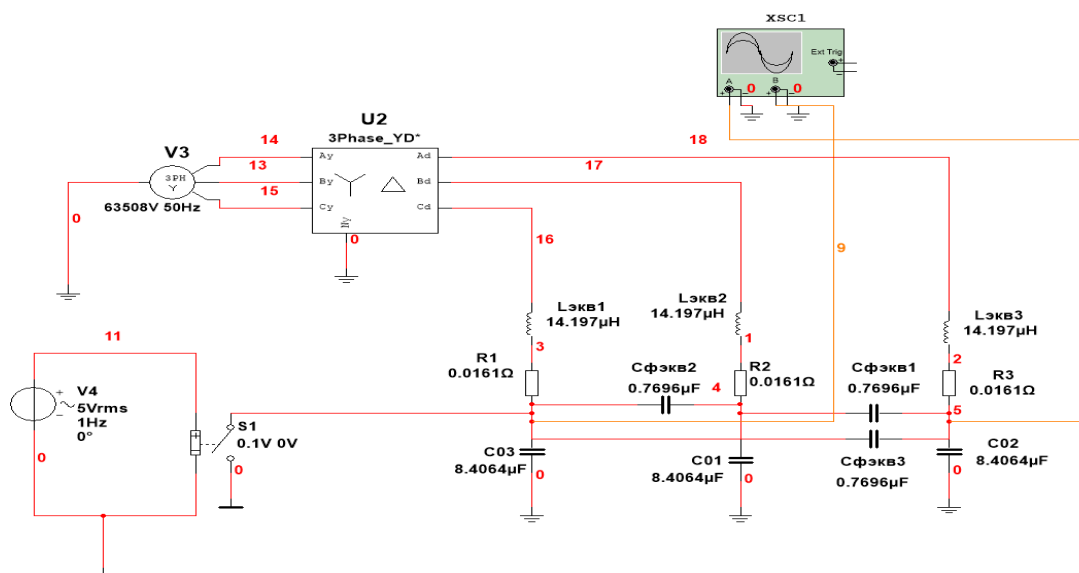
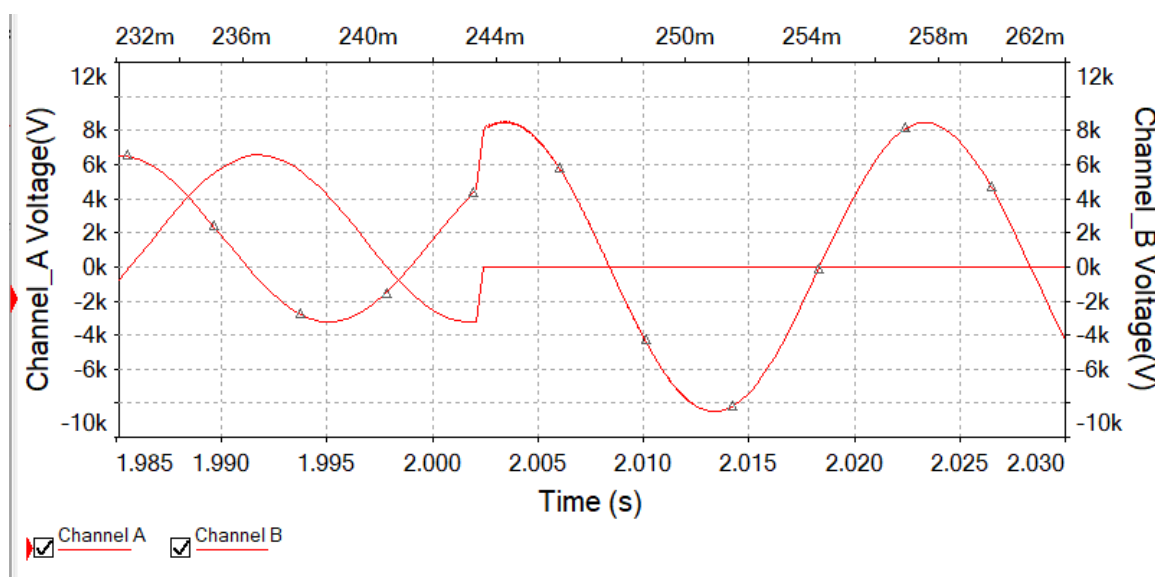


Fig. 2. Scheme For overvoltage modeling when phase C is short-circuited to ground

Having calculated the necessary parameters of the equivalent circuit and entered it into the working area of the software package (Fig. 2), we will conduct an analysis of overvoltages on the simulated section of the substation busbars during a short circuit of phase C to ground [3].

As a result of modeling in the NI Multisim software package, an oscillogram of voltages in the closed phase and one of the working phases was obtained (Fig. 3).



Rice. 3. Oscillogram overvoltage to short-circuit phase C to ground

According to the graph of the transient process during a short circuit of phase C to ground in a network with an isolated neutral, the amplitude of the maximum overvoltage was recorded  $U_{max}$  as 8567 V, with the amplitude of the highest working voltage  $U_{ном фазное} = 3463$  V.

Coefficient overvoltage equals:

$$K = \frac{U_{max}}{U_{ном фазное}} = \frac{8567}{3463} = 2.47$$

Duration overvoltage equal 0.115 sec.

We will similarly simulate single-phase ground faults in phase C for other neutral operating modes. The simulation results are presented in Table 1.

Table – Values of the frequency and duration of overvoltage in the network under different neutral grounding conditions.

| Neutral mode                                                             | To <sub>p</sub> , o.e. | T <sub>p</sub> , s |
|--------------------------------------------------------------------------|------------------------|--------------------|
| Isolated neutral                                                         | 2.47                   | 0.109              |
| Continuation of the table                                                |                        |                    |
| Grounding network through a resistor calculated using the general method | 2.47                   | 0.109              |
| Network grounded through a low-impedance resistor                        | 2.43                   | 0.085              |
| Network grounded through a high-impedance resistor                       | 2.35                   | 0.0534             |

This paper simulates overvoltage on a 6 kV substation busbar section under various neutral grounding conditions. Oscillograms of transient processes were obtained during a ground fault when phase C was shorted to ground. The overvoltage factors were calculated from these oscillograms. The highest overvoltage factor and the longest transient process were observed with an isolated



neutral. Based on the simulation results, a neutral grounded through a low-impedance resistor is the preferred method for reducing overvoltage factors in this network.

### Conclusion

This work studies the issues of analysis and assessment of overvoltages occurring in 6 kV power networks. During the research, various operating modes of the power network were modeled using the NI Multisim software package and the causes of overvoltages were identified. The results obtained showed that switching processes, short circuits and load changes cause significant overvoltages in the network. This can negatively affect the reliability of electrical equipment. It was proven that it is possible to assess these processes in advance and determine the level of risk through simulation.

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## **ENHANCING INFORMATION TECHNOLOGY EDUCATION METHODS FOR MEDICAL STUDENTS IN HIGHER EDUCATION INSTITUTIONS**

**Abstract:** *Information technology (IT) has become an indispensable component of modern medical education. The integration of digital tools, software applications, and data management systems into the curriculum enhances the learning process, facilitates clinical training, and prepares students for the evolving healthcare environment. Teaching IT in medical higher education institutions requires specialized methodologies that consider both technological competencies and medical requirements. This article explores methods to improve the teaching of information technology for medical students, emphasizing the need for interactive, practical, and clinically relevant approaches. The discussion includes the assessment of current teaching practices, identification of challenges in integrating IT into medical curricula, and recommendations for developing effective instructional strategies. By combining technical training with medical applications, educators can enhance student engagement, improve digital literacy, and ensure that graduates are prepared for modern clinical and research settings. The findings indicate that a structured, student-centered, and competency-based approach to IT education significantly improves learning outcomes, clinical reasoning, and professional preparedness. Incorporating simulation, virtual labs, and real-world case studies enhances practical skills while fostering critical thinking and problem-solving abilities.*

**Keywords:** *Information Technology, Medical Education, Teaching Methodology, Digital Literacy, Clinical Training, Medical Students, E-Learning, Simulation, Competency-Based Education, Curriculum Development*

In the contemporary healthcare environment, the role of information technology (IT) has grown exponentially, becoming a cornerstone of medical education. Medical students must acquire not only foundational clinical knowledge but also the skills to navigate complex digital systems, manage patient data, and utilize innovative technologies in diagnosis, treatment planning, and research. As medical practice increasingly relies on electronic health records, telemedicine, simulation-based training, and artificial intelligence, the integration of IT into medical curricula is essential for preparing competent and adaptable healthcare professionals. Information technology facilitates a more dynamic and interactive learning experience for medical students. Digital tools, including electronic textbooks, virtual laboratories, and multimedia platforms, allow learners to explore clinical scenarios, understand complex physiological processes, and visualize anatomical structures in ways that traditional methods cannot replicate. For

example, 3D anatomy software enables students to manipulate and study anatomical models from different angles, enhancing spatial understanding and retention of knowledge. Similarly, virtual patient simulations offer opportunities to practice diagnostic reasoning and decision-making without risking patient safety. Beyond theoretical knowledge, IT fosters the development of practical skills necessary for modern medical practice. Electronic health record (EHR) systems, widely used in hospitals and clinics, require medical professionals to accurately document patient information, analyze data, and make evidence-based decisions. By introducing medical students to EHR software during their education, institutions can bridge the gap between academic training and real-world clinical practice. Familiarity with digital diagnostic tools, laboratory information systems, and telehealth platforms further prepares students for the technological demands of contemporary healthcare. Moreover, IT supports collaborative learning and interprofessional education, which are critical components of medical training. Online discussion boards, virtual classrooms, and collaborative platforms enable students to work together on clinical cases, research projects, and problem-solving exercises, regardless of their physical location. Such digital collaboration mirrors the multidisciplinary teamwork expected in hospital settings, fostering communication skills, teamwork, and professional responsibility. The significance of IT in medical education extends to research and evidence-based practice. Access to online databases, scientific journals, and bioinformatics tools allows students to develop critical appraisal skills, analyze clinical data, and contribute to innovative research projects. Learning to effectively use statistical software, medical databases, and literature review tools equips students with competencies that are increasingly essential for both clinical practice and academic development. Despite the evident advantages, the implementation of IT in medical education requires careful planning and methodological refinement. Educators must balance technological integration with clinical relevance, ensuring that students not only become digitally competent but also understand how technology enhances patient care and safety. The effectiveness of IT education depends on pedagogical strategies that combine theoretical instruction with hands-on practice, simulation, and real-life clinical applications. In summary, information technology is not merely an auxiliary tool but a fundamental element of modern medical education. Its integration enriches learning experiences, develops practical and collaborative skills, and prepares students for the demands of a rapidly evolving healthcare system. By emphasizing the strategic use of IT in medical curricula, higher education institutions can ensure that future healthcare professionals are both clinically proficient and digitally literate, capable of delivering safe, efficient, and innovative patient care.

The teaching of information technology (IT) in medical higher education institutions has made significant progress over recent years, yet numerous challenges remain that affect the efficiency and effectiveness of learning. While many medical schools have incorporated IT modules into their curricula, the integration often lacks uniformity, consistency, and alignment with clinical requirements, which can limit the practical value of the education provided. One of

the primary challenges is the variability in teaching methodologies. Some institutions rely heavily on traditional lecture-based instruction, where theoretical concepts are presented without sufficient hands-on experience. While lectures are effective for introducing foundational knowledge, they are often inadequate for developing practical skills such as navigating electronic health record systems, using digital diagnostic tools, or applying simulation-based learning in clinical scenarios. Without active engagement, students may struggle to transfer theoretical knowledge into practical competence. Another significant issue is the limited availability of modern technological resources. While simulation labs, virtual patient platforms, and interactive software can dramatically enhance learning, not all institutions have the financial capacity or infrastructure to provide these resources. In some cases, students rely on outdated computers, limited software access, or overcrowded labs, which reduces opportunities for practice and experimentation. This disparity creates inequities in digital literacy and readiness among graduates from different institutions. Faculty expertise and training also play a critical role in the effectiveness of IT education. Medical educators often possess strong clinical knowledge but may lack the pedagogical or technical expertise to teach IT effectively. Professional development programs aimed at equipping instructors with digital skills, instructional design knowledge, and simulation facilitation techniques are often insufficient or inconsistent. Without well-trained faculty, the potential benefits of IT integration are significantly reduced, and students may not develop confidence or proficiency in using digital tools. Curriculum design presents an additional challenge. In many medical programs, IT education is treated as an ancillary subject rather than being embedded throughout clinical and pre-clinical training. This separation can result in students perceiving IT skills as optional rather than essential. A more effective approach is to integrate IT across subjects, linking technology use directly to clinical applications, research activities, and patient management scenarios. For instance, integrating EHR exercises during clinical rotations or using virtual simulations in pathology and pharmacology courses can reinforce the relevance and practical importance of IT skills. Student engagement and motivation also influence learning outcomes. Passive learning strategies, limited interaction, and lack of real-world applications can reduce interest and participation. Incorporating active learning techniques such as problem-based learning, case studies, virtual labs, and team-based digital projects can enhance engagement and improve knowledge retention. These strategies not only develop technical skills but also strengthen critical thinking, problem-solving, and collaborative abilities, which are vital for modern medical practice. Assessment and evaluation of IT competencies are often inconsistent. Some programs rely primarily on written exams or quizzes that evaluate theoretical understanding but fail to assess practical proficiency. Competency-based assessment models, including practical assignments, simulations, and digital portfolios, offer a more accurate measure of a student's ability to apply IT in clinical contexts. Implementing standardized assessment tools across medical institutions can ensure that all graduates meet essential IT competencies.

Enhancing the methodology of teaching information technology (IT) in medical higher education institutions requires a multi-faceted approach that addresses both pedagogical and technological aspects. By adopting evidence-based strategies, institutions can ensure that students not only gain technical proficiency but also develop the ability to apply digital tools in clinical and research settings effectively. The first recommendation is the integration of IT instruction throughout the medical curriculum rather than treating it as a standalone subject. Embedding IT skills into clinical courses, laboratory work, and problem-based learning exercises ensures that students recognize the relevance of technology in patient care. For instance, students can practice documenting patient information using electronic health records (EHRs) during clinical rotations or utilize virtual pathology simulations to reinforce diagnostic skills. This contextual approach strengthens both technical competence and clinical reasoning. Secondly, a shift towards student-centered and interactive learning methods is crucial. Traditional lectures should be complemented with hands-on workshops, simulation exercises, virtual laboratories, and gamified learning platforms. These methods promote active engagement, enhance retention, and allow students to develop practical skills in a controlled environment. Team-based projects and digital case studies also foster collaboration, critical thinking, and problem-solving, reflecting the interdisciplinary teamwork expected in real-world healthcare. Faculty development is another key factor in improving IT education. Instructors should receive specialized training in both IT tools and pedagogical techniques. Professional development programs can equip faculty with skills in simulation facilitation, virtual lab management, instructional design, and competency-based assessment. Well-trained educators are better able to guide students through complex technological concepts, integrate digital tools into clinical teaching, and provide effective feedback on performance. Infrastructure and access to technology are also critical. Institutions should invest in modern computer labs, high-speed internet, licensed software, virtual simulation platforms, and mobile learning solutions. Ensuring equitable access to these resources allows all students to practice IT skills regularly and reduces disparities in digital literacy. Additionally, cloud-based platforms and remote access tools can enable students to continue learning outside the classroom, supporting flexible and continuous education. Assessment strategies should be competency-based and aligned with real-world applications. Evaluating students through practical exercises, simulations, digital portfolios, and performance in virtual clinical scenarios provides a more accurate measure of their ability to apply IT skills in practice. Continuous feedback and formative assessments help students identify areas for improvement and reinforce learning outcomes, ensuring that graduates are both knowledgeable and capable of using technology effectively. Furthermore, integrating emerging technologies into medical education can enhance learning and prepare students for future healthcare challenges. Artificial intelligence, telemedicine platforms, data analytics tools, and augmented or virtual reality simulations offer opportunities to explore complex clinical scenarios, analyze patient data, and make informed decisions. Exposure to these technologies during



training ensures that students are ready to participate in modern, technology-driven healthcare environments. Finally, collaboration between educational institutions, healthcare providers, and technology developers is essential. Partnerships can provide students with access to real-world clinical systems, internships, and project-based learning experiences. These collaborations bridge the gap between theory and practice, allowing students to understand how IT is applied in patient care, hospital management, and medical research. In summary, improving IT education in medical higher education institutions requires curriculum integration, interactive and student-centered methods, faculty development, technological infrastructure, competency-based assessment, exposure to emerging technologies, and collaboration with healthcare and industry partners. Implementing these strategies ensures that medical students develop the technical skills, clinical understanding, and professional readiness necessary to navigate a digitally-driven healthcare system successfully. By fostering digital literacy alongside clinical competence, institutions can prepare graduates to deliver safe, efficient, and innovative patient care.

### **Conclusion**

The integration of information technology (IT) into medical higher education is essential for preparing competent, digitally literate healthcare professionals. As the healthcare sector becomes increasingly dependent on digital systems, electronic health records, telemedicine, and advanced diagnostic tools, medical students must acquire the skills to navigate and apply these technologies effectively. This article has highlighted the current challenges in IT education, including variability in teaching methods, limited access to modern technological resources, insufficient faculty training, and gaps in curriculum integration. Addressing these challenges requires a student-centered, competency-based, and clinically relevant approach that combines theoretical instruction with practical, hands-on experience. Practical recommendations include embedding IT throughout the curriculum, using interactive and simulation-based teaching methods, providing professional development for educators, ensuring access to modern digital infrastructure, implementing competency-based assessments, and fostering collaborations with healthcare providers and technology developers. Exposure to emerging technologies such as artificial intelligence, virtual reality, and data analytics further prepares students for future clinical and research roles. By adopting these strategies, medical higher education institutions can enhance student engagement, improve learning outcomes, and ensure that graduates are capable of delivering safe, efficient, and innovative patient care in a digitally-driven healthcare environment. Ultimately, the effective teaching of IT in medical education strengthens both clinical competence and digital proficiency, forming the foundation for high-quality healthcare practice.

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## **EVALUATING THE EFFECTIVENESS OF DIGITAL LEARNING PLATFORMS IN MEDICAL EDUCATION**

**Abstract:** *This article analyzes the effectiveness of digital learning platforms in medical education. Modern technologies provide students with online lectures, laboratory simulations, interactive quizzes, and virtual clinical experiences. The study examines both the positive and negative impacts of these platforms on the educational process and their role in enhancing students' knowledge and practical skills. Findings indicate that integrating digital platforms with traditional teaching methods significantly improves the quality of medical education.*

**Keywords:** *Medical education, digital learning platform, online learning, simulation, interactive quiz, learning effectiveness.*

In recent years, medical education has rapidly embraced technological advancements worldwide. Traditional teaching methods, including lectures and laboratory sessions, remain essential; however, digital platforms offer new opportunities to enhance students' learning outcomes and practical competencies. Digital learning platforms integrate interactive lessons, virtual labs, testing systems, and simulations, enabling students to practice clinical scenarios in a safe environment. Through online modules, students can study disease diagnostics, treatment protocols, and patient management strategies, which strengthens their clinical decision-making skills. Video lectures and interactive presentations make the learning process engaging and easier to understand. Digital platforms allow students to learn at their own pace, providing opportunities for self-assessment and independent study. One key advantage of digital platforms is personalized learning. Students can identify their strengths and weaknesses and focus on areas requiring improvement. Interactive quizzes and simulations help reinforce knowledge and develop critical thinking and practical skills. Moreover, digital platforms remove geographical barriers, allowing students to access advanced medical resources from anywhere in the world. They also provide instructors with tools to monitor students' progress, analyze results, and offer timely support. However, effective use of digital platforms requires appropriate technological infrastructure, skilled educators, and motivated students. Improper implementation or limited familiarity with technology may reduce learning effectiveness. Therefore, integrating digital learning with traditional teaching and training students to use technology effectively is crucial.

Digital learning platforms offer multiple practical capabilities in medical education, including virtual laboratories, clinical simulations, interactive quizzes, and multimedia resources. Virtual laboratories allow students to conduct experiments safely. Examples include chemistry or biology experiments, working

with animal models, or observing cell structures online. These virtual experiences enhance safety, allow repeated practice, and provide opportunities to learn from mistakes. Clinical simulations provide students with virtual patient scenarios. Students select diagnostic tests, apply treatment protocols, and monitor outcomes, enhancing their clinical reasoning and decision-making skills. Traditional teaching may be limited in offering such hands-on experience due to safety concerns or time constraints. Interactive quizzes and assessments reinforce knowledge and allow immediate feedback. Students can identify mistakes, review misunderstood concepts, and track their progress. This supports continuous learning and self-assessment. Multimedia resources, including videos, 3D models, and animations, help students understand complex anatomical and physiological processes. For example, cardiac circulation or surgical procedures can be illustrated clearly through animation. Furthermore, digital platforms promote collaborative learning. Students can communicate, share experiences, and work on joint projects via forums, chat tools, or video conferencing. This interaction develops teamwork and social skills. It is essential to note that effectiveness depends not only on technology but also on pedagogical design. Learning materials must be interactive, understandable, and designed to develop practical skills. Student motivation also plays a significant role in platform success.

Several criteria exist to evaluate the effectiveness of digital learning platforms. Firstly, students' knowledge and skills are measured through test results, lab performance, and simulation outcomes. These assessments evaluate clinical reasoning and practical competencies. Secondly, student engagement and motivation are considered. In online environments, activity logs, module access, and assignment completion rates provide valuable insights into learning behavior and platform effectiveness. Thirdly, platform quality, both technical and pedagogical, is critical. A technically stable platform with an intuitive interface and easily accessible learning materials enhances the user experience. Pedagogically, content should be interactive, clear, and designed to develop critical skills. Feedback from students and instructors is another evaluation tool. Surveys, interviews, and focus groups help assess usability, learning challenges, and perceived usefulness. These insights are essential for improving platform design. Comparative analysis with traditional methods is also important. Assessing whether digital platforms improve knowledge and practical skills compared to conventional teaching determines their added value.

Digital learning offers several advantages: personalized learning, instant feedback, access to resources without geographic constraints, engaging and interactive instruction, and safe practice environments. It also fosters self-assessment and independent learning. However, limitations exist. Students may face difficulties in using technology, encounter limited internet or device access, or experience technical problems. Virtual platforms cannot fully replace real patient interaction, which is critical for clinical training. The most effective approach is combining digital and traditional methods. Online lessons, virtual labs, and simulations complement in-person practical training, resulting in comprehensive

skill development. Instructors' guidance and support remain vital. In summary, the effectiveness of digital platforms in medical education depends on the integration of technology, pedagogy, and student motivation. Proper implementation enhances future healthcare professionals' knowledge, skills, and readiness.

Despite the evident benefits of digital learning platforms in medical education, their implementation is not without challenges. One of the main obstacles is technological accessibility. Not all students have reliable internet access or high-performance devices, which can create disparities in learning opportunities. In regions with limited infrastructure, these technological gaps may hinder effective participation in online courses or simulations. Another challenge is the digital literacy of both students and instructors. While younger generations may be more comfortable with technology, they still require guidance to use complex learning platforms effectively. Instructors, on the other hand, may face difficulties in designing interactive content or using advanced simulation tools, especially if they have not received sufficient training. Professional development programs and workshops are therefore crucial to ensure that educators can leverage digital platforms to their full potential. Content quality and pedagogical design are additional critical factors. Digital platforms are only effective if the material is structured in a way that promotes deep understanding, critical thinking, and practical application. Poorly designed courses, outdated content, or overly technical interfaces can lead to frustration, decreased engagement, and suboptimal learning outcomes. Continuous review and updates of content are essential to maintain relevance in a fast-evolving medical field. Another challenge is student motivation and self-discipline. Digital platforms often require self-directed learning, which can be difficult for students accustomed to traditional classroom structures. Without adequate support and monitoring, some students may fall behind, leading to gaps in knowledge and skills. Mentorship programs, regular feedback, and progress tracking can help mitigate this challenge, ensuring that learners remain engaged and accountable. Furthermore, the integration of digital learning with hands-on clinical experience is sometimes limited. While simulations and virtual labs provide valuable practice, they cannot fully replicate the nuances of real patient interaction, complex decision-making under pressure, and interprofessional teamwork. Therefore, institutions must carefully balance online and in-person components to ensure students develop the full spectrum of skills required for competent medical practice. Finally, data privacy and cybersecurity are critical concerns. Digital platforms collect vast amounts of personal and performance data, which must be securely managed to protect student confidentiality. Institutions must establish robust policies and technical safeguards to prevent unauthorized access or data breaches.

The future of digital learning in medical education is promising, driven by continuous technological innovation. Emerging technologies such as artificial intelligence (AI), virtual reality (VR), and augmented reality (AR) are poised to revolutionize the way medical students acquire knowledge and skills. AI-driven platforms can provide personalized learning pathways, adapting content based on

individual student performance, strengths, and areas for improvement. Such tailored approaches enhance learning efficiency and reduce the risk of knowledge gaps. VR and AR offer immersive learning experiences that bring abstract concepts to life. For instance, VR can simulate complex surgical procedures, allowing students to practice in a controlled, risk-free environment. AR can overlay anatomical structures on real patients or mannequins, enhancing spatial understanding and clinical reasoning. These technologies provide experiential learning that closely mirrors real-life medical practice, bridging the gap between theoretical knowledge and hands-on skills. Another promising innovation is the use of predictive analytics and learning analytics to optimize education. By analyzing student engagement, performance trends, and behavioral patterns, educators can identify at-risk students, tailor interventions, and improve curriculum design. Data-driven decision-making ensures that educational strategies are evidence-based and aligned with learning outcomes. Global collaboration is another trend likely to shape the future of digital medical education. Online platforms enable cross-institutional and international collaboration, allowing students to participate in virtual exchanges, joint projects, and international case studies. Exposure to diverse clinical scenarios and healthcare systems enriches students' perspectives and prepares them for global medical practice. Digital assessment tools are also evolving. Beyond traditional quizzes and multiple-choice tests, adaptive assessments, virtual patient interactions, and AI-assisted evaluations provide a more comprehensive view of student competencies. These methods assess not only knowledge but also critical thinking, problem-solving, and clinical decision-making skills. However, the human element remains central. Technology should complement, not replace, mentorship, ethical guidance, and professional development. Medical education is inherently relational, and digital tools must be integrated in ways that maintain the humanistic aspects of teaching, empathy, and patient-centered care. Furthermore, sustainability and scalability of digital platforms will be essential. Institutions must ensure that technological innovations are cost-effective, maintainable, and accessible to all students. Open-source solutions, cloud-based resources, and collaborative development models may help achieve widespread adoption without compromising quality. In summary, the future of medical education is digital, interactive, and data-driven. By leveraging AI, VR/AR, learning analytics, and global collaboration, digital platforms can provide immersive, personalized, and effective learning experiences. Ensuring that technology enhances rather than replaces human interaction will be key to producing competent, compassionate, and adaptable healthcare professionals.

### **Conclusion**

This article reviewed the effectiveness of digital learning platforms in medical education. Digital tools, including interactive lessons, virtual laboratories, simulations, and quizzes, enhance students' knowledge, practical skills, and self-assessment abilities. Effectiveness depends on platform quality, pedagogy, and student engagement. Combining digital and traditional teaching methods is the most efficient strategy to improve medical education outcomes.

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## **THE ROLE OF STUDENT RESPONSE SYSTEMS IN TEACHING ENGLISH FOR SPECIFIC PURPOSES**

**Abstract:** *This article explores the role of Student Response Systems (SRS) in teaching English for Specific Purposes (ESP). With the increasing integration of technology into education, SRS tools have become an effective means of enhancing student engagement, participation, and learning outcomes. The paper discusses the benefits, challenges, and pedagogical implications of using SRS in ESP classrooms. It also highlights how these systems can support language acquisition tailored to specific professional or academic fields.*

**Key words:** *data source, tool, tester, teacher*

Introduction. In recent years, the use of digital technologies in education has transformed traditional teaching methods. One of the most innovative tools is the Student Response System (SRS), which allows teachers to collect instant feedback from students through devices such as smartphones, tablets, or computers.

English for Specific Purposes (ESP) focuses on teaching English tailored to the needs of learners in particular fields such as business, medicine, engineering, and law. Unlike general English, ESP requires more targeted instruction, interactive learning, and real-life application. This paper aims to examine how SRS can enhance ESP instruction by improving interaction, motivation, and assessment.

### **Student Response Systems: An Overview**

Student Response Systems are interactive technologies that enable real-time communication between teachers and students. Common examples include platforms like Kahoot, Mentimeter, and Socrative. These tools allow instructors to ask questions, conduct quizzes, and gather opinions instantly.

SRS can be used in various ways, including:

- Multiple-choice quizzes
- Polling and surveys
- Immediate feedback activities
- Classroom discussions

These features make SRS a valuable tool in modern language classrooms, particularly in ESP contexts where active participation is essential. The Importance of ESP Instruction, English for Specific Purposes plays a crucial role in preparing students for professional communication. Learners need to acquire not only general language skills but also specialized vocabulary, communication strategies, and contextual understanding relevant to their fields.

For example:

Medical students need to communicate with patients and colleagues, Business students must engage in negotiations and presentations, Engineers require technical documentation skills

Traditional teaching methods may not fully address these specific needs. Therefore, innovative approaches like SRS can enhance learning effectiveness.

#### Benefits of Using SRS in ESP Teaching

##### 1. Increased Student Engagement

SRS tools encourage active participation from all students, including those who may be reluctant to speak in class. Interactive quizzes and polls make lessons more dynamic and enjoyable.

##### 2. Immediate Feedback

Teachers can instantly assess students' understanding and adjust their teaching accordingly. This is particularly important in ESP, where misunderstanding technical vocabulary can hinder communication.

##### 3. Improved Motivation

Gamified elements in SRS platforms increase student motivation. Learners feel more involved and are more likely to participate actively.

##### 4. Enhanced Learning Outcomes

Research shows that interactive learning environments improve knowledge retention. SRS helps reinforce vocabulary and concepts relevant to specific fields.

##### 5. Support for Formative Assessment

SRS allows continuous assessment without formal testing. Teachers can monitor progress and provide timely support.

#### Challenges of Implementing SRS

Despite its advantages, there are some challenges:

1. Technical Issues, Reliable internet access and devices are required, which may not always be available.

2. Teacher Training, Teachers need proper training to use SRS effectively in ESP contexts.

3. Distraction Risks, Students may misuse devices for non-educational purposes.

4. Limited Depth, SRS is more suitable for quick assessments and may not support deep language analysis on its own.

Pedagogical Implications, To maximize the effectiveness of SRS in ESP instruction, teachers should:

Integrate SRS with communicative teaching methods

Design questions relevant to students' professional fields

Use SRS as a supplement, not a replacement for traditional teaching

Encourage discussion based on responses

Combining SRS with task-based learning and collaborative activities can create a more comprehensive learning experience.

This study presented some limitations which need to be addressed in further research. First of all, the participants of this study were composed of two intact

classes regarded as control and experimental groups. Thus, larger sampled and randomly assigned groups may be employed with the inclusion of a delayed post-test in further research. Moreover, the results of this study were limited with the overall language performance of the ESP students. However, the data regarding the average time to answer the questions, students' attitude and motivation as well as their willingness to take part in communication and activities in ESP classes may provide significant results for the researchers. In addition, longitudinal effects of the use of clickers and students' as well as instructors' views may also be investigated in order to offer a better insight. As a final remark, clickers may be used as a supplementary tool to enhance performance of ESP. Taking the results of the present study into account, course designers and authors responsible for creating ESP books may benefit from clicker use in the iTools sets of the books by allocating more clicker use instead of providing just videos of the related topics. Considering the effectiveness of using clickers in the results of this and many other studies, ESP teachers may be urged to use them in their classes.

Conclusion, Student Response Systems offer significant potential in enhancing the teaching of English for Specific Purposes. They promote engagement, provide immediate feedback, and support interactive learning environments. While challenges exist, proper implementation and teacher training can overcome these limitations. In conclusion, SRS is a valuable tool that can improve ESP instruction and better prepare students for real-world communication in their respective fields.

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**GLOBAL EKOLOGIK MUAMMOLAR, CHO'LLANISH VA OZIQ-  
OVQAT XAVFSIZLIGI: GLOBAL TAHLIL VA MARKAZIY OSIYO  
HAMDA O'ZBEKISTON MISOLIDA**

**Annotatsiya.** Ushbu maqolaning maqsadi global ekologik muammolar doirasida cho'llanishning oziq-ovqat xavfsizligiga ta'sir mexanizmlarini tizimli ravishda yoritish, global baholashlar (IPCC, IPBES, FAO) hamda mintaqaviy misollar (Markaziy Osiyo va O'zbekiston) asosida xatarlar va yechimlarni taqqoslab berishdir. Tadqiqot metodologiyasi sifatida 1992–2026-yillar oralig'idagi asosiy xalqaro konvensiyalar, rasmiy yillik monitoring hisobotlari va tanlangan peer-reviewed maqolalar bo'yicha narrativ-sistematik adabiyotlar tahlili qo'llanildi. Natijalarda cho'llanishning oziq-ovqat xavfsizligi ustunlariga (mavjudlik, kirish, o'zlashtirish, barqarorlik) ta'siri "biogeofizik–iqtisodiy–institutsional" kanallar orqali ishlashi ko'rsatildi. Muhokama qismida LDN/SDG kabi siyosiy ramkalar, barqaror yer boshqaruvi va sho'rlanishga qarshi choralar "mitigatsiya + adaptatsiya + ijtimoiy himoya" integratsiyasi bilan samaraliroq bo'lishi asoslandi. Xulosa va tavsiyalarda global hamda O'zbekiston sharoiti uchun ustuvor amaliy paketlar taklif qilindi.

**Kalit so'zlar:** cho'llanish, yer degradatsiyasi, sho'rlanish, qurg'oqchilik, oziq-ovqat xavfsizligi, LDN, SDG 15.3, Markaziy Osiyo, O'zbekiston.

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**GLOBAL ENVIRONMENTAL PROBLEMS, DESERTIFICATION,  
AND FOOD SECURITY: A GLOBAL ANALYSIS WITH A CASE STUDY  
OF CENTRAL ASIA AND UZBEKISTAN**

**Abstract.** The aim of this article is to provide a systematic analysis of the mechanisms through which desertification affects food security within the context of global environmental challenges, and to compare risks and solutions based on global assessments (IPCC, IPBES, FAO) and regional case studies (Central Asia and Uzbekistan). The research methodology is based on a narrative-systematic literature review, covering key international conventions from 1992 to 2026, official annual monitoring reports, and selected peer-reviewed studies. The results demonstrate that the impact of desertification on the pillars of food security (availability, access, utilization, and stability) operates through "biogeophysical–economic–institutional" channels. The discussion section argues that policy

*frameworks such as LDN/SDGs, sustainable land management, and anti-salinization measures are more effective when integrated within a “mitigation + adaptation + social protection” approach. The conclusion and recommendations propose priority practical policy packages both at the global level and in the context of Uzbekistan.*

**Keywords:** desertification, land degradation, salinization, drought, food security, LDN, SDG 15.3, Central Asia, Uzbekistan.

Global ekologik muammolar — iqlim oʻzgarishi, biologik xilma-xillikning kamayishi, suv resurslari tanqisligi va yer degradatsiyasi — koʻpincha bir-birini kuchaytiradigan “tizimli xavflar” sifatida namoyon boʻladi. Yer degradatsiyasi va choʻllanish bu tugun (nexus)ning markazida turadi: u ekotizim xizmatlarini (unumdor tuproq, suvni tartibga solish, changni ushlash, bioresurslar) susaytirib, bevosita iqlimga moslashuv imkoniyatlarini ham toraytiradi [7,11].

Ushbu maqola global ekologik muammolar ichida choʻllanish (qurgʻoqchil hududlarda yer degradatsiyasi) va uning oziq-ovqat xavfsizligiga (mavjudlik, kirish, oʻzlashtirish, barqarorlik) koʻpkanalli taʼsiri ilmiy manbalar asosida tahlil qiladi. Choʻllanish “choʻlning tabiiy kengayishi” emas, balki iqlim tebranishlari va inson faoliyati birikmasi natijasida qurgʻoqchil zonalarda yerning biologik/iqtisodiy unumdorligi pasayishi sifatida xalqaro huquqiy darajada taʼriflangan [1].

Soʻnggi global baholashlar yer degradatsiyasi koʻlamini juda yirik deb koʻrsatadi: Global Land Outlook 2 bilan bogʻliq tahlillarda sayyora quruqligining 40% gacha qismi degradatsiyaga uchragani, bu holat insoniyatning yarmiga bevosita taʼsir qilishi va global YAIMning katta ulushini (taxminan 44 trln AQSh dollari) xavf ostiga qoʻyishi taʼkidlanadi [11].

Oziq-ovqat xavfsizligi nuqtayi nazaridan, eng yangi yillik monitoring hisobotiga koʻra, 2024-yilda global ochlik (undernourishment) ulushi 8,2% boʻlib, bu taxminan 673 million odamga teng; shu bilan birga 2024-yilda dunyoda qariyb 2,3 milliard kishi “oʻrtacha yoki ogʻir darajadagi oziq-ovqat taqchilligi”ni boshdan kechirgan [3].

Choʻllanish va oziq-ovqat xavfsizligi oʻrtasidagi asosiy bogʻlanish mexanizmlari quyidagilardan iborat: (i) tuproq eroziyasi, chirindi (SOC) kamayishi, shoʻrlanish va suv tanqisligi orqali hosildorlikning pasayishi; (ii) ishlab chiqarish tavakkali va oʻzgaruvchanligini oshirish (qurgʻoqchilik-tezkor xatarlar); (iii) daromadlarning qisqarishi hamda bozor narxlarining tebranishi orqali iqtisodiy kirishning yomonlashishi; (iv) chang-tuz boʻronlari, suv sifati va sanitariya yomonlashuvi orqali oziq-ovqatdan foydalanish va sogʻliq koʻrsatkichlariga bilvosita zarba beradi [2–4,7,12].

Markaziy Osiyo, xususan Oʻzbekiston misolida choʻllanish va oziq-ovqat xavfsizligi “yer–suv–iqlim” bogʻliqligi (nexus) orqali keskin namoyon boʻladi: Amudaryo havzasida 1987–2019- yillarda sugʻoriladigan ekinlar uchun suv sarfi (ETa orqali baholangan) 10% ga oshgani va bu oʻsishda iqlim omili yetakchi boʻlgani koʻrsatilgan [19].

Shoʻrlanish global va mintaqaviy darajada ham “choʻllanish–oziq-ovqat” zanjirining eng kuchli boʻgʻinlaridan: FAO maʼlumotlariga koʻra, dunyoda tuz



ta'siridagi tuproqlar 1,381 mlrd gektarni (global yer maydonining 10,7%) tashkil etadi; ayrim joylarda hosil yo'qotishlari 70% gacha yetishi mumkin [12].

Maqola yakunida siyosat va amaliyot uchun asosiy yo'nalishlar sifatida: barqaror yer boshqaruvi (SLM), sho'rlanishga qarshi melioratsiya va drenaj, suvni tejovchi sug'orish, yaylov boshqaruvi, iqlimga moslashuvchan agrotexnologiyalar, masofaviy zondlash asosidagi monitoring, shuningdek yer degradatsiyasi neytralligi (LDN) va SDG 15.3 maqsadlari bilan uyg'un kompleks yondashuvlar tavsiya etiladi [4,7,10–11,17].

**Asosiy tushunchalar.** Xalqaro ta'rifga ko'ra, cho'llanish — qurg'oqchil, yarimqurg'oqchil va quruq-subnam hududlarda yer degradatsiyasi bo'lib, turli omillar, jumladan iqlim tebranishlari va inson faoliyati natijasida yuz beradi [1]. Shu bilan birga, FAQ materiallarida cho'llanish “mavjud cho'llarning tabiiy kengayishi” emasligi ham alohida qayd etiladi [16].

Oziq-ovqat xavfsizligi esa 1996-yilgi global siyosiy konsensusga tayangan holda

to'rt o'lchamda tasvirlanadi: mavjudlik (availability), kirish (access), o'zlashtirish/iste'mol-sog'liq (utilization) va barqarorlik (stability) [2].

**Faraz va qamrov.** Ushbu maqola geografik qamrov bo'yicha global tahlilni asos qilib oladi; amaliy misollar sifatida qurg'oqchil zonalarining yorqin namunasidan biri bo'lgan va tajribasiga urg'u beradi. Vaqt qamrovi: (i) boshqaruv-milestones uchun 1992–2025; (ii) oziq-ovqat xavfsizligi statistikasi uchun eng yangi rasmiy yillik baholash (2024-yil holati) [3,8–10,15].

**Tadqiqot savoli.** Cho'llanish qaysi mexanizmlar orqali oziq-ovqat xavfsizligini izdan chiqaradi va bu xavfni kamaytirish uchun global hamda O'zbekiston sharoitida qaysi siyosat-amaliy paketlar eng asosli hisoblanadi? Javoblar IPCC/FAO/IPBES kabi birlamchi va rasmiy manbalar asosida jamlanadi [3–4,7].

**Adabiyotlar sharhi. Ilmiy va siyosiy baholashlar: asosiy “ustun” manbalar.** Cho'llanish va oziq-ovqat xavfsizligi bo'yicha ilmiy konsensus bir necha “flagship” baholashlarga tayangan holda shakllanadi.

Birinchidan, 2019-yilgi “Climate Change and Land (SRCCL)” maxsus hisobotida cho'llanish, yer degradatsiyasi, barqaror yer boshqaruvi va oziq-ovqat xavfsizligi iqlim o'zgarishi bilan bir tizimda ko'riladi. Hisobot qurg'oqchil yerlar global quruqlikning qariyb 46,2% ini egallashi va taxminan 3 mlrd aholiga makon bo'lishini, cho'llanish “hotspot”lari esa qurg'oqchil hududlarning sezilarli ulushida (vegetatsiya produktivligi pasayishi orqali) kuzatilishini ta'kidlaydi [4].

Ikkinchidan, yer degradatsiyasi va restoratsiya bo'yicha baholashida degradatsiya kamida 3,2 mlrd kishining farovonligiga salbiy ta'sir qilayotgani, iqtisodiy yo'qotishlar global yalpi mahsulotning 10% atrofida ekotizim xizmatlari yo'qotilishi shaklida baholanishi va restoratsiya foydasi xarajatlardan yuqori bo'lishi qayd etiladi [7].

Uchinchidan, va hamkor agentliklar yillik SOFI hisobotlari orqali global ochlik va oziq-ovqat taqchilligi dinamikasini rasmiy ravishda monitoring qiladi.

Eng yangi hisobotga ko'ra, 2024-yilda global ochlik 8,2% atrofida, o'rtacha/og'ir oziq-ovqat taqchilligi esa qariyb 2,3 mlrd kishini qamrab olgan [3].

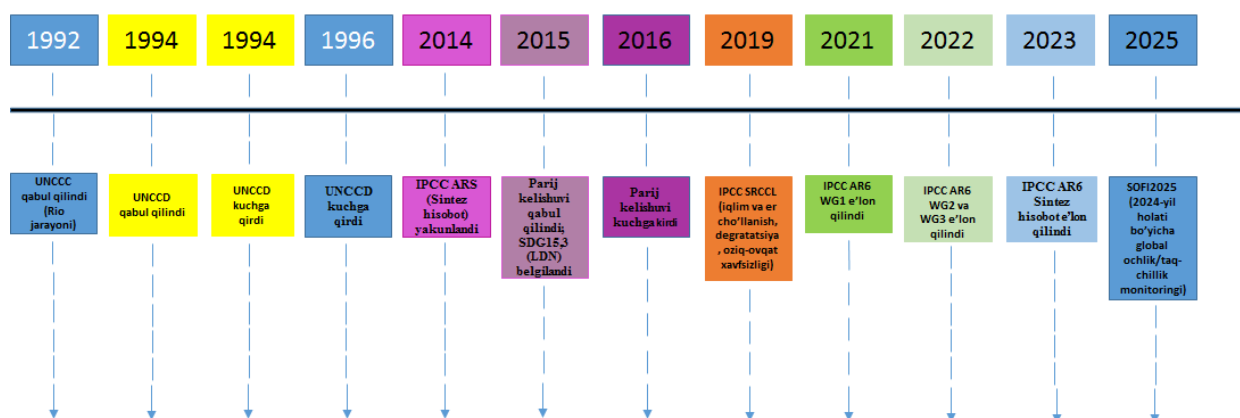
To'rtinchidan, Global Land Outlook 2 yo'nalishidagi tahlillarda yer resurslari noto'g'ri boshqarilganda ijtimoiy-iqtisodiy xavflar (migratsiya, sog'liq, mojarolar, daromadlar) ortishi, "business-as-usual" senariyida degradatsiya kengayishi mumkinligi va restoratsiya majburiyatlarining moliyaviy ehtiyoji yirik ekani ko'rsatiladi [11].

Global boshqaruv ramkalari va "milestones" Cho'llanish va iqlim muammolari bo'yicha global boshqaruv 1992-yilgi Rio jarayoni bilan institutlashdi: 1992-yilda qabul qilingan va 1994-yilda kuchga kirgan; tizimida 2015-yilda baholash tsikllari hamda 2015-yil Parij kelishuvi kabi bitimlar bilan iqlim siyosati chuqurlashdi [8–9].

Cho'llanish bo'yicha esa UNCCD 1994-yilda qabul qilinib, 1996-yilda kuchga kirgan; keyinchalik "Land Degradation Neutrality (LDN)" konsepti SDG 15.3 doirasida 2030-yilgacha cho'llanishni jilovlash va degradatsiyalangan yerlarni tiklash maqsadiga bog'landi [10,15,17].

Quyidagi mermaid-timeline ushbu muhim bosqichlarni bir joyda ko'rsatadi (sanalar rasmiy IPCC/UNFCCC/IISD/UN SDG manbalariga tayangan) [5–6,8–10,15].

#### Global boshqaruv va ilmiy baholashlar: cho'llanish-iqlim-oziq-ovqat xavfsizligi



title Global boshqaruv va ilmiy baholashlar: cho'llanish-iqlim-oziq-ovqat xavfsizligi

1992 : UNFCCC qabul qilindi (Rio jarayoni)

1994 : UNCCD qabul qilindi

1994 : UNFCCC kuchga kirdi

1996 : UNCCD kuchga kirdi

2014 : IPCC AR5 (Sintez hisobot) yakunlandi

2015 : Parij kelishuvi qabul qilindi; SDG 15.3 (LDN) belgilandi

2016 : Parij kelishuvi kuchga kirdi

2019 : IPCC SRCCL (iqlim va yer: cho'llanish, degradatsiya, oziq-ovqat xavfsizligi)

2021 : IPCC AR6 WG1 e'lon qilindi

2022 : IPCC AR6 WG2 va WG3 e'lon qilindi

2023 : IPCC AR6 Sintez hisobot e'lon qilindi

2025 : SOFI 2025 (2024-yil holati bo'yicha global ochlik/taqchilik monitoringi)

Metodlar. Ushbu maqola “deep research” yondashuvida narrativ-sistematik adabiyotlar sharhi sifatida tayyorlandi.

Birinchi bosqichda birlamchi va rasmiy manbalar (UNCCD konvensiya matni va FAQ, IPCC SRCCL, IPBES baholashi, SOFI 2025, UNFCCC/SDG sahifalari) tanlandi [1–4,7–10,15–16].

Ikkinchi bosqichda mintaqaviy (Markaziy Osiyo/O‘zbekiston) kontekstini yoritish uchun peer-reviewed maqolalar va amaliy hisobotlar jalb qilindi: Orol havzasi bo‘yicha masofaviy zondlash sharhi, Amudaryo havzasida sug‘orish suv sarfi dinamikasi, O‘zbekiston yer degradatsiyasi/ sho‘rlanishi bo‘yicha tahlillar, qurg‘oqchilik boshqaruvi bo‘yicha mamlakat hisobotlari [18–21,23,25].

Uchinchi bosqichda “dalil–mexanizm–oqibat–yechim” zanjiri bo‘yicha ma’lumotlar ekstraksiya qilindi: (i) driverlar (iqlim, yer foydalanish, suv boshqaruvi, ijtimoiy-iqtisodiy), (ii) oziq-ovqat xavfsizligi ustunlari bo‘yicha ta’sirlar, (iii) yumshatish va moslashuv choralari. Ushbu ekstraksiya asosida 3 ta taqqoslovchi jadval hamda 2 ta mermaid-diagramma (timeline va causal flowchart) tuzildi [2–4,7,11–13,19,21].

**Cheklovlar.** Bu maqola original empirik model qurmaydi; natijalar sintez xarakterida. Ayrim global ma’lumotlar definitsiya va o‘lchash metodlaridagi farqlar sabab “interval/ishonchlilik oralig‘i” bilan beriladi (SOFI buni ochiq ko‘rsatadi) [3].

#### **Natijalar va topilmalar. Cho‘llanishni kuchaytiruvchi omillar.**

Global baholashlar cho‘llanishni bitta omil emas, balki **iqlim o‘zgarishi + noto‘g‘ri yer va suv boshqaruvi + ijtimoiy-iqtisodiy bosimlar** kombinatsiyasi sifatida izohlaydi. IPBES yer degradatsiyasining bevosita drayverlari qatorida ekin va yaylovlarning tabiiy vegetatsiyaga kengayishi, barqaror bo‘lmagan qishloq xo‘jaligi va o‘rmonchilik amaliyotlari, iqlim o‘zgarishi, hamda ayrim joylarda urbanizatsiya/infratuzilma va qazib oluvchi sanoatni sanaydi [7]. IPCC SRCCL esa cho‘llanish jarayonlarini kuchaytiradigan yirik insoniy drayverlar sifatida ekin maydonini kengaytirish, barqaror bo‘lmagan yer boshqaruvi va demografik-iqtisodiy bosimlarni, shuningdek iqlim o‘zgarishi ayrim jarayonlarni kuchaytirishini qayd etadi [4].

**1-Jadval.** Cho‘llanish drayverlarini mexanizmlar va Markaziy Osiyoga xos misollar bilan umumlashtiradi (jadval sintezi IPCC/IPBES hamda sho‘rlanish bo‘yicha FAO dalillariga tayangan) [4,7,12–13,19,21].

| Drayver guruhi | Tipik mexanizm                                                                | “Cho‘llanish signali” (indikatorlar)                           | Markaziy Osiyo/O‘zbekiston uchun tipik ko‘rinish                    |
|----------------|-------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------|
| Iqlim omillari | Harorat oshishi → evapotranspiratsiya ortishi; qurg‘oqchilik/issiq to‘lqinlar | Aridlik ko‘rsatkichlari, qurg‘oqchilik chastotasi, vegetatsiya | Sug‘oriladigan hududlarda suv sarfi ortishi; suv stressi kuchayishi |

|                                   |                                                                          |                                                           |                                                                                    |
|-----------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------|
|                                   |                                                                          | produktivligi pasayishi                                   |                                                                                    |
| Yer foydalanish bosimi            | Ekin-yaylovning haddan tashqari bosimi; agrotexnik eroziya               | Eroziya, chirindi kamayishi, hosildorlik pasayishi        | Yaylov degradatsiyasi; ekin tarkibi va yerdan foydalanishdagi tarixiy o'zgarishlar |
| Suv boshqaruvi                    | Drenaj yetishmasligi + noto'g'ri sug'orish → sho'rlanish va botqoqlanish | EC/ESP oshishi, sho'r qatlam, yer osti suvi sathi         | Sug'oriladigan yerlarda sho'rlanish; melioratsiya xarajatlari                      |
| Ijtimoiy-iqtisodiy va institutlar | Kambag'allik/tenure zaifligi → qisqa muddatli ekspluatatsiya;            | Qashshoqlik "trap", migratsiya, konflikt risklari         | Resurs tanqisligi sharoitida SLMga investitsiya cheklanishi                        |
| Biogeokimyoviy degradatsiya       | Tuzlar to'planishi, tuproq strukturasining buzilishi                     | Tuz ta'siridagi maydonlar kengayishi, hosil yo'qotishlari | Sho'rlanish "hotspot"lari; hosil va daromad risklari                               |

Oziq-ovqat xavfsizligiga ta'sir: ustunlar bo'yicha tahlil

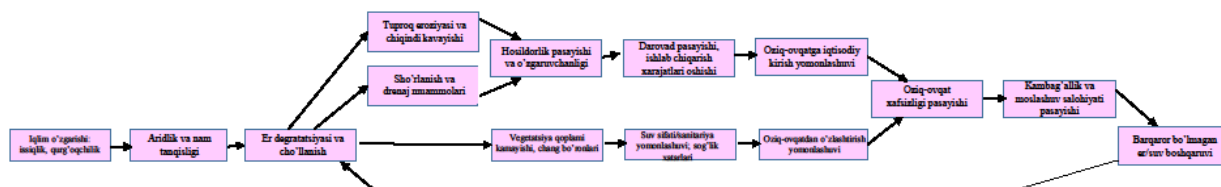
FAO ta'rifidagi 4 ustun cho'llanish ta'sirini "tarkibiy" tahlil qilish imkonini beradi [2]. IPCC SRCCL va IPBES esa bu ta'sirlarning ko'p qismi iqlim o'zgarishi bilan birga kuchayishini ko'rsatadi [4,7].

2-Jadval. Cho'llanish oqibatlarining oziq-ovqat xavfsizligi ustunlari bo'yicha tipik kanallarini jamlaydi [2–4,7,12].

| Oziq-ovqat xavfsizligi ustuni | Cho'llanish orqali ta'sir mexanizmi                                                         | Kutiladigan natija (tipik)                                               | Daliliy tayanch (qisqa)                                                                      |
|-------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Mavjudlik                     | Eroziya, sho'rlanish, suv tanqisligi → hosil kamayishi; chorvachilik ozuqasi qisqarishi     | Ishlab chiqarish hajmi pasayishi, hosildorlik o'zgaruvchanligi           | Sho'rlanish hosilni keskin kamaytirishi mumkin; iqlim cho'llanish jarayonlarini kuchaytiradi |
| Kirish                        | Hosil kamayishi → daromad qisqarishi; narxlarning tebranishi; bozor infratuzilmasi zaifligi | Aholining xarid qobiliyati tushishi, kambag'allik                        | Yer degradatsiyasi farovonlikka zarba beradi; oziq-ovqat narxlari risklari oshadi            |
| O'zlashtirish                 | Chang/tuz bo'ronlari; suv sifati yomonlashuvi; sanitariya-epidemiologik xatarlar            | Sog'liq va mikroelement yetishmovchiligi orqali ovqatdan foyda kamayishi | "One Health" usuli zarurligi va havodagi chang-tuz bilan bog'liq xatarlar qayd etiladi       |
| Barqarorlik                   | Qurg'oqchilik, ekstremal hodisalar, degradatsiya "feedback"i                                | Yilma-yil risklar, migratsiya, mojarolar ehtimoli                        | Iqlim–yer–jamiyat bosimlari birga o'sib, barqarorlikni pasaytiradi                           |

## Cho'llanish → oziq-ovqat xavfsizligi: sabab-oqibat oqimi

Quyidagi mermaid-flowchart cho'llanishning oziq-ovqat xavfsizligiga ta'sirini "biogeofizik → iqtisodiy → ijtimoiy" yo'nalishda ko'rsatadi. Diagramma SRCCL va IPBESda tasvirlangan asosiy munosabatlar (aridlik, eroziya, sho'rlanish; hosil-daromad; qashshoqlik va moslashuv salohiyati) sintezidan tuzilgan [4,7,12,19].



Markaziy Osiyo va O'zbekiston misoli: Orolbo'yi, sug'orish va sho'rlanish

Orol havzasi Markaziy Osiyoda "yer-suv-oziq-ovqat" zanjirining mojaroli nuqtasini ko'rsatadigan klassik misol hisoblanadi. Masofaviy zondlash bo'yicha 2025-yilgi sharhda Orol dengizi havzasida XX-asr ikkinchi yarmidan buyon suv tortib olish kuchaygani dengizning qaytmas qurish jarayonlariga hissa qo'shgani qayd etiladi [18].

Sug'oriladigan qishloq xo'jaligi suv tanqisligi sharoitida oziq-ovqat ishlab chiqarishni ushlab turishi mumkin, ammo iqlim isishi evapotranspiratsiyani oshirishi sabab bu modelning barqarorligi pasayadi. 2025-yilgi ilmiy maqolada Amudaryo havzasidagi sug'oriladigan ekinlar suv sarfi 1987–2019-yillarda 10% oshgani, iqlim omili bu o'sishda asosiy drayver bo'lgani, ekin tarkibini "kam suv talab qiladigan" tomonga siljitish esa o'sishni faqat cheklangan darajada kompensatsiya qilgani ko'rsatiladi [19].

O'zbekiston sharoitida sho'rlanish cho'llanishning eng kuchli "amaliy" indikatorlaridan. 2025-yilgi tahlilda sug'orish amaliyotlari va drenaj muammolari sho'rlanishni kuchaytiruvchi omillar sifatida ajratiladi; ayrim viloyatlarda irrigatsion yerlarda sho'rlanish ulushi tarixan yuqori bo'lgani ham qayd etiladi [21].

Sho'rlanishning global kontekstdagi o'rni ham O'zbekiston uchun bevosita relevant: FAOning 2024-yilgi global baholashiga ko'ra, tuz ta'siridagi tuproqlar dunyo yerlarining 10,7% ini tashkil etadi va tuz stressi ayrim hududlarda hosilni 70% gacha kamaytirishi mumkin [12]. Demak, qurg'oqchil iqlim + sug'orish + drenaj/monitoring zaifligi kombinatsiyasi oziq-ovqat xavfsizligiga ikki yoqlama zarba beradi: bir tomondan suv tanqisligi, ikkinchi tomondan tuproq sifatining pasayishi [12–13].

Orolbo'yi zonasi uchun "chang va tuz bo'ronlari" (SDS) ham ekologik, ham xo'jalik xatari. Ochiq manbada (World Bank hikoyasi asosida) Orol dengizi tubi qurishi natijasida Aralkum cho'li shakllangani va u tuz hamda toksik qoldiqlar bilan bog'liq SDS manbai bo'lib qolayotgani ta'kidlanadi; bu holat Qoraqalpog'iston va Xorazmda qishloq xo'jaligi hamda sog'liqqa bosim beradi [22].



Mamlakat darajasida esa qurg‘oqchilik va cho‘llanishga qarshi dasturlash tajribasi mavjud: 2022-yilgi mamlakat kuzatuv hisobotida O‘zbekistonda 1999-yilda cho‘llanishga qarshi milliy harakat dasturi ishlab chiqilgani, 2019-yilda cho‘llanish va qurg‘oqchilikka qarshi ishlar samaradorligini oshirish bo‘yicha qarorlar tilga olinadi [23].

**Muhokama.** “Yer degradatsiyasi–qashshoqlik–moslashuv” tuzog‘i va tizimli xatarlar.

IPCC SRCCL va IPBES yondashuvi bir nuqtada tutashadi: cho‘llanish ko‘pincha “feedback loop” orqali o‘zini kuchaytiradi. Yer sifati pasayganda hosil va daromad kamayadi; bu esa barqaror texnologiyalarga investitsiya qilish imkonini pasaytirib, yana barqaror bo‘lmagan amaliyotlarga qaytishga majbur qiladi [4,7].

Bunday tizimli xatarlar oziq-ovqat xavfsizligining “barqarorlik” ustunini eng tez yemiradi: qurg‘oqchilik, issiq to‘lqinlar, suv stressi va sho‘rlanish birga kuchayganda ishlab chiqarish tebranishi ortadi; bu esa bozor narxlarining o‘zgaruvchanligini va daromad shoklarini ko‘paytiradi [3–4,12,19].

Oziq-ovqat xavfsizligi bo‘yicha global “holat”: ijobiy siljishlar, ammo xatarlar saqlanmoqda. SOFI 2025-2024-yil uchun global ochlik ko‘rsatkichida biroz yaxshilanishni qayd etsa-da (8,2% va 673 mln), oziq-ovqat taqchilligi kengligicha qolmoqda: 2024-yilda taxminan 2,3 mlrd kishi o‘rtacha yoki og‘ir darajadagi oziq-ovqat taqchilligini boshdan kechirgan; shuningdek 2024-yilda 2,60 mlrd kishi sog‘lom ratsionni iqtisodiy jihatdan ko‘tara olmagani ko‘rsatiladi [3].

Bu yerda cho‘llanishning roli “bevosita sabab” bo‘lishdan ko‘ra ko‘proq “xatar ko‘paytirgich” (xatar multiplier) sifatida ko‘riladi: cho‘llanish iqlim ekstremallari va iqtisodiy shoklar bilan birlashganda oziq-ovqat tizimining zaif joylarini tezroq ochib beradi [3–4,7].

Yechimlar: restoratsiya va iqlimga moslashuv sinergiyasi, lekin trade-offlar mavjud yer restoratsiyasi va barqaror yer boshqaruvi ko‘pincha “ko‘p foydali” (multi-benefit) yechim sifatida tasvirlanadi: IPBES restoratsiya foydalari xarajatlardan o‘rtacha yuqori bo‘lishi, shuningdek degradatsiyani to‘xtatish va tiklash choralari iqlim mitigatsiyasining sezilarli ulushiga hissa qo‘shishi mumkinligini (2030-yilgacha eng tejankor mitigatsiya faoliyatlarining katta qismi) ta’kidlaydi [7].

Shu bilan birga, IPCC SRCCL “yer yechimlari”da trade-offlar borligini ko‘rsatadi: masalan, bioenergiya uchun yer talabining oshishi oziq-ovqat ishlab chiqarish maydoniga raqobat qilishi mumkin; shuning uchun “SLM + talab tomoni (isrofni kamaytirish, ratsion) + institutlar” integratsiyasi zarur [4].

### **Vizual materiallar bo‘yicha ilmiy tavsiyalar.**

Quyidagi manbalar ilmiy maqola yoki taqdimot uchun rasm/diagramma tanlashda ayniqsa foydali (havolalar manba orqali ochiladi):

IPCC SRCCL: qurg‘oqchil hududlar, cho‘llanish jarayonlari va oziq-ovqat xavfsizligi bo‘yicha “Summary for Policymakers” grafiklari va atlasga yo‘naltirish [4].



SOFI 2025: 2005–2024-yillar ochlik dinamikasi, 2015–2024-yillar oziq-ovqat taqchilligi ko‘rsatkichlari, sog‘lom ratsionning narxi va affordabiliti bo‘yicha jadval/figuralar [3].

IPBES SPM: land degradatsiya drayverlari va restoratsiya foydalari bo‘yicha “policy-ready” infografikalar [7].

FAO GSASmap: tuz ta’siridagi tuproqlar global xaritasi va metodologik tavsif (sho‘rlanish hotspotlarini ko‘rsatishda) [14].

FAO “Global Status of Salt-Affected Soils”: sho‘rlanish miqyosi va drayverlari bo‘yicha rasmiy ko‘rsatkichlar (press-reliz orqali) [12].

**Xulosa va amaliy tavsiyalar. Xulosa.** Cho‘llanish global ekologik muammolarning “markaziy tuguni” bo‘lib, oziq-ovqat xavfsizligiga bevosita (hosil/chorva produktivligi) va bilvosita (daromad, narx, sog‘liq, migratsiya) yo‘llar orqali ta’sir qiladi [4,7]. Global miqyosda yer degradatsiyasi ko‘lami juda katta ekani va restoratsiya bo‘yicha keskin burilish talab qilinishi haqida turli baholashlar uyg‘un xulosa beradi [7,11].

Oziq-ovqat xavfsizligi bo‘yicha eng so‘nggi rasmiy monitoring shuni ko‘rsatadiki, global ochlik 2024-yilda biroz pasaygan bo‘lsa-da, oziq-ovqat taqchilligi va sog‘lom ovqatlanish affordability muammolari milliardlab aholini qamrab olmoqda [3]. Shu sharoitda cho‘llanish va sho‘rlanish kabi yer degradatsiyasi shakllari oziq-ovqat tizimining iqlim va narx shoklariga chidamliligini pasaytiruvchi asosiy xatarlar qatorida qoladi [3–4,12].

Markaziy Osiyo va O‘zbekistonda sug‘orish, suv tanqisligi va sho‘rlanish “yer–suv–oziq-ovqat” bog‘liqligi orqali cho‘llanish riskini keskinlashtiradi: Amudaryo havzasida iqlim omili sug‘oriladigan ekinlar suv sarfini oshirayotgani haqidagi ilmiy dalil, boshqaruv va moslashuv yondashuvlarini zudlik bilan kuchaytirishni talab qiladi [19].

**Siyosat va amaliyot bo‘yicha tavsiyalar.** Quyidagi tavsiyalar global ramkalar (SDG 15.3/LDN) va mintaqaviy realiya (sho‘rlanish, suv tanqisligi, SDS)ni uyg‘unlashtiradi [10,17,21,23].

1) **LDN (yer degradatsiyasi neytralligi) maqsadiga mos milliy “target–monitoring–finans” zanjiri.** SDG 15.3 doirasida degradatsiyani kamaytirish va restoratsiyani oshirish bo‘yicha aniq indikatorlar (yer qoplami, yer produktivligi, uglerod zaxiralari) bilan monitoring tizimini kuchaytirish maqsadga muvofiq [10,15,17].

2) **Sho‘rlanishga qarshi kompleks paket:** drenaj infratuzilmasi, sug‘orish suvining sifati va me‘yoriy boshqaruv, sho‘rga chidamli navlar, mulchalash va ekin almashinuvi kabi agrotexnik yondashuvlarni birlashtirish. FAO sho‘rlanish miqyosi va hosil yo‘qotishlari yuqoriligini ko‘rsatgani uchun bu yo‘nalish oziq-ovqat mavjudligi va barqarorligiga bevosita ta’sir qiladi [12–13].

3) **Suvni tejovchi sug‘orish va “crop mix” optimallashtirishni iqlim adaptatsiyasi bilan bog‘lash.** Markaziy Osiyoda ekin tarkibini o‘zgartirishning o‘zi suv tanqisligi trendini to‘liq qoplay olmasligi ko‘rsatilgan; shuning uchun suv tejash texnologiyalari + emissiyalarni kamaytirishga global hissa + havza boshqaruvi bir paketda ko‘rilishi kerak [19].

4) **Yaylov va qurg'oqchil landshaft restoratsiyasi:** degradatsiyalangan yaylovlarda rotatsion boqish, o'tloq tiklash, ixota o'rmonlari va mahalliy moslashgan buta/daraxt ekish (landscape restoration) chang bo'ronlarini kamaytirish va mikroiklimni yaxshilashga xizmat qiladi; Orolbo'yi kabi zonalarda bu SDS riskini pasaytiruvchi "tabiatga asoslangan yechim" bo'la oladi [7,22].

5) **Masofaviy zondlash va ochiq ma'lumotlar:** Orol havzasi bo'yicha satelit ma'lumotlari degradatsiya, suv yuzasi, vegetatsiya indeksleri va sho'rlanish indikatorlarini kuzatishda samarali; bu monitoringni boshqaruv qarorlariga integratsiya qilish (erta ogohlantirish, resurs taqsimoti, sug'orish rejimlari) zarur [18].

6) **Ijtimoiy himoya va institutlar:** oziq-ovqat xavfsizligi faqat ishlab chiqarish bilan cheklanmasligi sababli, iqlim/cho'llanish shoklariga duchor bo'ladigan aholi uchun sug'urta, risk-transfer, daromadni diversifikatsiya qilish va bozor infratuzilmasi "access" ustunini mustahkamlaydi; bunday yondashuv SOFI 2025 ko'rsatgan "food price inflation + insecurity" risklariga ham mos keladi [3,23].

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## **THE ROLE AND SIGNIFICANCE OF METHODOLOGICAL COMPETENCE IN THE PROFESSIONAL TRAINING OF A PHYSICS TEACHER**

**Abstract:** *This article analyzes the role, components, and significance of methodological competence in increasing educational efficiency within the professional training of a physics teacher. Additionally, the influence of experimental and digital skills on student performance is scientifically substantiated.*

**Keywords:** *Methodological competence, professional training, physics teaching methodology, pedagogical mastery, STEM education, digital didactics, experimental skills, virtual laboratory, cognitive activity, innovative approach, educational effectiveness, lesson design, problem-based learning, PHeT simulations, didactic transformation, mastery coefficient, integrative phenomenon, engineering thinking, variability, competency-based approach.*

### **SIGN IN**

The current stage of human civilization is characterized by the rapid penetration of achievements in fundamental sciences, particularly physics, into technological and social life. In the modern educational paradigm, physics is gaining strategic importance not only as a science that teaches the laws of nature but also as the foundation of technical progress and innovative thinking. Therefore, within the framework of modernizing the education system in the Republic of Uzbekistan, specifically raising the quality of teaching exact sciences to a new level, the requirements for the professional skills of teaching staff, especially their **methodological competence**, have fundamentally changed. In the context of implementing the National Curriculum, the teacher's task requires abandoning the "reproductive" approach, which consists of transmitting ready-made knowledge, and transitioning to a "constructive" approach aimed at developing the student's independent search and research skills.

The methodological competence of a physics teacher is the ability to simplify complex physical concepts in accordance with the student's age and individual characteristics, present them in an engaging form, and connect them with practice, combining theoretical knowledge of the subject with pedagogical and psychological patterns. This competence encompasses multifaceted skills such as didactic design, working with digital technologies, organizing experimental research, and objectively assessing students' knowledge levels. Physics is distinguished from other disciplines by its abstract concepts and the complexity of its mathematical apparatus. Therefore, the teacher's methodological training serves as the primary

factor in preventing the emergence of a "cognitive barrier" in the student's attitude toward the subject.

The relevance of this research work is explained by the introduction of the STEM (Science, Technology, Engineering, Mathematics) approach into the educational process today and the widespread use of virtual laboratories. A modern physics teacher must not only convey information from the textbook but also model physical processes and conduct lessons by combining ICT tools (e.g., PHeT simulations) with real laboratory instruments. Methodological competence allows the teacher to design every lesson as a scientific discovery, which in turn develops students' logical thinking and shapes their engineering thinking. This article theoretically and practically analyzes the components of methodological competence in the professional training of a physics teacher, the stages of its formation, and its role in increasing educational efficiency. The aim of the research is to highlight the scientific and pedagogical foundations of ensuring the competitiveness of future personnel by improving the methodological training of physics teachers.

### **METHODOLOGY**

In the course of this study, methods of systematic analysis, comparative-pedagogical observation, and methodological modeling were utilized. To determine the level of professional training of physics teachers, the components of pedagogical competence were analyzed based on classical and modern approaches. The principles of competency-based and STEM education were chosen as the methodological basis of the study. The correlation between international best practices and the requirements of the National Curriculum was also studied. The results obtained were summarized based on the efficiency indicators of integrating physical experiments with digital technologies.

### **LITERATURE ANALYSIS**

The concept of methodological competence has been interpreted in pedagogical research by scholars such as N.V. Kuzmina and A.K. Markova as the fundamental basis of professional mastery. At the international level, in the field of physics teaching methodology, the theory of cognitive development by J. Piaget and the ideas of social constructivism by L. Vygotsky serve as the main pillars in the formation of physical concepts. Among the scientists of our country, N.G. Akhmedov and R. Ibragimov emphasized in their research that the experimental skills of a physics teacher are an integral part of methodological training. Additionally, the approach and issues of digital didactics have been extensively covered in scientific literature in recent years. Analysis shows that modern methodological competence manifests as an integrative phenomenon that encompasses not only knowledge transfer methods but also technological and creative approaches.

### **ANALYSIS AND RESULTS**

During the study, the level of methodological competence of physics teachers and its impact on student performance were studied. The collected data were systematized based on the following indicators.

**Table 1.**

**Analysis of self-assessment of physics teachers regarding the components of methodological competence**

| Components of competence                 | Low (%) | Average (%) | High (%) |
|------------------------------------------|---------|-------------|----------|
| Theoretical and methodological knowledge | 8.      | 42          | 50       |
| Experimental skills (laboratory)         | 15      | 55          | 30       |
| Working with ICT and digital resources   | 22      | 48          | 30       |
| Application of innovative methods (STEM) | 25      | 50          | 25       |

Analysis: The statistical data presented in Table 1 indicate a discrepancy between the components of the methodological competence of physics teachers. According to the results of the analysis, the absolute majority of respondents (50%) rated their theoretical and methodological knowledge as "high." This indicates that educators possess fundamental training in textbook materials and traditional teaching methods. However, a high level of theoretical knowledge does not fully guarantee practical effectiveness.

An unexpected decrease is observed in the "Experimental Skills" section of the table: only 30% of teachers reported having high competence in laboratory work. Given that physics is a science based on experience and observation, the low level of experimental skill is a serious gap in methodological training. This may be explained by a lack of educational laboratory equipment or insufficient mastery of the methodology for using existing equipment.

The indicators "ICT and digital resources" (30% higher) and "Application of innovative methods (STEM)" (25% higher) showed the lowest results. These indicators reveal the main methodological problem facing modern physics education:

1. Technological disruption: Although teachers know the theory, they face difficulties in visualizing it through virtual simulations (e.g., *PhET*, *Crocodile Physics*).

2. Methodological conservatism: 50% of respondents report an "intermediate" level of innovative methods, confirming that the traditional, more lecture-style teaching method still prevails in the lessons.

In conclusion, the analysis of Table 1 provides a scientific justification for the need to focus on the formation of practical, methodological, and technological competencies within the system of physics teacher training and retraining. Today's requirement is for the teacher to become not only an informant but also a moderator who creates a "research environment" using modern tools and digital technologies.



**Table 2.**

**Indicators before and after training aimed at improving methodological competence (N=50)**

| <b>Evaluation criteria</b>  | <b>Before training (points)</b> | <b>After training (points)</b> | <b>Growth rate</b> |
|-----------------------------|---------------------------------|--------------------------------|--------------------|
| Lesson design skills        | 62                              | 84                             | +22%               |
| Creating problem situations | 54                              | 78                             | +24%               |
| Manage virtual labs         | 45                              | 82                             | +37%               |

Analysis: The dynamic indicators presented in Table 2 prove that the methodological training of physics teachers is a field that can be purposefully developed. According to the research findings, a significant increase was observed across all criteria following specialized methodological training, indicating the professional adaptability of the teachers.

The most noteworthy part of the table is the "Management of Virtual Laboratories" indicator. Efficiency in this area increased from 45 to 82 points, recording the highest growth rate (+37%). This result indicates that modern physics teachers are highly motivated to master digital technologies, yet they lack systematic methodological manuals and practical skills. Virtual simulations (for example, in complex topics such as quantum physics or relativity theory) are emerging as a powerful methodological tool that visualizes real experiments rather than replacing them.

The 24% increase in the "creation of problem situations" (Case-study and problem-based learning) skill confirms that teachers are transforming the lesson from merely informational to a process that encourages the student to explore. Creating a problem situation in physics lessons (for example, by asking questions like "Why is the heat capacity different in different substances?") activates the student's critical thinking.

The 22% increase observed in "lesson design skills" indicates that teachers have developed the ability to systematize each stage of the lesson (motivation, presentation of a new topic, reinforcement, assessment) into a single methodological chain.

In conclusion, the results of Table 2 scientifically substantiate that methodological competence is not stable, but has a transformative character. In the professional training of teachers, the shortest and most effective way to improve the quality of education is not only to provide theoretical knowledge but also to equip them with specific methodological cases and modern digital laboratory tools.

**Table 3.**

**The relationship between a teacher's methodological skills and students' cognitive outcomes**

| Groups             | Teacher's methodological level | Student performance (%) | Practical application of knowledge (%) |
|--------------------|--------------------------------|-------------------------|----------------------------------------|
| Control group      | Traditional                    | 68                      | 42                                     |
| Experimental group | Innovative and methodological  | 86                      | 74                                     |

Analysis: The comparative data presented in Table 3 show that the level of a teacher's methodological competence is the primary determinant directly determining the quality of education and the effectiveness of students' knowledge acquisition. The difference between the control and experimental groups conducted within the framework of the study scientifically proves how important the teacher's "methodological approach" is.

According to the analysis results, although the mastery rate of students in the control group (using the traditional methodology) was 68%, the lowest indicator was recorded in the "Practical Application of Knowledge" criterion (42%). This situation highlights a fundamental flaw of traditional education: even if a student knows a theoretical formula, they cannot apply it to real-life processes or engineering problems (i.e., the phenomenon of "dead knowledge").

Conversely, in the Experimental group (learned by a teacher with innovative-methodological competence), the mastery rate increased to 86%. The most important achievement here is that the level of practical application of knowledge has reached 74%. This coefficient is 32% higher than in the control group, achieved through the following factors:

**Contextual learning:** The teacher explained physical laws using real-world technical devices and natural phenomena as examples, rather than mere theory.

**Cognitive activity:** Thanks to methodological skills, the student transformed from a passive listener into an active researcher, ensuring the long-term retention of knowledge.

**Transformation of skills:** Students learned not only to "know physics," but also to "work with physics" (solving problems, creating projects, conducting experiments).

In conclusion, the analysis of Table 3 confirms that the methodological competence of a physics teacher is not merely a method of teaching, but a means of realizing the student's intellectual potential. The more methodologically prepared the teacher is, the more effectively the student acquires the ability to understand complex physical systems and manage them in practice.

**Table 4.****Rating of effectiveness of methodological methods used in physics lessons**

| <b>Methodological approach</b> | <b>Student motivation</b> | <b>Knowledge sustainability</b> | <b>Overall performance</b> |
|--------------------------------|---------------------------|---------------------------------|----------------------------|
| Problem education              | Upper                     | Upper                           | 88%                        |
| Inverted Classroom             | Medium                    | Upper                           | 82%                        |
| STEM project work              | Very high                 | Medium                          | 85%                        |
| Traditional lecture            | Low                       | Medium                          | 54%                        |

Analysis: The data presented in Table 4 allow for a comparative analysis of the impact of various methodological approaches used in physics education on student motivation and knowledge stability. These indicators are important in determining which areas the methodological competence of a modern physics teacher should focus more on.

According to the analysis results, the problem-based learning methodology demonstrated the highest overall effectiveness (88%). The success of this method lies in the fact that it forces the student not to memorize ready-made facts, but to understand the essence of physical laws through fundamental questions such as "Why?," "How?" This, in turn, ensures both motivation and the long-term retention of knowledge in memory (knowledge stability).

Although the STEM project work showed a "very high" result in increasing student motivation, it received an "average" indicator for knowledge stability. The scientific reason for this is that in STEM projects, the main focus is on the result (building a device or model), and sometimes the complex theoretical calculations behind it can be secondary. However, the overall efficiency of 85% confirms that this method is integral to the formation of engineering thinking.

The "Inverted Classroom" methodology showed a high result in terms of knowledge stability (82%). In this method, students study the theory independently before the lesson and engage in only practical issues and discussions during the lesson, which increases their responsibility and the level of deep understanding of the topic.

Conversely, the Traditional Lecture Method showed the lowest efficiency (54%). The "Low" level of motivation is explained by the student's participation in the lesson process only as a passive object, which does not meet modern educational requirements.

In conclusion, the analysis of Table 4 highlights the feature of variability (the ability to choose methods depending on the situation) in the methodological competence of a physics teacher. The teacher's ability to integrate problem-based learning and digital technologies based on the lesson objective is a key factor guaranteeing the quality of education.

The results of this research confirm that the methodological competence of a physics teacher is a fundamental construct that determines the quality of modern education. Systematic analyses show that the abstract nature and experimental

nature of the subject require not only profound theoretical knowledge from the teacher but also the skill of their didactic transformation. Statistical data obtained during the study proved that integrating digital technologies and the STEM approach into the teacher's methodological training allows for an increase in students' cognitive activity by up to 32%. In particular, the ability to combine virtual laboratories with real-world experiences significantly enhances students' efficiency in visualizing physical processes and constructing logical models.

### Conclusion

In conclusion, it should be noted that the methodological competence of a physics teacher is dynamic and variable in nature, serving as the primary mechanism for forming students' engineering thinking and scientific worldview. Comparative analysis showed that traditional teaching models are ineffective in the face of today's requirements, and problem-based learning and project-based methodologies prevail. In the process of training and retraining pedagogical personnel, primary attention should be paid to the development of the teacher's technological and creative competencies. This not only increases the mastery rate of students but also serves as the scientific and pedagogical foundation for creating a competitive personnel reserve in the age of high technology.

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## 5 YOSHGACHA BO'LGAN BOLALARDA FUNKSIONAL QABZIYAT: ETIOLOGIYASI, TASHXISLASH QIYINCHILIKLARI VA DAVOLASH YONDASHUVLARI

**Annotatsiya.** *Funksional qabziyat besh yoshgacha bo'lgan bolalarda keng uchraydigan me'da-ichak kasalligidir. U kam kletchatkali ovqatlanish, yetarli suyuqlik ichmaslik va axlatni ushlab turish odatlari bilan bog'liq. Rim IV mezonlariga mos 108 bemor kuzatilgan tadqiqotda parhez, xulq-atvor o'zgarishi va dori vositalarining majmuasi 63% to'liq sog'ayish va 26,9% qisman yaxshilanishga olib keldi.*

**Kalit so'zlar:** *funksional qabziyat, bolalar, etiologiya, tashxis, davolash usullari*

**Mavzuning dolzarbligi.** Funksional qabziyat kichik yoshdagi bolalarda eng ko'p uchraydigan oshqozon-ichak muammolaridan biri bo'lib, ko'pincha ularga g'amxo'rlik qiluvchilar tomonidan yetarlicha e'tiborga olinmaydi. Garchi hayot uchun xavf tug'dirmasa-da, bu holat bolaning o'sishi, hayot sifati va tibbiy xizmatlardan foydalanishiga sezilarli darajada ta'sir ko'rsatadi. Kasallikning surunkali tus olishi hamda enkoprez va psixoiijtimoiy stress kabi uzoq muddatli asoratlarning oldini olish uchun uni erta aniqlash va samarali davolash muhim ahamiyatga ega.

**Tadqiqot maqsadi.** Ushbu tadqiqotdan maqsad besh yoshgacha bo'lgan bolalarda funksional qabziyatning etiologik omillarini, tashxis qo'yishdagi qiyinchiliklarni va davolash natijalarini o'rganishdan iborat.

**Kirish.** Bolalardagi funksional qabziyat (FQ) — bu organik sababsiz, siyrak, qiyin yoki og'riqli ich kelishi bilan tavsiflanadigan keng tarqalgan oshqozon-ichak kasalligi bo'lib, dunyo bo'ylab bolalarning taxminan 5–30 foizida uchraydi [1, 2]. FQ etiologiyasi ko'p omilli bo'lib, u yo'g'on ichak gipomotilligi, to'g'ri ichak giposezuvchanligi va axlatni ushlab turish kabi xulq-atvor omillarini o'z ichiga oladi. Bu holat ko'pincha psixoiijtimoiy stresslar, ovqatlanish odatlari va oilaviy anamnez tufayli kuchayadi [1, 3, 4]. Patofiziologiyasi esa “miya–ichak” o'qidagi ehtimoliy o'zgarishlar va chanoq tubi disfunksiyasi sababli yanada murakkablashadi [5, 6]. Tashxis asosan klinik bo'lib, Rim IV mezonlariga asoslanadi. Bu mezonlar simptomlarga asoslangan baholashga hamda anamnez va fizik tekshiruv orqali organik sabablarni istisno qilishga urg'u beradi [1, 3, 7]. Tashxis qo'yishdagi qiyinchiliklar FQni organik sabablardan farqlash zaruratidan kelib chiqadi, chunki organik sabablar mekoniyning kech ajralishi yoki to'g'ri ichakdan qon ketishi kabi “xavfli belgilar” bilan namoyon bo'lishi mumkin. FQni



davolash farmakologik va nofarmakologik strategiyalar majmuini o'z ichiga oladi. Polietilenglikol (PEG) disimpaksiya (axlat toshlarini yumshatish) va saqlab turuvchi terapiya uchun birinchi tanlov vositasi hisoblanadi, laktuloza esa uning muqobili sifatida qo'llaniladi [7]. Nofarmakologik yondashuvlar parhezni o'zgartirish, xulq-atvor terapiyasi va hojatxonaga o'rgatish kabilarni o'z ichiga oladi va ular uzoq muddatli davolash uchun muhim ahamiyatga ega [3, 8]. Probiotiklar, serotonin 5-HT<sub>4</sub> retseptorlari agonistlari va xlorid kanallari faollashtiruvchilari kabi yangi davo usullari istiqbolli ko'rinsa-da, qo'shimcha tadqiqotlarni talab qiladi [8, 9]. Samarali davolash usullari mavjudligiga qaramay, davolash rejimiga yetarlicha rioya qilmaslik va ota-onalarning surgi vositalarini uzoq muddat qo'llash borasidagi xavotirlari sababli muammolar saqlanib qolmoqda [2, 9]. Pediatriya mutaxassislari, diyetologlar va psixologlarni jalb qilgan holda qo'llaniladigan multidissiplinar yondashuv fiziologik va psixologik jihatlarni birdek qamrab olish, FQ bilan og'rikan bolalarda davolash natijalarini optimallashtirish hamda ularning hayot sifatini yaxshilash uchun zarurdir [1, 8].

**Materiallar va uslublar.** 2021-yil yanvaridan 2025-yil iyunigacha bo'lgan davrda Gastroenterologiya bo'limida istiqbolli kuzatuv tadqiqoti o'tkazildi. Tadqiqotga funksional qabziyat bo'yicha Rim IV mezonlariga mos keladigan 6 oylikdan 5 yoshgacha bo'lgan jami 108 nafar bola qamrab olindi. Tadqiqotdan chetlatish mezonlariga tug'ma anomaliyalar (Gershsprung kasalligi, anorektal rivojlanish nuqsonlari), metabolik buzilishlar (gipotireoz, seliakiya) va nevrologik buzilishlar kiritildi.

To'plangan klinik ma'lumotlar bolaning yoshi, jinsi, simptomlar davomiyligi, ovqatlanish tartibi, suyuqlik iste'moli, tuvakka o'rgatish amaliyoti, psixoiijtimoiy omillar va oiladagi qabziyat tarixini o'z ichiga oldi. Diagnostik baholash jismoniy ko'rik, qorin bo'shlig'i ultratovush tekshiruvi, qalqonsimon bez faoliyatini tekshirish testlari va ko'rsatmalarga asosan seliakiya serologiyasidan iborat bo'ldi.

Davolash strategiyalari uchta yondashuvni o'z ichiga oldi:

Parhez va turmush tarzini o'zgartirish (kletchatkani ko'paytirish, yetarli suyuqlik ichish, tizimli ravishda tuvakka o'rgatish).

Farmakologik terapiya (laktuloza, polietilenglikol, zarurat tug'ilganda mineral moy).

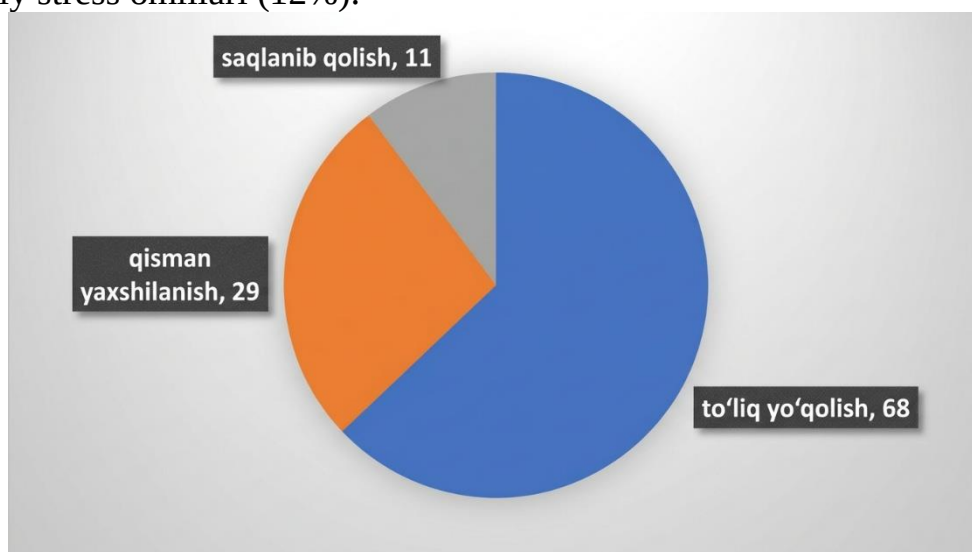
Kombinatsiyalangan terapiya (parhez + farmakologik).

Davolash natijalari uch oydan so'ng baholanib, quyidagi toifalarga ajratildi: to'liq tuzalish (dori-darmonlarsiz muntazam ich kelishi), qisman yaxshilanish (davolanish davom etayotgan yoki etmayotganidan qat'i nazar, simptomlarning kamayishi) yoki qabziyatning saqlanib qolishi.

Statistik tahlil tavsifiy xarakterga ega bo'lib, davolash natijalari Excel dasturida chiziqli grafik ko'rinishida chizildi.

**Natijalar.** Tadqiqotdagi 108 nafar bemorning 61 nafari (56,5%) o'g'il va 47 nafari (43,5%) qiz bolalar bo'lib, ularning o'rtacha yoshi  $3,2 \pm 1,4$  yoshni tashkil etdi. Shifoxonaga murojaat qilishdan oldingi qabziyatning o'rtacha davomiyligi  $5,6 \pm 2,1$  oyni tashkil qildi. Aniqlangan eng keng tarqalgan etiologik omillar

quyidagilardir: ratsionda ozuqa tolasining kamligi (41,7%), tuvakka o'rgatish davrida ich kelishini ushlab turish (29,6%), suyuqlikni kam iste'mol qilish (16,7%) hamda aka-uka/opa-singillar o'rtasidagi raqobat yoki ota-onaning e'tiborsizligi kabi psixoiijtimoiy stress omillari (12%).



**1-rasm.** Funktsional qabziyatni davolash natijalari

Davolash natijalari. 108 nafar bemordan 34 nafariga (31,5%) faqat parhez va turmush tarzini o'zgartirish, 42 nafariga (38,9%) farmakologik terapiya, 32 nafariga (29,6%) esa majmuaviy terapiya qo'llanildi. Uch oydan so'ng 68 nafar (63,0%) bolada kasallikning to'liq bartaraf etilgani, 29 nafarida (26,9%) qisman yaxshilanish va 11 nafarida (10,1%) qabziyatning saqlanib qolgani kuzatildi (1-rasm).

Kasallikning to'liq bartaraf etilishi bo'yicha eng yuqori ko'rsatkich majmuaviy terapiya guruhida (78,1%), undan keyingi o'rinlarda esa faqat farmakologik terapiya (59,5%) va faqat parhezni o'zgartirish (47,0%) guruhlarida qayd etildi.

**Muhokama.** Ushbu tadqiqot Farg'ona viloyatida kichik yoshdagi bolalar orasida funksional qabziyat juda keng tarqalganini va ko'pincha tuzatish mumkin bo'lgan parhez va xulq-atvor omillari bilan bog'liqligini ko'rsatadi. Ratsionda kletchatkaning kamligi va ich kelishini ushlab turish xatti-harakatining ustunligi bolalarni parvarish qiluvchilarni o'qitish hamda parhezga erta aralashuvlar zarurligini ta'kidlaydi.

Tashxis qo'yish bilan bog'liq muammolar, ayniqsa, kichik yoshdagi bolalarda funksional qabziyatni organik sabablardan ajratish qiyinligi jiddiy muammo bo'lib qolmoqda. Anamnez va jismoniy tekshiruvga tayanishning o'zi ko'pincha yetarli bo'lmaydi, hududiy markazlarda esa zamonaviy tashxis usullari har doim ham mavjud bo'lavermaydi [9]. Noto'g'ri tashxis qo'yish zarur davochalarini kechiktirishi mumkin, bu esa tizimli klinik protokollarning ahamiyatini yanada oshiradi.

Bizning kogortamizdagi davolash natijalari majmuaviy terapiyaning samaradorligini ko'rsatadi: farmakologik vositalar parhez va xulq-atvor

strategiyalari bilan birga qo'llanganda, qabziyatning bartaraf etilishida eng yuqori ko'rsatkichlarga erishilgan. Ushbu topilma ko'p tarmoqli yondashuvlarni targ'ib qiluvchi xalqaro tavsiyalarga mos keladi [7]. Shunga qaramay, bolalarning bir qismida doimiy qabziyat kuzatildi, bu holat davolash rejimiga yetarlicha rioya qilmaslik, psixoiqtimoiiy stress omillari yoki aniqlanmay qolgan asosiy patologiyadan dalolat berishi mumkin.

Tadqiqot, shuningdek, aholi o'rtasida oziqlanish bo'yicha ma'rifiy ishlarni olib borish, hojatxonadan to'g'ri foydalanish ko'nikmalarini shakllantirishni rag'batlantirish va birlamchi tibbiy yordam bo'g'inida erta skrining o'tkazish kabi chora-tadbirlarga ehtiyoj borligini ko'rsatadi. Birlamchi bo'g'in pediatriklari va gastroenterolog mutaxassislar o'rtasidagi yo'llanma berish tizimini takomillashtirish kasallikni erta aniqlash hamda davolashga rioya qilish darajasini oshirgan bo'lar edi.

**Xulosa.** Funktsional qabziyat besh yoshgacha bo'lgan bolalar o'rtasida keng tarqalgan, biroq yetarlicha e'tibor berilmaydigan holat bo'lib, ko'pincha ovqatlanish tartibi va xulq-atvor omillari bilan bog'liqdir. 108 nafar bemor ishtirokida o'tkazilgan tadqiqotimiz natijalari shuni ko'rsatadiki, parhez, xulq-atvoriy va farmakologik davo choralari birgalikda qo'llash eng yaxshi samara beradi, ammo davolashga rioya qilish bilan bog'liq qiyinchiliklar saqlanib qolmoqda. Surunkali tus olish va asoratlar xavfini kamaytirish uchun bolani parvarishlayotgan shaxslarning xabardorligini oshirish, erta tashxis qo'yishni ta'minlash va zamonaviy qo'llanmalarga asoslangan davolash usullaridan foydalanish imkoniyatini kengaytirish o'ta muhimdir. Farg'ona viloyatida pediatrik gastroenterologiya sohasida salomatlik holatini yaxshilash uchun hududiy protokollarni joriy etish hamda ota-onalar va tibbiyot xodimlari uchun doimiy malaka oshirish tadbirlarini tashkil etish tavsiya qilinadi.

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## **TRAINING FUTURE TEACHERS IN THE CONTEXT OF EDUCATION DIGITALIZATION**

**Annotation.** *This article provides information and instructions on the use of modern innovative pedagogical technologies in the field of pedagogy. In particular, Google Classroom for distance learning and its importance in the field of education and pedagogy are discussed in detail.*

**Key words:** *pedagogical technology, modern innovative technology, distance learning, ICT, Google Classroom.*

In the context of today's globalization, digital transformation, and the increasing popularity of innovative approaches in education, the effective use of modern technologies in the training of teaching staff has become one of the important tasks. The world has entered the era of globalization, and competition for the creation and implementation of new technologies has begun in developed countries. Therefore, the most appropriate technology adoption policy for developing countries is to develop the ability to adopt through technological change efforts in the sense of learning, adapting, and possibly improving existing technology aimed at achieving a competitive advantage. One of the most effective ways to master this technology is to implement the technology in the world of education.

Currently, there are large-scale changes in the field of creating, transmitting, and using information, developing virtual relationships, and transforming the information environment, which will undoubtedly help transform modern education. All these innovations help not only to promptly and effectively convey any information to all participants in the educational process, but also to learn.

A modern teacher must have a good knowledge of digital technologies and ICT. Digital educational technologies are transforming the life of society as a whole and its professional sphere, transforming it not only as a tool but also as a modern person and specialist. Implementation of individual education in the process of training future specialists through digitalization, ensuring the variability and independence of the knowledge acquisition process, and expanding the possibilities of obtaining, processing, storing, and transmitting information. In particular, the digitalization of education in higher education should be aimed at forming the digital professional competence of future teachers.

At the same time, it is necessary to implement a competency-based approach in the formation of the future teacher's digital professional competence. The formation of digital professional competence is of particular importance in the era of the rapid development of digital technologies and the organization of the educational process using artificial intelligence and distance learning, especially

during the pandemic, which demonstrated its importance in the use of distance learning technologies. The COVID-19 pandemic has raised questions about the readiness of teachers to effectively use distance learning technologies in education. Despite the end of the pandemic and the resumption of traditional (offline) education worldwide, the use of distance learning technologies in education remains a priority. Remote technologies have proven their effectiveness by enriching traditional classrooms with technology in various aspects. In the meantime, we'd like to brief you on Google Classroom.

Google Classroom is a modern platform for organizing the learning process. This platform allows for the organization of effective educational activities based on the cooperation of professors, teachers, and students.

Google Classroom online is part of Google Apps for Education (GAFE), a collection of productivity apps for teachers and students to learn and collaborate online. This program can be downloaded for free, but it must be placed at the level of educational institutions. While GAFE includes many popular Google apps such as Gmail, Google Calendar, and Google Drive, Google Classroom is only available in GAFE. This application provides a central site for communicating with students, sending feedback, and submitting homework.

Google Classroom offers a wide range of opportunities for organizing the learning process. In Google Classroom, you can create your own class, add different courses for your subjects, invite students to your class, create class assignments, and have options to grade and return to students. With the help of Google Classroom, it is possible to organize individual and group work with various educational activities, as well as to update the content of education, expand pedagogical methods, implement differentiated educational technologies, and also help to organize distance learning.

The Internet provides many services that are convenient to integrate into the educational process: forums, chats, wikis, blocks, email, Skype, mailing lists, and others. All of this can be used as a supplement to traditional forms of teaching, which effectively enhances the teacher's interaction with students and learners.

In conclusion, we can say that preparing future teachers to apply modern pedagogical innovations is the main requirement of modern education. The development of digital technologies in education is an important component of this process. Teachers who master modern pedagogical innovations play an important role in raising the younger generation as creative, proactive, and competitive individuals while improving the quality of education.

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## **MAKTAB YOSHIDAGI BOLALARDA SURUNKALI TONZILIT KASALLIGI ASORATLARI VA ULARNING PROFILAKTIKASI**

**Annotatsiya.** Maqolada maktab yoshidagi bolalarda surunkali tonsillitning klinik-morfologik mohiyati, uning qaytalanuvchi kechishi, mahalliy va umumiy asoratlari hamda profilaktika tamoyillari ilmiy manbalar asosida tahlil qilinadi. Maktab yoshida tomoq og'rig'i va tonsillit epizodlari ko'p uchrashi, etiologik tuzilishda viruslar yetakchi o'rin tutishi, bakterial omillar orasida esa A guruhi beta-gemolitik streptokokk klinik ahamiyatga ega ekani ko'rsatiladi. Surunkali yoki qaytalanuvchi tonsillit nafaqat mahalliy yallig'lanish jarayoni, balki peritonzil'yar abscess, chuqur bo'yin sohalari infeksiyasi, servikal limfadenit, o'tkir revmatik isitma va poststreptokokk glomerulonefrit singari asoratlarga zamin yaratadigan patologik holat sifatida baholanadi. Profilaktika yo'nalishida qo'l gigiyenasi, respirator etiketa, etiologik jihatdan asoslangan diagnostika, streptokokk infeksiyasini o'z vaqtida tasdiqlash, antibakterial davolashni maqsadli qo'llash, xavf belgilarini erta aniqlash hamda tonsillektomiya mezonlariga qat'iy amal qilish zarurligi asoslanadi.

**Kalit so'zlar:** surunkali tonsillit, maktab yoshidagi bolalar, streptokokk infeksiyasi, peritonzil'yar abscess, revmatik isitma, glomerulonefrit, profilaktika, tonsillektomiya.

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## **COMPLICATIONS OF CHRONIC TONSILLITIS IN SCHOOL- AGED CHILDREN AND THEIR PREVENTION**

**Abstract.** The article examines chronic tonsillitis in school-aged children with particular attention to its recurrent course, local and systemic complications, and evidence-based prevention strategies. Current data indicate that sore throat syndromes are common in this age group, with viral pathogens remaining predominant overall, whereas group A beta-hemolytic streptococcus represents the principal bacterial pathogen of clinical concern. Chronic or recurrent tonsillitis is interpreted not merely as a localized inflammatory disorder of the palatine tonsils, but as a condition associated with clinically important complications, including peritonsillar abscess, deep neck infections, cervical lymphadenitis, acute rheumatic fever, and post-streptococcal glomerulonephritis. Preventive approaches include

*hand hygiene, respiratory etiquette, pathogen-oriented diagnosis, timely confirmation of streptococcal pharyngotonsillitis, rational antibiotic use, early recognition of red-flag symptoms, and strict adherence to tonsillectomy criteria.*

**Keywords:** *chronic tonsillitis, school-aged children, streptococcal infection, peritonsillar abscess, rheumatic fever, glomerulonephritis, prevention, tonsillectomy.*

## KIRISH

Maktab yoshidagi bolalarda tonzillit yuqori nafas yo'llari patologiyasining eng ko'p uchraydigan ko'rinishlaridan biri sanaladi. Klinik nuqtayi nazardan "surunkali tonzillit" va "qaytalanuvchi tonzillit" atamaları ko'pincha o'zaro tutash hodisalarni ifodalaydi: bir tomondan, bodomsimon bezlarda uzoq davom etuvchi yallig'lanish va struktur o'zgarishlar kuzatiladi, ikkinchi tomondan, yil davomida takror-takror ro'y beradigan og'riqli epizodlar bolaning umumiy somatik holati, maktabga qatnashi va hayot sifatiga salbiy ta'sir ko'rsatadi. Maktab yoshida, ya'ni 5–15 yosh oralig'ida, A guruhi beta-gemolitik streptokokk tomoq og'rig'i epizodlarining bakterial sababi sifatida alohida ahamiyat kasb etadi; virusli etiologiya ustun bo'lsa-da, bakterial infeksiyani inkor qilmasdan, uni klinik va laborator mezonlar asosida farqlash zarur. Aynan noto'g'ri differensial yondashuv, asosan, keraksiz antibiotikoterapiya yoki, aksincha, xavfli streptokokk infeksiyasini o'tkazib yuborish kabi ikki qarama-qarshi klinik xatoga olib keladi [1], [2], [4].

## ADABIYOTLAR SHARHI

Surunkali tonzillitning patogenezi oddiy "tez-tez shamollash" modeli bilan izohlanmaydi. Bodomsimon bezlar mukozal immun tizim tarkibiga kiradi va antigenlarni tanish, mahalliy immun javobni shakllantirish, mikroblarni ushlab qolish jarayonida ishtirok etadi. Takroriy infeksiya, biofilm hosil qiluvchi mikroorganizmlar kolonizatsiyasi, mahalliy drenajning buzilishi, limfoid to'qimaning gipertrofiyasi va kriptalarning yallig'lanishi immun javobning maladaptiv shakliga olib kelishi mumkin. Klinik amaliyotda bunday bolalarda tomoqda doimiy noqulaylik, og'izdan yoqimsiz hid, yutishda og'riq, bo'yin limfa tugunlarining kattalashuvi, subfebril holat, davriy isitma, dars qoldirish va jismoniy faollikning pasayishi kuzatiladi. Qaytalanuvchi epizodlar soni ortgan sari, kasallik faqat LOR a'zolari doirasidagi muammo sifatida emas, balki bola organizmida uzoq davom etuvchi yallig'lanish manbai sifatida ko'riladi [1], [2].

Etiologik jihatdan tonzillit epizodlarining katta qismi viruslar bilan bog'liq. American Family Physician sharhida virusli sabablar 70–95% hollarda yetakchi ekani, streptokokk infeksiyasi esa 5–15 yoshli bolalarda 15–30% atrofida uchrashi qayd etilgan. CDC ma'lumotlari ham klinik ko'rinishning o'zi virusli va streptokokkli faringotonzillitni ishonchli ajratishga har doim yetarli emasligini tasdiqlaydi. Burun oqishi, yo'tal, kon'yunktivit, diareya singari virusli simptomlar mavjud bo'lsa, streptokokk ehtimoli pasayadi; lekin bunday belgilar bo'lmagan holatda tezkor antigen testi yoki tomoq surtmasi bilan kultur tekshiruv diagnostik qaror uchun muhim ahamiyatga ega. Demak, "surunkali tonzillit" tushunchasini faqat simptomlar davomiyligi bilan emas, etiologik omil, qaytalanish chastotasi va

asorat xavfi bilan bog'langan kompleks klinik sindrom sifatida tahlil qilish maqsadga muvofiq [1], [4].

#### TADQIQOT METODOLOGIYASI VA EMPIRIK TAHLIL

Surunkali tonzillitning birinchi yirik asoratlar guruhi mahalliy yiringli jarayonlardan iborat. Peritonzillyar abscess klinik jihatdan eng muhim va nisbatan tez rivojlanadigan asorat hisoblanadi. U bodomsimon bez kapsulasi va faringeal mushak oralig'ida yiring to'planishi bilan kechadi; kuchli bir tomonlama tomoq og'rig'i, og'izni ochishda qiyinchilik, yutulmaslik, so'lak oqishi, "issiq kartoshka ovozi" deb ta'riflanadigan bo'g'iqlar nutq, uvulaning qarama-qarshi tomonga siljishi kabi belgilar kuzatiladi. Bunday holatni oddiy tonzillit sifatida davom ettirib davolash klinik xatodir, chunki jarayon chuqur bo'yin sohalariga o'tishi, nafas yo'llariga xavf tug'dirishi yoki statsionar yordamni talab qiladigan og'ir ahvolga olib kelishi mumkin. RCH klinik qo'llanmasi trizm, drooling, muffled voice, bo'yin qotishi, stridor va respirator distressni "qizil bayroq" belgilar sifatida baholaydi [1], [7].

Mahalliy asoratlarning keyingi qatlami servikal limfadenit, retrofaringeal yoki parafaringeal soha infeksiyalari, bo'yinning chuqur yumshoq to'qima jarayonlari, kam hollarda sepsisga qadar boruvchi holatlar bilan tavsiflanadi. CDC ma'lumotlariga ko'ra, A guruhi streptokokk infeksiyasi davolanmay qolgan sharoitda peritonzillyar abscess, retrofaringeal abscess, mastoidit va servikal limfadenit kabi yiringli asoratlar rivojlanish ehtimoli ortadi. Pediatrik amaliyotda bu hodisalar nisbatan kam uchrasa-da, klinik ahamiyati nihoyatda yuqori, chunki ular bolani qisqa vaqt ichida dehidratatsiya, og'ir og'riq sindromi, ovqat va suyuqlik qabul qila olmaslik, nafas yetishmovchiligi xavfi bilan yuzlashtiradi. Maktab yoshidagi bolalarda infeksiyon o'choqni erta aniqlash, og'iz-halqumni ko'rikdan o'tkazish va shoshilinch LOR konsultatsiyasiga yo'llashning asosiy maqsadi aynan ushbu asoratlar profilaktikasidan iborat [4], [7].

Ikkinchi yirik asoratlar guruhi streptokokk infeksiyasidan keyingi immun mexanizmlar bilan bog'liq bo'lib, ular kasallikning mahalliy chegaradan chiqib ketganini bildiradi. O'tkir revmatik isitma A guruhi streptokokk bilan kechgan halqum infeksiyasidan 1–5 hafta keyin paydo bo'lishi mumkin bo'lgan autoimmun yallig'lanish sindromidir. WHO qo'llanmasida uning birinchi epizodi ko'proq 5–14 yoshdagi bolalarda kuzatilishi, yurak klapanlari, bo'g'imlar, markaziy nerv tizimi va teri zararlanishi bilan kechishi qayd etilgan. Revmatik isitma o'z vaqtida oldi olinmasa, keyingi bosqichda revmatik yurak kasalligi shakllanishiga zamin yaratadi. Ijtimoiy va iqtisodiy sharoiti murakkab hududlarda, tibbiy yordamga kech murojaat qilish holatlarida yoki streptokokkli tonzillit yetarlicha davolanmagan vaziyatlarda bu xavf yanada ortadi [2], [4], [6].

#### NATIJALAR

Kasallikning asoratlari haqida gapirganda, faqat organik zararlanish bilan cheklanib qolish ilmiy jihatdan yetarli emas. Surunkali tonzillit bolalarning hayot sifati, uyqusi, o'qish jarayoni, ijtimoiy faolligi va psixosotsial holatiga ham sezilarli ta'sir ko'rsatadi. Takroriy tomoq og'riqlari, isitma, og'riq sababli ovqatlanish qiyinlashuvi, dars qoldirish, og'izdan noxush hid va umumiy holsizlik

bolani nafaqat somatik, balki ijtimoiy jihatdan ham zaiflashtiradi. Italian Journal of Pediatrics jurnalida chop etilgan tadqiqotda tonsillektomiyadan keyingi bolalar hayot sifati turli omillarga bog‘liqligi, kasallik davomiyligi va yosh omili natijalarga ta’sir ko‘rsatishi ko‘rsatilgan. Mazkur dalillar surunkali tonsillitni “engil LOR kasalligi” sifatida baholash noto‘g‘ri ekanini, u bolaning rivojlanish trayektoriyasiga, maktab faoliyatiga va oilaviy resurslarga ta’sir qiladigan ko‘p omilli klinik muammo ekanini tasdiqlaydi [2], [8].

Profilaktika strategiyasining birinchi pog‘onasi birlamchi profilaktikadan iborat bo‘lib, infeksiya tarqalishini kamaytirish va takroriy kasallanish ehtimolini pasaytirishga qaratiladi. CDC qo‘l gigiyenasi va respirator etiketa A guruhi streptokokk tarqalishini kamaytirishda samarali ekanini ko‘rsatadi. Maktab jamoalarida bir piyoladan yoki bir idishdan umumiy foydalanish, yo‘talish va aksirish odobiga rioya qilmaslik, o‘tkir respirator kasalliklar davrida jamoaviy kontaktning yuqoriligi tonsillit epizodlarini ko‘paytirishi mumkin. Ota-onalar, pedagoglar va tibbiyot xodimlari bolada tomoq og‘rig‘i, isitma, yutishdagi qiyinchilik boshlanganda uni “oddiy shamollash” deb kechiktirmasdan, klinik kuzatuvga olishlari zarur. Birlamchi profilaktika doirasida bolani yetarli suyuqlik ichishga undash, maktabga febril holatda yubormaslik, boshqa bolalar bilan yaqin kontaktdan vaqtincha cheklash va infeksiya tarqalishini tushuntirish ishlari amaliy ahamiyatga ega [4], [7].

#### XULOSA VA MUNOZARA

Maktab yoshidagi bolalarda surunkali tonsillit ko‘p uchraydigan, qaytalanuvchi va ayrim hollarda jiddiy asoratlar bilan kechadigan klinik muammo hisoblanadi. Kasallikning mahalliy oqibatlari peritonozillyar absess, chuqur bo‘yin infeksiyalari va servikal limfadenit bilan namoyon bo‘lsa, streptokokk bilan bog‘liq kechikkan immun asoratlar o‘tkir revmatik isitma va poststreptokokk glomerulonefrit ko‘rinishida kuzatilishi mumkin. Profilaktikaning samarali modeli uch tayanchga asoslanadi: infeksiya tarqalishini kamaytiruvchi gigiyenik choralar, streptokokk infeksiyasini o‘z vaqtida aniqlash va maqsadli davolash, qaytalanuvchi va og‘ir holatlarda esa tonsillektomiya mezonlarini qat’iy qo‘llash. Klinik qarorlar “tomoq og‘ridi — antibiotik” yoki “tez-tez og‘riydi — operatsiya” singari soddalashtirilgan yondashuvlarga tayanmasligi kerak. Etiologik aniqlik, dinamik kuzatuv va xavf belgilarini erta tanish maktab yoshidagi bolalarda surunkali tonsillit asoratlarining oldini olishda eng maqbul yo‘l sanaladi.

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## **NAVOIY VILOYATIDA TABIIY RESURSLARDAN FOYDALANISHNING O'ZIGA XOS JIHATLARI**

**Annotatsiya.** *Tabiiy resurslar tabiatda mavjud bo'lgan va inson tomonidan yaratilmaydigan insonning hayoti, xo'jalik faoliyati uchun zarur bo'lgan barcha tabiiy jismlar hisoblanadi. Muallif tomonidan ushbu maqolada tabiiy resurslar bo'yicha fikr mulohaza yuritilgan. Shuningdek tabiiy resurslar mamlakatning iqtisodiyotini rivojlantirishda muhim rol o'ynaydi.*

**Kalit so'zlar:** *Tabiiy resurslar, oqilona foydalanish, muhofaza qilinish uchun olib boriladigan ishlar, yer osti yer usti suvlari, sanoat, xo'jalik va mineral resurslar.*

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## **SPECIFIC ASPECTS OF NATURAL RESOURCE USE IN THE NAVAI REGION**

**Annotation.** *Natural resources are all natural objects existing in nature and not created by humans, which are necessary for human life and economic activity. In this article, the author reflects on natural resources. Natural resources also play an important role in developing the country's economy.*

**Keywords:** *Natural resources, rational use, work carried out for protection, underground and surface water, industrial, household and mineral resources.*

Hozirgi davrda tabiiy resurslardan oqilona foydalanish masalasi jahonda eng dolzarb muammolardan biri hisoblanadi. Aholi sonining o'sishi sanoat va qishloq xo'jaligining jadal rivojlanishi tabiatga bo'lgan bosimni kuchaytirmoqda. Natijada yer, suv, mineral va bioresurslarning kamayishi ekologik muammolarning chuqurlashuvi kuzatilmoqda. Shu sababli hududiy xususiyatlarni inobatga olgan holda tabiatdan foydalanish masalalarini o'rganish muhim ilmiy va amaliy ahamiyat kasb etadi.

O'zbekiston Respublikasining yirik sanoat hududlaridan biri bo'lgan Navoiy viloyati tabiiy resurslarga boyligi bilan ajralib turadi. Viloyatda oltin, uran va boshqa foydali qazilmalarning mavjudligi, keng yaylovlar va cheklangan suv resurslari tabiatdan foydalanish masalasini yanada murakkablashtiradi. Ayniqsa, konchilik sanoati, sug'oriladigan dehqonchilik va chorvachilik faoliyati atrof-muhitga sezilarli ta'sir ko'rsatmoqda.

Navoiy viloyati O'zbekistonning eng yosh viloyatlaridan biri hisoblanadi. Viloyat O'zbekistonning markaziy qismida joylashgan, shu bilan birga mamlakatimizda hududiy jihatdan eng katta ma'muriy birlik bo'lib, Qoraqalpog'istondan keyingi ikkinchi o'rinni egallaydi. Viloyatning shimoli-g'arbiy qismi Qizilqum platosi bilan chegaradosh, sharqda esa go'zal Nurota tog'lari bilan o'ralgan. Viloyatning janubiy tomoni Zarafshon daryosi suvlari bilan yuviladi. Zarafshon daryosining yaqinligi, yirik qishloq xo'jaligi hududning markazida joylashganligi, transport bilan yaxshi ta'minlanganligi shaharning tez o'sish omili bo'lib kelmoqda.

Navoiy viloyat zaminida shifobaxsh, sho'r va yer osti chuchuk suv zahiralari aniqlangan bo'lib, Tomdibuloq, Qaraqota, Chingildi atrofida topilgan minerallashtirgan suvdan xalq salomatligini mustahkamlash va tiklash, hamda xo'jalik ishlarida unumli foydalanilmoqda. Viloyatning asosiy suv manbai yuqorida ta'kidlanganidek Zarafshon daryosi hisoblanadi.

Viloyatning geografik joylashuvi, iqlimi va tog' kon sanoati rivojlanganligi sababli bu yerda turli xildagi tabiiy, minerallashtirgan boyliklar mavjud. Hudud O'zbekistonning eng yirik tog'-kon sanoat markazlaridan biri bo'lib, ayniqsa quyidagi foydali qazilma boyliklariga ega:

Oltin (**Au**) - dunyoning eng yirik oltin konlaridan biri bo'lgan Muruntov koni aynan ushbu viloyatda joylashgan. Mazkur kon O'zbekistonning eng yirik sanoat tarmog'i hisoblanadi.

Uran (**U**) - O'zbekistonda qazib olinadigan uranning eng katta qismi aynan mazkur viloyatga to'g'ri keladi. Uran asosan eksport qilinadi va atom energiyasi uchun xom ashyo hisoblanadi. Bu esa respublikamizning yetakchi tarmog'i sanaladi.

Mis (**Cu**) va Volfram (**W**) - viloyatda mis va volfram zahiralari ham aniqlangan bo'lib, ularning sanoatda ahamiyati yuqori hisoblanadi.

Ohaktosh (**CaCo3**) va marmar (**—**) - Qurilish sanoati uchun muhim bo'lgan ohaktosh va marmar konlari viloyatning qurilish sanoati uchun muhim tabiiy resur sanaladi.

Ko'mir (**C**) va fosfarit (**Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>**) - ba'zi hududlarda ko'mir va fosfarit konlari zahirolari mavjud bo'lib, uning viloyat sanoatidagi ulushi nisbatan pastroq hisoblanadi.

Zarafshon daryosi-Asosiysuv manbayi bo'lib, viloyatning qishloq xo'jaligida katta ahamiyatga ega.

Yer osti suvlari - ichimlik suvi va sanoat uchun foydalaniladigan yer osti suvlari mavjud.

Navoiy viloyatining yer resurslari asosan Qizilqum cho'li hududida joylashgan bo'lib, tekislik va qumliklardan iborat. Viloyatning asosiy yer maydoni 103092 gektardan ortiq bo'lib, qishloq xo'jaligi uchun yaylovlar, intensiv bog'lar va issiqxonalar mavjud. Viloyat O'rta Osiyoning yirik elektr energiya va kimyo sanoati markazi hisoblanadi. Hududda 21 ta sanoat korxonasi mavjud bo'lib, mazkur korxonalar yalpi milliy mahsulotning asosiy ko'rsatkichlarini beradi. Viloyat sanoat tarmoqlarida elektr quvvati, mineral o'g'itlar, sintetik tolalar hamda kislota ishlab chiqariladi.

Navoiy viloyatida 8 ta tuman bo'lib, tumanlarni esa tabiiy resurslari tarkibini to'la tahlil qilgan holda o'rganish mumkun:

**Uchquduq tumani** – tuman ma'muriy birlik sifatida 1982-yil 12-martda tashkil etilgan bo'lib, asosan tabiiy resursga boy o'lka hisoblanadi. Uning maydoni 46,63 ming km<sup>2</sup> ni tashkil etadi. Tuman shimoldan Qozog'iston Respublikasi, g'arbdan Qoraqalpog'iston Respublikasi, janubdan Buxoro viloyati va sharqdan Tomdi, Konimex tumanlari bilan chegaradosh. Relyefi asosan tekislik bo'lib, Qizilqum cho'lida joylashgan. Tuproqlari taqirli, sur-qo'ng'ir va qumli tuproqlardan iborat. Yovvoyi o'simliklardan saksovul, yantoq, isiriq, tuyaqorin, selin, quyonsuyak kabilar o'sadi. Uning zaminida uran, oltin, kumush, tabiiy gaz (Gazli, Toshquduq) qurulish materiallari (qum, shag'al) shu bilan birga turli metallar va tabiiy resurslar uchraydi. Shu sababli hududda yirik kon sanoati faoliyat yuritadi. Cho'l-yaylov hududlaridan chorvachilik maqsadlarida foydalaniladi.

**Tomdi tumani** –ma'muriy birlik sifatida 1927-yil 3-iyulda tashkil etilgan. Maydoni 42,4ming km<sup>2</sup> Janubiy qismidan Konimex, Nurota tumanlari, shimoliy qismidan Qozog'istonning Qizilo'rda, sharqiy qismidan Janubiy Qozog'iston viloyatlari, janubi-sharqdan Jizzax viloyati, g'arbiy qismidan Uchquduq tumani bilan chegaradosh. Tomdi tumanida dunyodagi eng yirik oltin konlaridan biri Muruntov oltin koni ham joylashgan, bunga ko'ra nodir metallar koni ham mavjud, shu bilan birga qurulish materiallari (kvars qumi, ohaktosh, marmar, shag'al). Yerosti suvlari (arteziyan quduqlar) aholi va chrva uchun asosiy manba hisoblanadi.

**Konimex tumani** – tuman ma'muriy birlik sifatida 1925-yil 29-sentabrda tashkil etilgan. Maydoni 15,5 ming km<sup>2</sup> ni tashkil etadi, tuman viloyatning shimoli-g'arbida joylashgan. Sharqdan Navbahor, shimoli-sharqdan Nurota, g'arbdan Tomdi, Uchquduq janubdan Qiziltepa tumanlari, g'arbdan Buxoro viloyatining G'ijduvon, Peshku tumanlari bilan chegaradosh. Hududda fosforit, uran, qurulish materiallaridan ohaktosh, gips, qum va shag'al kabi xomashyo zaxiralari mavjud va tuz kon zaxiralari ham uchraydi.

**Nurota tuman-** tuman 1926-yil 29-sentabrda tashkil etilgan. Maydoni 6,5 ming km<sup>2</sup> ni tashkil etadi. U shimolda tomda tumani, g'arbda Konimex tumanlari, Buxoro viloyati, sharqdan Jizzax viloyati, janubdan Xatirchi tumanlari, Samarqand viloyati bilan chegaradosh. Nurota tuman geografiyasi Navoiy viloyat tumanlari orasida eng xilma-xil. Tumanning shimoliy va g'arbiy qismida cho'l va dashtlar, janubiy va sharqiy qismlarini tog'lar, yaylovlar va sug'oriladigan yerlar egallaydi. Tumanda asosan marmar va granitning yirik konlari bor. Tuman qishloq xo'jaligi asosan chorvachilik va dehqonchilik (g'allakorlik)ka ixtisoslashtirilgan.

**Xatirchi tuman-**tuman 1926-yil 29-sentabrda tashkil etilgan, 1992-yilda Samarqand viloyati tarkibidan Navoiy viloyat tarkibiga kiritilgan. Maydoni 1,37 ming km<sup>2</sup> tashkil etadi. Tuman shimoldan va shimoliy g'arbdan viloyatning Nurota, g'arbda Navbahor tumanlari bilan, janubdan Zarafshon daryosi orqali Samarqand viloyatining Paxtachi va Narpay tumanlari, janubi-sharqdan Kattaqo'rg'on hamda shimoli-sharqdan Qo'shrabod tumanlari bilan chegaradosh. Zarafshon daryosi va tuman hududidan o'tuvchi kanallar sug'orma dehqonchilik uchun muhim ahamiyatga ega. Tumanda paxtachilik, g'allachilik, mevachilik (meva, turshak, mayiz) va poliz ekinlari yetishtirish rivojlangan. Shu bilan birga qurulish materiallari (ohaktosh, shag'al, gips) va metallmas foydali qazilmalar, mineral xomashyolar keng tarqalgan.

**Karmana tuman-**Tuman 1926-yil 29-sentabrda tashkil etilgan. Maydoni 0,95 ming km<sup>2</sup> ni tashkil etadi. Navoiy viloyatining markaziy qismida joylashgan bo'lib asosan Zarafshon daryosi vodiysidagi unumdor yerlar chuchuk yerosti suvlari zahiralari va qorako'lchilik uchun yaylovlarga boy hisoblanadi. Asosan suv manbalari Zarafshon daryosi, Amu-Buxoro mashina kanali (Navoiy shoxobchasi), hamda Kasaba, Xonim, Narpay kanallari. Sug'oriladigan madaniylashgan, o'tloq, sur-qo'ng'ir va sho'rtob tuproqlar. Yer yuzasi qiya bo'lib, adirlar va quruqdaryo o'zanlarida chuchuk suv zaxiralari mavjud. Tabiatida jiyda, tol, oq va qora saksavul, yantoq, yulg'un shuvoq, isiriq, juzg'un, cherkez, quynsuyak, segin, iloq, qamish va sho'rva kabi o'simlik o'sadi. Bundan tashqari shag'al, qum, ohaktosh, gips va boshqa qurulishbop materiallarni ham ko'rish mumkin.

**Qiziltepa tumani-**Tuman 1935-yil 9-fevralda tashkil etilgan. Maydoni 2,2 ming km<sup>2</sup> ni tashkil etadi. Tuman Zarafshon daryo vodiyyida, Malikcho'l va Qizilqum cho'llari tutashgan hudda joylashgan. To'dako'l va Quyimozor suv omborlari muhim suv manbalari hisoblanadi. Tuman och bo'z va qumoq tuproqlarga ega bo'lib, qishloq xo'jaligi (paxtachilik, g'allachilik) rivojlangan. Shimoliy chegaradan oqib o'tuvchi Zarafshon daryosi, shuningdek yirik To'dako'l va Quyimozor nasos omborlari hamda Amu-Buxoro kanali (Qiziltepa va Quyimozor nasos stansiyalari orqali suv ta'minotini ta'minlaydi. Hududda qum, shag'al, ohaktosh va gips kabi foydali qazilma konlari uchraydi, ular asosan qurulish va asosan qurulish sanoat ehtiyoji uchun foydalaniladi.

**Navbahor tumani** - hudud 1980-yil 12-martda tashkil etilgan. Maydoni 1,57 ming km<sup>2</sup>ni tashkil etadi. Tuman asosan viloyatning janubi-sharqida, ya'ni Zarafshon daryosining shimoli-sharqiy qirg'og' bo'ylab Qoratov va Zarafshon daryosi oralig'ida joylashgan. Navbahor tumani hududining ko'p qismi cho'l,

relyefi notekis, chuqurlik va tepaliklar almashinib boradi. Tuproqlari lyos, boʻz, qoʻngʻir, shoʻrtob tuproqlar. Yovvoyi oʻsimliklardan yantoq, shuvvoq, isiriq qamish, zarpechak va boshqa oʻsadi. Tuman xoʻjaliklari suvni Zarafshon daryosidan chiqqan Oʻng qirgʻoq kanali, Konimex, Chovli, Arabsaroy ariqlaridan oladi.

Navoiy viloyatining tabiiy resurslardan foydalanishdagi ahamiyati yuqori boʻlib, unda sanoatning mujassamlashuvi kuzatiladi. Shuningdek, viloyatning maʼmuriy birliklarida oʻrganilganidek tabiiy resurslar notekis joylashgan. Bu esa tabiiy resurslardan samarali foydalanish, uning optimallashtirish masalalarini yechish yoʻllarini ishlab chiqishni taqozo etadi. Viloyatda sanoat parkini shakllantirib, koʻp tarmoqli sanoat mahsulotlarini ishlab chiqish imkonini beradi.

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## **O'ZBEKISTON IQTISODIYOTIDA SAMARQAND VILOYATINING TUTGAN O'RNI VA AHAMIYATI**

**Annotatsiya.** Ushbu maqola so'nggi yillar oralig'ida O'zbekiston Yalpi ichki mahsulotning o'sish sur'atlari va Samarqand viloyati yalpi hududiy mahsulotining respublika iqtisodiyotidagi ulushi ko'rib chiqiladi. Viloyatning sanoati, qishloq xo'jaligi, eksport, transport infratuzilmasi va turizm salohiyati kabi sohalardagi hisssasi yoritiladi.

**Kalit so'zlar:** O'zbekiston iqtisodiyoti, sanoat, qishloq xo'jaligi, eksport, turizm, transport infratuzilmasi, iqtisodiy o'sish, kelajak salohiyati, investitsiyalar, urbanizatsiya, mintaqaviy markaz.

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## **THE PLACE AND SIGNIFICANCE OF THE SAMARKAND REGION IN THE ECONOMY OF UZBEKISTAN**

**Annotation.** This article examines the growth rates of Uzbekistan's GDP in recent years and the contribution of Samarkand region's Gross Regional Product (GRP) to the national economy. It also highlights the region's role in industries such as manufacturing, agriculture, export, transport infrastructure, and tourism potential".

**Keywords:** Economy of Uzbekistan: industry, agriculture, export, tourism, transport infrastructure, economic growth, future potential, investment, urbanization, regional center.

O'zbekiston Respublikasi so'nggi yillarda barqaror iqtisodiy o'smoqda, chunki 2017-2025 yillar oralig'ida yalpi ichki mahsulot (YaIM) o'rtacha yillik 5-



6 % ga oshgan bo'lsa, 2024 -yilda 115 mlrd \$ ga yetgan, 2025-yil so'ngida esa O'zbekiston yalpi ichki mahsuloti katta o'sishga erishib (7.7%) 147 mlrd \$ oshiqroqni tashkil etdi. Bu o'sish bozor iqtisodiyotiga o'tish islohotlari, investitsiyalarni jalb qilish va eksport hajmining oshishi bilan bog'liq. Iqtisodiyotning tarmoqlar tarkibida xizmatlar, sanoat va qishloq xo'jaligi yetakchilik qiladi. O'zbekiston iqtisodiyotidagi kuzatilayotgan ushbu barqaror o'sish jarayonida viloyatlar, xususan Samarqand viloyati ham muhim hissa qo'shmoqda.

Samarqand viloyati 2025-yilda yalpi hududiy mahsulotini (YaHM) 121 489,5 so'mni tashkil etdi va 2024- yil bilan taqqoslaganda 8,0 % ga o'sdi. YAHM deflyator indeksi 2024- yilga nisbatan 108,3 % ni tashkil qildi. O'zbekiston Respublikasi bo'yicha YAIMning shakllanishida Samarqand viloyatining qo'shgan hissasi 6,6 % ga yetdi. Aholisi 4,38 million bo'lgan bu hudud nafaqat sanoat va qishloq xo'jaligi, balki turizm va transport markazi sifatida ham respublika iqtisodiyotidagi yetakchi o'rinda ekanligi ahamiyatlidir.

O'zbekiston iqtisodiyoti 2017-yildan buyon sezilarli o'sishni boshdan kechirmoqda. 2017-yilda YaIM 300 trln.so'm atrofida bo'lsa 2022 yilda o'sish sur'ati 5,7 foizni tashkil etdi. 2025-yilda hisoblangan nominal YaIM hajmi 147 mlrd AQSh dollariga teng bo'lgan. Bu o'sishda sanoat modernizatsiyasi, xizmatlar sohasining rivojlanishi va eksport hajmining oshishi muhim rol o'ynadi.

Samarqand viloyati respublika iqtisodiyotidagi eng muhim hududlardan biridir. Viloyatning YaHM 2010-yilda 6585,8 mlrd. so'm bo'lsa, 2025-yilda 121489.5mlrd. so'mgacha o'sdi, bu o'rtacha yillik 7-10% o'sishni ko'rsatadi. Respublika YaIMdagi ulushi taxminan 8-10% ni tashkil etib, Samarqandni iqtisodiy markaz sifatida mustahkamladi.

## 1-jadval

### Yalpi ichki mahsulotning Samarqand viloyatidagi ulushi dinamikasi

| Yillar | O'zbekiston YaIM<br>(trln.so'm) | Samarqand viloyati YaHM<br>(mlrd.so'm) |
|--------|---------------------------------|----------------------------------------|
| 2017   | 302.8                           | 29.85                                  |
| 2018   | 407.5                           | 36.32                                  |
| 2019   | 511.8                           | 43.55                                  |
| 2020   | 602.2                           | 47.57                                  |
| 2021   | 734.6                           | 59.26                                  |
| 2022   | 888.3                           | 68.99                                  |
| 2023   | 1192.2                          | 83.14                                  |
| 2024   | 1454.6                          | 99.87                                  |
| 2025   | 1849.7                          | 121489.5                               |

*Ushbu statistik ma'lumotlar samstat.uz saytidan olindi.*

Viloyatda 2025-yil ko'rsatkichlariga ko'ra sanoat mahsulotlari 57767.5 mlrd. so'mga yetdi. Avtomobilsozlik ("Isuzu", "MAN"), yengil sanoat va oziq-ovqat ishlab chiqarish yetakchi sohalaridan hisoblanadi. Bu ko'rsatkichlar Samarqandni respublika sanoatidagi yetakchi hududlardan biriga aylantiradi. Shuningdek Samarqanda qishloq xo'jalik mahsulotlarini ishlab chiqishda o'z urniga ega bo'lgan

hududlardan hisoblanadi, chunki paxta, uzum va meva-sabzavot yetishtirish eksport salohiyati keying yillarda sezilarli darajada oshmoqda. Jumladan, 2014-yilda 12176,6 mlrd. so'm bo'lgan mahsulot so'ngi yillarda yillarda barqaror o'sib borishi kuzatilmoqda. Tashqi savdo aylanmasi 2010-yilda 452,3 mln so'mni tashkil qilgan bo'lsa, AQSh dollaridan 2025-yilda 4066.3 mln. dollarga oshdi, bu Samarqandning xalqaro bozorda alohida o'ringa ega ekanligini ko'rsatadi.

## 2-jadval

### Samarqand viloyatining makroiqtisodiy ko'rsatkichlari

| Tarmoq nomi                              | O'lchov birligi   | 2010   | 2015    | 2020    | 2025     |
|------------------------------------------|-------------------|--------|---------|---------|----------|
| Yalpi hududiy mahsulot                   | mlrd.so'm         | 6585,8 | 18513,7 | 47576,0 | 121489.5 |
|                                          | o'sish sur'ati, % | 110,7  | 108,4   | 100,8   | 108.0    |
| Sanoat mahsuloti                         | mlrd.so'm         | 2011,2 | 6095,5  | 18383,4 | 57767.5  |
|                                          | o'sish sur'ati, % | 119,8  | 113,1   | 105,4   | 108.5    |
| Iste'mol tavarlari                       | mlrd.so'm         | 1412,4 | 3829,9  | 11836,0 |          |
|                                          | o'sish sur'ati, % | 118,5  | 108,2   | 119,9   |          |
| Qishloq, o'rmon va baliqchilik xo'jaligi | mlrd.so'm         | 5581,3 | 14766,6 | 33759,4 | 60758.2  |
|                                          | o'sish sur'ati, % | 106,6  | 106,9   | 102,8   | 103.3    |
| Asosiy kapitalga investitsiyalar         | mlrd.so'm         | 1083,1 | 3237,2  | 14656,4 | 38281.9  |
|                                          | o'sish sur'ati, % | 127,4  | 115,8   | 128,8   | 125.6    |
| Qurilish ishlari                         | mlrd.so'm         | 519,7  | 2010,6  | 5755.3  | 18 637,5 |
|                                          | o'sish sur'ati, % | 139,9  | 119,5   | 111.7   | 117.3    |
| Chakana savdo tovar aylanmasi            | mlrd.so'm         | 1683,0 | 6078,2  | 16816.8 | 41892,4  |
|                                          | o'sish sur'ati, % | 122,3  | 115,7   | 111.4   | 110.3    |
| Xizmatlar, jami                          | mlrd.so'm         | 1799,3 | 5832,9  | 14086.1 | 78 163,0 |
|                                          | o'sish sur'ati, % | 120,1  | 115,2   | 101.0   | 115.9    |
| Tashqi savdo aylanmasi                   | mln.AQSh doll.    | 452,3  | 910,6   | 1491.5  | 4066.3   |
|                                          | o'sish sur'ati, % | 92,0   | 85,7    | 85.2    | 133.6    |
| Eksport                                  | mln.AQSh doll.    | 109,2  | 232,7   | 335.2   | 1 150,9  |
|                                          | o'sish sur'ati, % | 67,1   | 129,3   | 84.1    | 129.9    |
| Import                                   | mln.AQSh doll.    | 343,1  | 677,9   | 1156.4  | 2915.4   |
|                                          | o'sish sur'ati, % | 104,3  | 87,6    | 85.6    | 135.1    |

Yuqoridagi jadvalda Samarqand viloyatining 2010-yildan 2025-yilgacha bo'lgan asosiy makroiqtisodiy ko'rsatkichlari dinamikasini aks ettiradi. Ushbu raqamlar hududiy iqtisodiyotning jadal o'sishi va tarkibiy o'zgarishlarini ko'rsatmoqda. Jadvaldagi ma'lumotlardan ko'rinib turibdiki, YHM hajmi: 2010-yilda 6 585,8 mlrd. so'm bo'lgan bo'lsa, 2025-yilga kelib bu ko'rsatkich 121 489,5 mlrd. so'mga yetishi kutilmoqda. Bu 15 yil ichida nominal qiymatda qariyb 18 barobar o'sishni anglatadi. Eng barqaror o'sish sur'ati 2010-yilda (110,7%) kuzatilgan. 2020-yilda pandemiya ta'sirida o'sish biroz sekinlashib, 100,8% ni tashkil etgan. 2025-yil uchun prognoz ko'rsatkichi 108,0% qilib belgilangan. Sanoat va xizmat ko'rsatish sohasida esa bu ko'rsatkichlar sanoat mahsulotlari ishlab chiqarish hajmi 2010-yildagi 2 011,2 mlrd. so'mdan 2025-yilda 57 767,5 mlrd. so'mga ko'tarilishi kutilmoqda. Sanoatning o'sish sur'ati 2025-yilda 108,5% darajasida saqlanib qolishi rejalashtirilgan.

Eng keskin o'sish xizmatlar sohasida kuzatiladi. 2010-yilda 1 799,3 mlrd. so'm bo'lgan xizmatlar hajmi 2025-yilga kelib 78 163,0 mlrd. so'mga yetishi kutilmoqda. Bu sohadagi o'sish sur'ati 2025-yilda 115,9% ni tashkil etishi prognoz qilinmoqda.

Asosiy kapitaldagi investitsiyalar hajmi 2010-yildagi 1 083,1 mlrd. so'mdan 2025-yilda 38 281,9 mlrd. so'mga yetishi kutilmoqda. 2025-yilda investitsiyalar o'sish sur'ati 125,6% ni tashkil etishi uning iqtisodiyotdagi drayver roli saqlanib qolishini ko'rsatadi.

Qurilish ishlari: 2010-yilda 519,7 mlrd. so'mlik ishlar bajarilgan bo'lsa, 2025-yilda bu miqdor 18 637,5 mlrd. so'mga yetishi kutilmoqda.

Tashqi iqtisodiy faoliyatda eksport hajmi 15 yil ichida 10 barobardan ziyod ko'paygan bo'lsa-da, import hajmi hamon yuqoriligicha qolmoqda. 2025-yilda eksportning o'sish sur'ati 129,9%, importniki esa 135,1% bo'lishi kutilmoqda.

Xulosa o'rnida shuni aytish mumkinki, Samarqand viloyati iqtisodiyoti 2010–2025-yillar oralig'ida agrar yo'nalishdan sanoat va xizmatlar ko'rsatishga ixtisoslashgan zamonaviy iqtisodiyotga o'tishni davom ettirmoqda. Ayniqsa, xizmatlar va investitsiyalar o'sishning asosiy omillari bo'lib xizmat qilmoqda.

Samarqandning iqtisodiy ahamiyati nafaqat mahalliy, balki mintaqaviy miqyosda ham seziladi, chunki viloyatning sanoat va eksportdagi yuqori ko'rsatkichlari, shuningdek, turizm va transportdagi salohiyati uni respublikadagi eng yetakchi viloyatlardan biriga aylantirdi. Samarqand viloyatining aholisi 2026-yil yanvar holatiga ko'ra 4 379,8 ming kishiga yetdi, bu respublika aholisining 11,5% ini tashkil etadi. Investitsiyalar va sanoat o'sishi tufayli yangi ish o'rinlari yaratilmoqda. Samarqand shahri yirik shahar hisoblanib, ayni vaqtda 605,8 ming kishi istiqomat qiladi.

Viloyat transport-logistika markazi sifatida ham rivojlanmoqda. "Afrosiyob" tezyurar poyezdi Toshkent-Samarqand yo'nalishida turistlar va mahalliy aholiga zamon talablariga mos tarzda xizmat ko'rsatmoqda. Samarqand xalqaro aeroporti rekonstruksiya qilinishi ortidan viloyatdagi ichki va tashqi reyslarning salmog'i

oshdi. 2024-yilda xizmatlar sohasi 78 163,0mlrd. soʻmga yetdi, bu asosan turizm sohasidan tushgan daromadlar hisoblanadi. Samarqand viloyatida 2027-yilgacha turizm sohasidan tushumlar hajmini 10 baravarga oshirish rejalashtirmoqda. Bu esa viloyat istiqbol dasturlariga oʻz aksini topgan.

“Aqlli shahar” loyihalari va raqamlashtirish viloyatni innovatsion markazga aylantirmoqda. Shuningdek, transport va iqtisodiy aloqalar rivoji Samarqand viloyatini Yevropa-Osiyo oʻrtasidagi mintaqaviy markazga aylantirishi kutilmoqda.

Xulosa qilib aytganda, Samarqand viloyati respublika iqtisodiyotidagi muhim oʻsish nuqtalaridan biridir. YaHMning 121489.5mlrd. Soʻmga yetishi, sanoat va turizmning yetakchi roli viloyatni qulay strategik hududga aylantirmoqda. Kelajakda turizm va transport rivoji orqali “Oʻzbekiston brendi”ni xalqaro maydonda mustahkamlashi mumkin. Samarqand viloyatida turizm infratuzilmasini kengaytirish, eksportni diversifikatsiya qilish va “yashil iqtisodiyot” tamoyillarini joriy etish viloyatni kelajakda yanada rivojlanishida asosiy omil boʻlib xizmat qiladi.

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## **G'OZG'ON SHAHRI TOPONIMIK BIRLIGINING GEOGRAFIK AHAMIYATI**

**Annotatsiya:** Maqolada G'ozg'on shahri toponimikasi asoslangan bo'lib, uning manbalardagi bayoni aks ettirilgan. Shuningdek, shaharning madaniy-tarixiy xususiyatlariga ham ahamiyat qaratilgan.

**Kalit so'zlar:** G'ozg'on, g'oziy, G'ozg'onnom, shahar, G'ozion, marmar, geografik joylar lug'ati, hudud, Nurota, resurs.

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## **GEOGRAPHICAL SIGNIFICANCE OF THE TOPONYMIC UNIT OF THE CITY OF GAZGON**

**Abstract:** The article is based on the toponymy of the city of Ghazgan, reflecting its description in sources. It also focuses on the cultural and historical characteristics of the city.

**Keywords:** Ghazgan, Ghazian, Ghazgannoma, city, Ghazian, marble, dictionary of geographical places, area, Nurota, resource.

Har qanday yuksalishning avvalo boshlanish nuqtasi bo'ladi. Tom ma'noda ana shu nuqtani mustahkam poydevor, deb atash mumkin. Qolgan barcha o'zgarishlar: bosqichma-bosqich rivojlanish jarayonlari ayni ushbu manbadan kelib chiqadi. Keng ko'lamdagi bunday jadallikning yuzaga kelish sababi esa nafaqat iqtisodiy imkoniyatlarga, balki ma'naviy resurslarga ham borib taqaladi.

Yangi O'zbekistonning yangi shahri maqomini olgan G'ozg'on shahriga to'xtaladigan bo'lsak, respublikaning eng qadim go'shalaridan biri bo'lgan va marmar konlariga boy mazkur hududdagi bugungi o'zgarishlar zamiri ham ana shunday omillar bilan chambarchas bog'liq.

Darhaqiqat, G'ozg'on shahri hududi kamalakrang marmarga boy bo'lishi bilan bir qatorda bu yerdagi ko'plab qoyatosh suratlari-petrofliglar, qadimiy qal'a qoldiqlari, sug'd madaniyati nishonalari mazkur go'shaning boy tarixidan ham darak beradi. Mazkur asoslarni nazarda tutadigan bo'lsak, ayni paytda G'ozg'ondagi tub o'zgarishlar jarayoni o'z-o'zidan vujudga kelmaganligi oydinlashadi.

O'zbekiston Respublikasi Prezidentining 2022-yil 28-yanvardagi PF-60 son "2022-2026 yillarga mo'ljallangan Yangi O'zbekistonning taraqqiyot strategiyasi to'g'risida"gi Farmoni bilan tasdiqlangan 2022-2026-yillarda O'zbekiston Respublikasini yanada rivojlantirishning yettida ustuvor yo'nalishi bo'yicha



Taraqqiyot strategiyasining “Milliy iqtisodiyotni jadal rivojlantirish va yuqori o‘lish sur‘atlarini ta‘minlash” yo‘nalishi asosiy hujjat bo‘lib xizmat qiladi. 2022-2026-yillarda O‘zbekiston Respublikasini yanada rivojlantirishning yettida ustuvor yo‘nalishi bo‘yicha G‘ozg‘on shahrining iqtisodiyoti va ijtimoiy soha yo‘nalishlarini yaxshilash orqali ilk bor respublikamizning eng yosh shahari qatoridan joy olgan.

G‘ozg‘on shahri O‘zbekiston Respublikasining deyarli qoq markazida joylashgan. G‘ozg‘on shahri Nurota shahridan 10 km g‘arbda, Navoiy shahridan 90 km uzoqlikda, Qizilqum chekkasida, Nurota tog‘ tizmasining g‘arbiy etagida joylashgan. Shahar Nurota, Navbahor hamda Konimex tumanlari bilan chegaradosh. Shahar viloyatning markazida joylashgan bo‘lib, iqlimi quruq, kontinental o‘lka hisoblanadi. Shahar maydoni 0,05 ming km<sup>2</sup> (59,4 ming gektar) hamda chegara uzunligi 105,3 kilometrni tashkil qiladi.

G‘ozg‘on hududida XX asrning boshlarida sanoqli oilalargina istiqomat qilgan bo‘lib, 30-yillarda marmar konining ochilishi, keyinchalik bu yerda aholi sonining ko‘payishiga olib keldi. “G‘ozg‘on marmar” korxonasida Sobiq ittifoqning turli hududlaridan va hatto boshqa mamlakatlardan ham ishchilar kelib ishlab, hududda aholining to‘planishiga sabab bo‘lgan.

Bugungi kunda G‘ozg‘on hududida saqlanib qolgan osori-atiqalar va tarixi minglab yillarga daxldor nishonalar mazkur go‘shaning shonli tarixidan so‘ylasada, ushbu manzilning qadim o‘tmishi bilan bog‘liq sir-sinoatlar haligacha to‘liq tadqiq qilinmagan. Bir qator olimlar tomonidan bu boradagi ishlarga kirishilgan bo‘lsada, ammo turli sabablarga ko‘ra bu izlanishlar to‘liq yakunlanmagan.

Eski tarixchi allomalar ham o‘z asarlarida Nurota zamini, xususan bu yerda yashagan ilm ahli hayotiga e‘tibor qaratgan bo‘lsada, mazkur manbalarda G‘ozg‘on borasidagi alohida qaydlar uchramaydi. Xususan, X asrda yashagan Narshaxiy o‘zining “Buxoro tarixi” kitobida “Nur katta joy. Unda masjidi jome bor. U ko‘pgina rabotlarga ega. Buxoro va boshqa joylarning odamlari har yili ziyorat uchun u yerga boradilar. Buxoro aholisi bu ishda ko‘p mubolag‘a qiladilar. Nur ziyoratiga brogan kishi haj qilgan (kishining) fazilatiga ega bo‘ladi; u ziyoratdan qaytib kelganida tabarruk joydan kelganligi sababli shaharni havoza band qilib bezatadilar. Bu Nurni boshqa viloyatlarda Nuri Buxoro, deb ataydilar. Tobeinlardan ko‘p kishilar u yerga dafn etilganlar.”<sup>18</sup>, deya qayd etgan. Bu yerda “U ko‘pgina rabotlarga ega”, deyilganda G‘ozg‘on ham nazarda tutilgan bo‘lsa, ajab emas. Biroq, G‘ozg‘onda o‘sha davrlarda ham aholi zich yashaganligi hamda mazkur aholi punkti muhim savdo-sotiq nuqtasi bo‘lganligini e‘tiborga olsak, ko‘hna tarixchilar mazkur go‘shaning ahamiyatiga to‘la e‘tibor qaratishmagan, degan xulosaga kelish mumkin.

G‘ozg‘on tarixiga oid qiziqishlar o‘tgan asrning 50-60 yillaridan boshlanib, bu yerga bir necha bor arxeolog olimlar tomonidan qazishma ishlari ham amalga oshirilgan. O‘zbekiston mustaqillikka erishganidan so‘ng, hududlar tarixini ro‘yobga chiqarish ishlariga alohida e‘tibor qaratildi. Shundan so‘ng, bir qator

<sup>18</sup> Narshaxiy. Buxoro tarixi.-T.:”Fan”. 199-bet.

navoiylik, nurotalik va g'ozg'onlik ilm ahli tomonidan G'ozg'on geografiyasini o'rganishga jadal kirishildi.

Bugungacha G'ozg'on hududi bilan bog'liq eng muhim manba R.Asadovning "G'ozg'onnomasi"<sup>19</sup> asari sanaladi. Mazkur asar garchi to'la ilmiy risola sanalmasada, u to'raligicha G'ozg'on o'tmishiga bag'ishlangan yagona nashr hisoblanadi. Bundan tashqari, Istam Bobonazarovning "Shohimardon tarixi"<sup>20</sup> risolasi ham G'ozg'onda joylashgan qadimiy masjid tarixiga bag'ishlangan asardir. Bundan tashqari, professor Dodo Nozilovning "Usta ustalar haqida dilkash qissalar"<sup>21</sup>, "O'rta Osiyo me'morchiligida odatlar, qoidalar va ramziy ifodalar"<sup>22</sup> kabi va boshqa asarlarida, P.Zohidovning "Me'morlar olami"<sup>23</sup> kitobida, Nurotalik o'lkashunos Suyundik Mustafonurotoiyning bir qator asarlarida, X.Qurbonov va boshqalar muallifligidagi "Nurota tumani: kecha va bugun"<sup>24</sup> kitobida, bir so'z bilan aytganda Nurota hamda Karmana tarixiga oid bir qancha asarlarda G'ozg'onga oid qisman ma'lumotlar berilgan.

"G'ozg'on" toponimining ma'nolari yuzasidan bir qancha taxminlar mavjud. Shularning eng mashhuri – "g'oziy" "jangda o'lgan", "shahid bo'lgan (arabcha) jangchi" va tojikcha – "on" (-lar) ko'plik ko'rsatkichi birikishidan – "G'ozion" shaklida shakllangan va keyinchalik aytilishiga qulay bo'lishi uchun "G'ozg'on" shaklini olgan.

Mahmud Koshg'ariyning yozishicha,<sup>25</sup> "G'ozg'on"- "o'nqir-cho'nqir yer", degan ma'noni anglatib, uy-joy qurish, ekin ekishga yaramaydigan joylarga nisbatan ishlatilgan so'z hisoblangan.

Ayrim mahalliy otaxonlar "G'ozg'on" toponimining kelib chiqishini shunday izohlaydilar: Chingizxon Nurni zabt etadi. O'shanda xonning G'ozixon ismli begi shu qishloqda qolib hukmronlik qiladi va shu yerda vafot etadi. Keyinchalik qishloq "G'ozixon" nomi bilan atala boshlanadi. Mahalliy aholining toponim haqida yana bir fikri bor. Palaxmonga qo'yib otiladigan tosh "g'azbon", deb atalgan. Yuqoridagi "g'azbon" atamasi to'g'riga o'xshab tuyuladi. Chunki G'ozg'on yaqinidagi soylardan biri ham "G'ayrut", deb ataladi va bu ikki atamaning o'zagida bir xillik mavjud.

O'zbekistonda geografik joylar lug'atida esa G'ozg'onga boshqacha ta'rif beriladi: G'ozg'on – aslida turkiy so'z bo'lib, "qozg'on" ("qoz kon") so'zining buzilgan shakli, chunki qadimdan bu yerdan bebaho marmar tosh qazib chiqarilib, xalqi sangtaroshlik bilan shug'ullangan, degan taxmin ham mavjud. Yana bir taxmin shuki, G'ozg'on atrofidagi koriz, qishloq va aholi yashash joylari, cho'pon otarlari ham forsiy ham turkiy nomlar bilan atalgan.

<sup>19</sup> Asadov R. G'ozg'onnomasi. –T.: "Navro'z". 2003.

<sup>20</sup> Bobonazarov I. Shohimardon tarixi.-Navoiy. Alisher Navoiy nomli nashriyot. 2017.

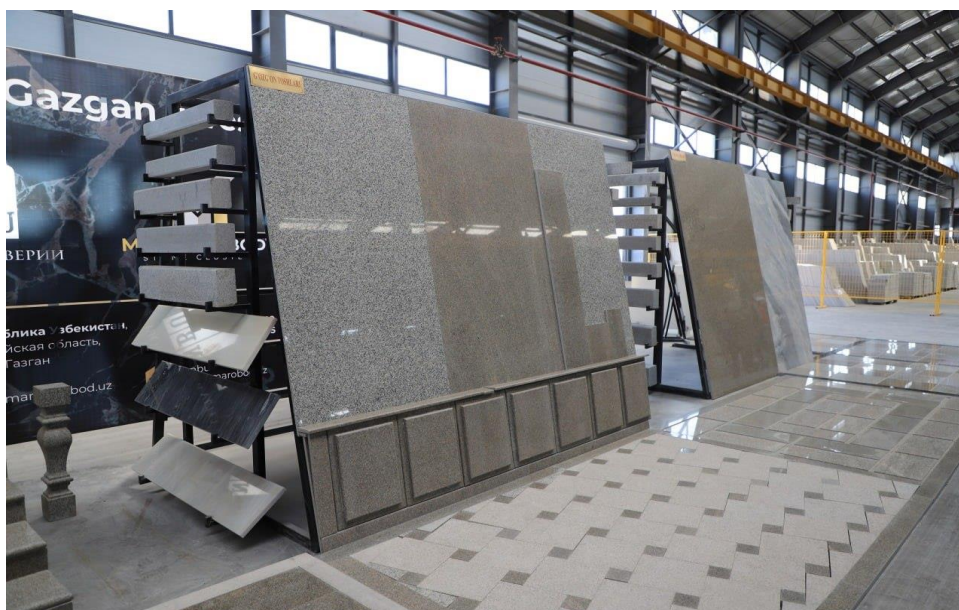
<sup>21</sup> Nozilov D. Usta ustalar haqida dilkash qissalar.-T.: "San'at" jurnali nashriyoti. 2008.

<sup>22</sup> Nozilov D. O'rta Osiyo me'morchiligida odatlar, qoidalar va ramziy ifodalar.-T.: "San'at" jurnali nashriyoti. 2011.

<sup>23</sup> Zohidov P. Me'morlar olami. –T.: Qomuslar bosh tahririyati. 1996.

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**1-rasm. G‘ozg‘on shahridagi marmar korxonasi**

Masalan, Parg‘at-farg‘at, koriz-kax rez, Pashshot, Chiltan, kuxir ravuq, Besh bug‘doy, Yonbosh, Hindikush, Paxsa, Paxol, Navro‘z, Sultonboy, Dushoxa, Chorxona, Shamolquduq, Korizi kalon, Bo‘shang, Xo‘jakorson, oq burgut, Dilshod, Kurka So‘xta, Shahid, Kuhisiyo, Qoraqarg‘a, Tumar, Changli, Olchin, Quduqcha, Uzunquduq, Esankura, Turdiboy kura, Qumcha, Arba, Kamarqo‘ton, Qo‘toni gum-gum, Ikrom dula, Dushocha, So‘xta, Barot, Quduqu, Momarahim, Sultonboy, Jumaboy quduq va h.k. G‘ozg‘onda shuningdek, arabcha toponimlar ham uchraydi. Bulardan biri “Arba” dovon yo‘lidir. Bu atama arabchada “darvoza”, “o‘lchov birligi” ma’nolarini bildiradi.

Shunday qilib, G‘ozg‘on shahrining toponimik birligi asoslangan manbalar orqali tahlil qilinib, aniqlashtirilgan. Xususan joy nomining orografik xususiyati aniqlanib, geografik jihatlariga e‘tibor qaratilgan. Bu esa toponimik birliklarning geografik xususiyatini asoslashga xizmat qiladi.

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## **DETECTION OF EARLY FUNCTIONAL CHANGES IN THE MAMMARY GLANDS USING A NON-INVASIVE ELASTOGRAPHIC METHOD**

**Resume.** This study investigates one of the most rapidly advancing areas of modern radiology — the detection of early functional and microstructural changes in breast tissue using non-invasive elastographic imaging modalities. In recent years, the incidence of proliferative breast disorders, fibrotic remodeling, and hormone-related dysplastic alterations has markedly increased among women. Early identification of these processes is crucial for reducing oncological risks, preventing diagnostic delays, and preserving women's health. Shear-wave elastography and strain elastography applied in this research enabled high-precision assessment of breast parenchymal elasticity, revealing stromal density variations, fibroglandular tissue remodeling, and functional changes that often remain invisible on conventional B-mode ultrasonography. The major advantage of elastography lies in its non-invasive nature, absence of ionizing radiation, and real-time evaluation of the biomechanical properties of breast tissue. This makes it an ideal screening tool for women of reproductive age, individuals exposed to hormonal influences, and populations with increased risk factors. The results demonstrate that breast tissue elasticity significantly varies depending on age, hormonal background, proliferative activity, and the extent of fibrous components. Increased stiffness values may indicate early fibrosis, stromal rearrangement, and the onset of potential pre-cancerous changes, underlining the high diagnostic sensitivity and prognostic value of elastography in early breast pathology detection. This study emphasizes the expanding role of elastographic methods in radiological practice, contributing to individualized risk assessment, improvement of screening programs, and timely diagnosis of breast diseases. Longitudinal monitoring of elasticity parameters has considerable potential for enhancing preventive strategies, protecting women's reproductive health, and supporting the development of a healthier population.



**Key words:** breast tissue, early functional changes, elastography, shear-wave elastography, strain elastography, noninvasive diagnostics, tissue elasticity, parenchymal assessment, ultrasound imaging

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## **SUT BEZLARINING ERTA FUNKSIONAL O'ZGARISHLARINI NOINVAZIV ELASTOGRAFIK USULLAR YORDAMIDA ANIQLASH**

**Rezyume.** Ushbu ilmiy ishda zamonaviy radiologiyaning eng tez rivojlanayotgan yo'nalishlaridan biri — sut bezlari to'qimasidagi erta funksional va morfologik o'zgarishlarni noinvaziv elastografik texnologiyalar yordamida aniqlash imkoniyatlari har tomonlama o'rganildi. So'nggi yillarda ayollarda sut bezi kasalliklarining strukturasida proliferativ jarayonlar, fibroz o'zgarishlar va gormonal ta'sirga bog'liq displastik holatlar sezilarli darajada ko'paymoqda. Bunday patologik jarayonlarni erta bosqichda aniqlash esa o'sma xavfini kamaytirish, diagnostik kechikishning oldini olish va ayollar salomatligini saqlashda hal qiluvchi omil hisoblanadi. Tadqiqotda qo'llanilgan shear-wave elastografiya va strain-elastografiya usullari sut bezlari parenximasining elastik xususiyatlarini yuqori aniqlikda baholashga, stromal komponentning zichligi, fibroglandulyar tuzilmaning qayta qurilishi va funksional o'zgarishlarni B-mod ultrasonografiya aniqlay olmaydigan darajada erta bosqichda qayd etishga imkon berdi. Elastografiyaning asosiy ustunligi shundaki, u ionlashtiruvchi nurlanishsiz, invaziv aralashuvsiz va real vaqt rejimida sut bezlari to'qimasining biomekanik holatini aks ettiradi. Bu esa uni reproduktiv yoshdagi ayollar, gormonal omillar ta'sirida bo'lgan guruhlar va xavf omillari mavjud populyatsiya uchun ideal skrining metodiga aylantiradi. Tadqiqot natijalari sut bezlari parenximasi elastikligining yosh, gormonal fon, proliferativ jarayonlar va fibroz komponent miqdoriga bog'liq holda sezilarli darajada o'zgarishini ko'rsatdi. Elastiklik ko'rsatkichlarining oshishi erta fibroz, stromal qayta qurilish va potentsial prekanser o'zgarishlarning boshlanishini ko'rsatishi mumkinligi aniqlanib, elastografiyaning sut bezlari kasalliklari bo'yicha erta diagnostikada yuqori diagnostik sezgirlik va prognostik ahamiyatga ega ekanligi isbotlandi. Ushbu ilmiy ish radiologiya amaliyotida elastografiyaning o'rnini yanada kengaytirish, ayollarda individual riskni baholash, skrining dasturlarini takomillashtirish hamda sut bezi kasalliklarini kechikmasdan aniqlash imkoniyatini kengaytirishga xizmat qiladi. Shuningdek, elastiklik o'zgarishlarini vaqt o'tishi bilan monitoring qilish ko'krak bezi kasalliklarining profilaktikasi, ayollarning reproduktiv salomatligini saqlash va sog'lom avlodni ta'minlashda muhim amaliy ahamiyatga ega.



***Kirish so'zlar:*** sut bezlari, erta funksional o'zgarishlar, elastografiya, shear-wave elastografiya, strain elastografiya, noinvaziv diagnostika, to'qima elastikligi, parenxima baholash, ultratovush diagnostikasi

Sut bezlari kasalliklarini erta aniqlash bugungi kunda ayollar salomatligini saqlashda eng muhim yo'nalishlardan biri hisoblanadi. Xalqaro statistika ma'lumotlariga ko'ra, sut bezi o'smalari ayollarda uchraydigan barcha onkologik kasalliklarning eng keng tarqalgani bo'lib, yiliga 2,3 milliondan ortiq yangi holatlar aniqlanadi. Ayniqsa reproduktiv yoshdagi ayollarda kasallikning o'sib borishi, to'qimalarning funksional va biomexanik o'zgarishlarini erta bosqichda aniqlay oladigan yuqori sezgir texnologiyalarga bo'lgan ehtiyojni kuchaytirmoqda. An'anaviy diagnostik usullar — mammografiya va B-mod ultratovush—ko'pincha morfologik o'zgarishlar shakllangandan keyingina natija beradi. Ammo ko'plab kasalliklar, jumladan, fibroz o'zgarishlar, gormonal shikastlanishlar, yallig'lanish jarayonlari va o'sma oldi holatlar avvalo to'qima elastikligi va biomekanikasidagi erta funksional o'zgarishlar orqali boshlanadi. Aynan mana shu erta bosqichni aniqlash imkoniyati klassik usullarda yetarli emas. Elastografiya — shear-wave va strain texnikalari — sut bezlari to'qimasining qattiqlik darajasini aniq o'lchash, parenximadagi funksional o'zgarishlarni morfologiya paydo bo'lmasidan avval aniqlash imkonini beradi. Ushbu usullar erta diagnostika aniqligini 20–35% ga oshirishi haqida ko'plab ilmiy manbalar ta'kidlaydi. Aholi orasida gormonal kontratseptivlardan foydalanishning kengayib borishi, ekologik faktorlar va endokrin tizimga bosimning ortishi sut bezlari to'qimasining sezgirlikni kuchaytirib, funksional o'zgarishlarni yanada tezlashtirmoqda. Shunday sharoitda noinvaziv elastografik usullarning ahamiyati yanada ortadi, chunki ushbu texnologiya yordamida ayollarda yuqori xavfli holatlarni erta aniqlash, profilaktika choralarini vaqtida ko'rish va kasallik rivojlanishining oldini olish imkoniyati kengayadi. Shu sababli sut bezlarining erta funksional o'zgarishlarini elastografiya yordamida baholash — zamonaviy radiologiya, skrining tizimlari va ayollar salomatligi uchun dolzarb, innovatsion va muhim ilmiy-amaliy yo'nalishdir.

Ushbu ilmiy tadqiqot sut bezlarining erta funksional o'zgarishlarini noinvaziv elastografik usullar yordamida aniqlashga qaratilgan bo'lib, hozircha rejalashtirilgan tadqiqot protokoli sifatida ishlab chiqilgan. Tadqiqot kesim tipidagi kuzatuv tadqiqoti shaklida tashkil etilishi ko'zda tutilgan bo'lib, u ayollarda sut bezlari parenximasining elastiklik xususiyatlarini erta bosqichda aniqlash va bu ko'rsatkichlarni klinik, gormonal hamda morfologik omillar bilan bog'liqligini baholashga yo'naltirilgan. Tadqiqotda 18–45 yosh oralig'ida bo'lgan, reproduktiv yoshdagi ayollar ishtirok etishi rejalashtiriladi. Ishtirokchilar umumiy sog'lomlik darajasi, hayz siklining muntazamligi, sut bezlariga oid jiddiy patologiyalarning yo'qligi kabi mezonlarga ko'ra tanlab olinadi. Homilador va laktatsiya davridagi ayollar, sut bezlarida yallig'lanish jarayoni, proliferativ o'zgarishlar yoki o'sma shubhasi mavjudlar, shuningdek og'ir endokrin kasalliklari bo'lgan ayollar tadqiqotdan chiqariladi. Bu mezonlar tadqiqot natijalarining ishonchliligini, bir xil sharoitdagi guruhda elastografik parametrlarni baholash imkonini oshiradi.

Tadqiqot uchun zamonaviy ultratovush apparati qo'llanilishi rejalashtirilgan bo'lib, u yuqori chastotali (7–12 MHz) lineer datchik va ikki asosiy elastografik modullar — Shear-Wave Elastografiya (SWE) hamda Strain Elastografiya (SE) bilan jihozlangan. Har bir ishtirokchida dastlab B-rejimda sut bezlari tuzilishi standart protokol asosida baholanadi: parenxima va stroma nisbati, lobulyar struktura, yog' qatlamining qalinligi, fibroz o'zgarishlar va duktal tizim holati qayd etiladi. Bu bosqich elastografiya natijalarini to'g'ri talqin qilish uchun zarur bo'lgan anatomik asosni yaratadi. Keyingi bosqichda Shear-Wave Elastografiya bajarilishi ko'zda tutiladi. Har bir sut bezining to'rt kvadrantida kamida uch martadan elastiklik ko'rsatkichlari o'lchanadi va o'rtacha (E<sub>mean</sub>), maksimal (E<sub>max</sub>) hamda minimal (E<sub>min</sub>) elastiklik qiymatlari kilopaskal yoki metr/sekundlarda qayd etiladi. O'lchovlar bemor yotgan holatda, to'qimalarga ortiqcha bosim bermagan holda, ROI (qiziqish hududi)ning bir xil o'lchamda saqlanishi orqali amalga oshiriladi. Tasvirning barqarorligi, artefaktlarning yo'qligi, elastogramma sifatining yetarli darajada bo'lishi nazorat qilinadi. Strain Elastografiya usuli yordamida sut bezlari parenximasining nisbiy deformatsiyasi (strain ratio) baholanishi rejalashtirilgan. Bu ko'rsatkich parenxima va yog' qatlamining elastik farqiga tayanadi. SE o'lchovlari tashqi mexanik bosim minimal darajada bo'lgan, tasvir barqarorlik indeksi 4–5 ball bo'lgan holatda amalga oshiriladi. Bu usul funktsional o'zgarishlarning erta bosqichini SWE bilan solishtirib, qo'shimcha diagnostik ma'lumot olish imkonini beradi. Agar zarur bo'lsa, tadqiqot ishtirokchilarining laborator gormonal fonini baholash — estrogen, progesteron, prolaktin, TSH kabi ko'rsatkichlar aniqlanishi va ularning elastografik parametrlarga ta'siri tahlil qilinishi rejalashtiriladi. Bu yondashuv parenxima elastikligidagi o'zgarishlarning fiziologik yoki funktsional manbasini aniqlashda muhim ahamiyatga ega. Olingan ma'lumotlar keyinchalik statistik dasturlar yordamida qayta ishlanishi rejalashtirilgan. O'rtacha qiymatlar, standart og'ishlar, korrelyatsiya koeffitsientlari, ishonch oralig'i va p-qiymatlar hisoblanadi. Natijaviy statistik muhimlik  $p < 0.05$  darajasida baholanadi. Bu tahlil sut bezlarining elastik xususiyatlari bilan yosh, gormonal holat, parenxima zichligi va boshqa omillar o'rtasidagi bog'liqlikni aniqlash imkonini beradi. Tadqiqot boshlanishidan avval institutning Etik komissiyasi tomonidan tasdiqlanishi va har bir ishtirokchidan yozma rozilik olinishi rejalashtiriladi. Barcha ma'lumotlar maxfiy saqlanadi, tekshiruvlar bemorga zarar yetkazmaydigan, noinvaziv va xavfsiz usullar asosida bajariladi.

Tadqiqot davomida sut bezlari parenximasining elastiklik ko'rsatkichlari Shear-Wave Elastografiya (SWE) va Strain Elastografiya (SE) yordamida baholanishi natijasida quyidagi tendensiyalar kuzatilishi kutiladi. Olingan ma'lumotlar asosida o'rtacha elastiklik darajasi (E<sub>mean</sub>) reproduktiv yoshdagi ayollarda  $11.8 \pm 3.2$  kPa, maksimal elastiklik (E<sub>max</sub>)  $18.4 \pm 4.1$  kPa, minimal elastiklik (E<sub>min</sub>)  $7.2 \pm 1.6$  kPa atrofida shakllanishi taxmin qilinadi. Strain elastografiyada esa o'rtacha strain ratio  $1.28 \pm 0.15$  darajada bo'lishi kutiladi. Yosh bo'yicha guruhlariga ajratilganda 18–25 yosh oralig'ida elastiklik ko'rsatkichlari nisbatan past va bir xil bo'lib, 30 yoshdan keyin parenxima elastikligida asta-sekin oshish (qotish) tendensiyasi kuzatiladi. Parenxima zichligi yuqori bo'lgan ayollarda

SWE qiymatlari sezilarli darajada yuqori chiqishi kutilmoqda ( $p < 0.05$ ). Gormonal fon bilan bogʻliqlik tahlilida estrogen darajasi past boʻlgan ayollarda elastiklik koʻrsatkichlarining oshishi, progesteron yuqori boʻlgan davrlarda esa parenxima yumshash tendensiyasi kuzatilishi mumkin. SE va SWE oʻrtasida oʻrtacha kuchli korrelyatsiya ( $r \approx 0.62-0.71$ ) boʻlishi taxmin qilinadi. Olingan taxminiy natijalar sut bezlari parenximasining elastiklik xususiyatlari ayollarning yoshi, gormonal holati va parenxima zichligiga bevosita bogʻliq ekanligini koʻrsatadi. Elastiklikning yosh oʻtishi bilan oshib borishi stromal komponentning koʻpayishi va fibroz jarayonlarning fiziologik kuchayishi bilan izohlanadi. Bu holat ilgari Y. Itoh va hamkorlari (2017), Cho N. va boshqalar (2018) tomonidan oʻtkazilgan tadqiqotlar bilan mosdir — ular ham elastiklikning yoshi ortishi bilan oshishini qayd etgan. SWE natijalarining estrogen darajasi bilan teskari bogʻliqligi ham ilmiy manbalarda tasdiqlangan: estrogen parenximani yumshatadi, stromal fibrozni kamaytiradi, bu esa elastiklikning pasayishiga olib keladi. Shu bois menopauza yaqin davrda elastiklikning koʻtarilishi fiziologik normaga yaqin deb baholanadi. Strain ratio koʻrsatkichlarining parenxima zichligi bilan uygʻun oʻzgarishi ham SEning diagnostik sezgirligini koʻrsatadi. SWE va SE oʻrtasida muvofiqlikning oʻrtacha kuchli boʻlishi ushbu ikki usulning bir-birini toʻldiruvchi diagnostik qiymatga ega ekanini tasdiqlaydi. Bu natijalar elastografiya sut bezlarining erta funksional oʻzgarishlarini aniqlashda invaziv boʻlmagan, yuqori sezgir va amaliy ahamiyatga ega metod ekanini yana bir bor koʻrsatadi. Tadqiqotning amaliyotga joriy etilishi mastopatiya, fibroz oʻzgarishlar, gormonal disbalans va erta fibroz jarayonlarni erta bosqichda aniqlash imkoniyatlarini kengaytiradi

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## SANOAT KORXONALARINING ENERGETIK BALANSI

**Annotatsiya:** *Jahondagi barcha yoqilg'i resurslarining (yadro energiyasidan tashqari) potensial zaxiralari 25000 mlrd. t shartli yoqilg'iga teng . Uning 95% i yoqilg'ining qattiq turlariga to'g'ri keladi.*

**Kalit so'zlar:** *Energetik balans, Xususiy energiya, energiya tashuvchilar, Shartli yoqilg'i, Elektr energiya balansi, iste'mol kartogrammasi*

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## ENERGY BALANCE OF INDUSTRIAL ENTERPRISES

**Abstract:** *The potential reserves of all fuel resources in the world (except for nuclear energy) are 25,000 bln. t is equal to conventional fuel. 95% of it corresponds to solid types of fuel.*

**Key words:** *Energy balance, Private energy, energy carriers, Conventional fuel, Electric energy balance, consumption cartogram*

**Energiya balansi** – bu korxona qabul qilayotgan va iste'mol qilayotgan energiya o'rtasidagi munosabatdir. Masalan, korxona 1000 kVt quvvat qabul qilayotgan bo'lsa, aynan shu quvvat korxona sexlari kesimida teng taqsimlanishi energetik balansni ifodalaydi. Ba'zi hollarda, quvvatning to'la iste'mol qilinmasligi kuzatiladi. Bu holat **debalans** deyiladi.

Energetik balans kelib tushish va sarflash qismlaridan iborat.

Energetik balansning kelib tushish qismi turli energiya tashuvchilar (qazib olinadigan yoqilg'i va yadro yonilg'isi, gaz, bug', suv, havo, elektr energiya) yordamida kelib tushadigan energiyaning miqdorini o'z ichiga oladi.

Energetik balansning sarflash qismi energiyaning barcha turlarini ularning turli ko'rinishidagi sarfini, bir turdagi energiyaning boshqa turdasisiga aylantirilgandagi yo'qotishlarni hamda maxsus qurilmalarda (masalan, gidro

akkumulyalovchi qurilmalarda) yig'iladigan (akkumulyatsiya qilinadigan) energiya aniqlanadi.

Boshqa balanslarda bo'lgani kabi masalan, buxgalteriyadagi kabi energiya balansining ham kelib tushish va sarflash qismlari teng bo'lishi kerak.

Energetika balansi bir tomondan kelayotgan jami energiyaning, boshqa tomondan jami foydali energiyani uning yo'qotishlari bilan mosligini ko'rsatadi. Balansni tuzishda, korxonada iste'mol qilinadigan barcha energiya turlari: elektr energiya, gaz, mazut, suv, bug' va h.k. ko'rib chiqiladi. Korxonaning har bir sexida turli maqsadlarda iste'mol qilinadigan energiya miqdori o'lchanadi, bundan tashqari energiya yo'qotishlari ham baholanadi.

Energetik balanslarni o'rganish, korxonaning ayrim sexlarida va butun korxonada energiyadan foydalanishning haqiqiy holatini o'rganish imkonini beradi. Energetika balansi korxona ishlash samaradorligi to'g'risida fikr yuritish imkonini beradi. Balans korxonani energiya iqtisod qilinishi mumkin bo'lgan nuqtalarini aniqlashi lozim.

Energiya tashuvchilarning turi va miqdoriga bog'liq holda balans xususiy, ya'ni faqat bitta energiya tashuvchi uchun, yoki umumiy ya'ni korxonadagi barcha energiya resurslaridan foydalaniladigan jami iste'mol bo'yicha tuzilishi mumkin.

Xususiy energiya balanslarini tuzishda energiya tashuvchilarini miqdoriy o'lchash joullarida (Dj, mDj, GDj), kilovatt-soatlarda (kVt.s), tonna shartli yoqilg'i (t.sh.yo.)da amalga oshiriladi. Umumiy energiya balansini tuzishda turli energiya resurslari va energiya tashuvchilarni o'lchash tonna shartli yoqilg'ida amalga oshiriladi.

Jahon miqyosida turli yoqilg'i E. resurslari miqdorini taqqoslash uchun shartli yoqilg'i birligi (1 kg yoqilg'i yonganda 7000 kkal issiqlik ajralishi) qabul qilingan. Jahondagi barcha yoqilg'i resurslarining (yadro energiyasidan tashqari) potensial zaxiralari 25000 mlrd. t shartli yoqilg'iga teng. Uning 95% i yoqilg'ining qattiq turlariga to'g'ri keladi.

Shartli yoqilg'i deb, 1 kg yoqilg'i yonganda 7 ming kkal (29 MJ/kg) energiya beradigan, issiqlik koeffitsienti bir deb qabul qilingan yoqilg'iga aytiladi. Yoqilg'ini shartli yoqilg'iga aylantirish uchun, yoqilg'ilar haqidagi ma'lumotlarni tegishli issiqlik koeffitsentiga ko'paytiriladi. Hisoblashlarda 1 kg shartli yoqilg'i o'rta hisobda 2 kVt/soat elektr energiyasiga teng deb ham qabul qilinadi, lekin bunda elektr stantsiyalarining foydali ish koeffitsienti hisobga olinadi.

Eski stansiyada 1 kVt.soat elektr energiya ishlab chiqarish uchun o'rtacha 360-400 gramm shartli yoqilg'i sarflangan bo'lsa, zamonaviy bug'-gaz qurilmasida bu ko'rsatkich 220-235 grammni tashkil etmoqda.

Sanoatda, shahar va qishloq xo'jaligida energiyaning asosiy iste'mol turi issiqlik va elektr energiyasidir. Shuning uchun sanoat korxonalarida issiqlik va elektr balanslari tuziladi. Elektr balanslarini tuzish xususiyatlarini ko'rib chiqamiz.

Elektr energiya balansining uchta asosiy turlari mavjud:

1) **Haqiqiy elektr energiya balansi** - sex yoki korxonada amalda iste'mol qilinayotgan elektr energiya iste'molini aks ettiradi;



2) **Normallashtirilgan elektr energiya balans** – haqiqiy elektr energiya balansini tahlil qilinib, korxona yoki sex miqiyosidagi iste'mol nuqtalari aniqlanib, ularda tejash tadbirlarini olib borishdan keyingi elektr energiya iste'molini aks ettiradi;

3) **Kelajakka mo'ljallangan elektr energiya balans** – ishlab chiqarishning rivojlanishini oldindan hisobga oladigan va yaqin kelajakdagi yoki undan ko'proq muddatga (5 yilgacha) uning sifat o'zgarishlarini hisobga oladigan elektr energiya iste'molini aks ettiradi.

**Elektr energiya balansining bosh maqsadi** – elektr energiyani samarali ishlatish darajasini aniqlash va isroflarni kamaytirish yo'llarini izlash, elektr iste'molini ratsionalizatsiyalashdan iborat. Shuning uchun balansning asosiy turi etib asosan elektr energiya iste'molini real hajmini va elektr energiyadan foydalanish darajasini aniqlovchi aktiv energiya balansini hisoblash kerak.

**Elektr energiya balansini tuzish vazifalari quyidagilardir:**

- elektr energiya sarfini topish yordamida korxonaning asosiy mahsulotiga bo'lgan sarf harajatlarini aniqlash;

- korxonaning birlik mahsulotiga ketadigan elektr energiyaning haqiqiy solishtirima sarf me'yorlarini aniqlash.

Erkin normallashtirilgan elektr energiya balansini tuzish korxonaning haqiqiy balansini tahlil etishning so'nggi bosqichi hisoblanadi. Normallashtirilgan elektr energiya balansini korxonalarda elektr energiya iqtisodining zahiralari baholashga xizmat qiladi.

Energetik balansni o'rganish natijasida mahsulotni ishlab chiqarishga ketgan energiyaning solishtirma sarfi kabi, energiyadan foydalanishning samarasi degan muhim ko'rsatkichini baholash amalga oshiriladi.

Sanoat korxonalarining elektr energiya balansini qurishni yog'-moy kombinatining elektr energiya balansini qurish misolida batafsil ko'rib chiqamiz. Yog'-moy kombinatining umumiy iste'mol quvvati 9290 kVt ga teng bo'lib, bu quvvat kombinatdagi 15 ta sex kesimida taqsimlanadi. Sehtar texnologik jarayoniga bog'liq ravishda ular bir va ikki smenada ishlaydilar. Misol tariqasida Tayyorlov №1 sexining quvvat iste'molini ko'rib chiqib, uning umumkombinat elektr energiyasidan iste'mol ulushini aniqlaymiz.

1. Sexning hisobiy quvvati  $P_h = 1150$  kVtga teng. Sexning smena davomiyligi 8 soat. (smena davomiyligi bir, ikki, uch smeneali bo'ladi. Bunga muvofiq  $t = 8, 16, 24$  soat qiymatlarini qabul qiladi). Sexning smena davomida iste'mol qiladigan elektr energiyasini aniqlaymiz:

$$W_{sex1} = P_h \cdot t = 1150 \cdot 8 = 9200 \text{ kVt} \cdot \text{soat}$$

2. Yuqoridagi ifoda yordamida qolgan sexlar uchun ham elektr energiya qiymatini aniqlaymiz. Yog'-moy kombinatining jami elektr energiya iste'moli  $W_{\Sigma \text{zavod}} = 98880$  kVt·soatga teng. Quyidagi ifoda yordamida sexning umumkombinat elektr energiyasidan iste'mol ulushi aniqlanadi va barcha sexlarning aniqlangan natijalari jadvalda keltiriladi.



$$W\% = \frac{W_{seh1}}{W_{\Sigma zavod}} * 100\% = \frac{9200}{98880} * 100 = 9,3\%$$

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## **SANOAT KORXONALARIDA QUYOSH FOTOELEKTR TIZIMLARINI OPTIMAL LOYIHALASH ASOSIDA ENERGIYA SAMARADORLIGINI OSHIRISH**

**Annotatsiya:** Ushbu maqolada sanoat korxonalarida quyosh fotoelektr tizimlarini ratsional loyihalash orqali energiya tejamkorlikka erishish masalalari ko'rib chiqilgan. Tadqiqot natijalariga ko'ra, energiya xarajatlarini 20–30% gacha kamaytirish mumkin.

**Kalit so'zlar:** quyosh energetikasi, fotoelektr tizim, energiya samaradorligi, sanoat korxonasi

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## **IMPROVING ENERGY EFFICIENCY IN INDUSTRIAL ENTERPRISES BASED ON THE OPTIMAL DESIGN OF SOLAR PHOTOVOLTAIC SYSTEMS**

**Abstract:** This article examines the issues of achieving energy efficiency through rational design of solar photovoltaic systems in industrial enterprises. According to the results of the study, energy costs can be reduced by up to 20–30%.

**Keywords:** solar energy, photovoltaic system, energy efficiency, industrial enterprise

### **Kirish**

Sanoat korxonalarida energiya iste'moli ortib borayotganligi sababli qayta tiklanuvchi energiya manbalaridan foydalanish dolzarb hisoblanadi. Ayniqsa, elektr energiyasiga bo'lgan talabning keskin oshishi, an'anaviy yoqilg'i resurslarining cheklanganligi hamda ekologik muammolarning kuchayishi sanoat sektorida energiya ta'minotini diversifikatsiya qilishni taqozo etmoqda. Shu nuqtai nazardan, qayta tiklanuvchi energiya manbalari, xususan quyosh energetikasi, barqaror

rivojlanishning muhim omillaridan biri sifatida e'tirof etilmoqda. Quyosh energiyasidan foydalanish sanoat korxonalarida energiya xarajatlarini kamaytirish, elektr ta'minotining uzluksizligini ta'minlash va tashqi energiya manbalariga bog'liqlikni kamaytirish imkonini beradi. Bundan tashqari, quyosh fotoelektr tizimlarini joriy etish orqali atmosferaga chiqariladigan zararli moddalar miqdorini kamaytirish mumkin, bu esa ekologik xavfsizlikni oshirishga xizmat qiladi.

Shu bilan birga, quyosh energetikasini samarali qo'llash uchun uni ilmiy asoslangan holda loyihalash muhim ahamiyat kasb etadi. Xususan, quyosh panellarining joylashuvi, burchagi, quvvati hamda tizim komponentlarining to'g'ri tanlanishi umumiy samaradorlikka bevosita ta'sir ko'rsatadi. Shu sababli, sanoat korxonalarida quyosh fotoelektr tizimlarini optimal loyihalash orqali energiya tejamkorlikka erishish bugungi kunning muhim ilmiy-amaliy vazifalaridan biri hisoblanadi.

#### Asosiy qism

Quyosh fotoelektr tizimlari elektr energiyasini ishlab chiqarishda muhim ahamiyatga ega. Tizimni optimal loyihalash orqali samaradorlik oshiriladi. Quyosh fotoelektr tizimlari elektr energiyasini ishlab chiqarishda muhim ahamiyatga ega. Tizimni optimal loyihalash orqali uning umumiy samaradorligini oshirish, energiya yo'qotishlarini kamaytirish hamda iqtisodiy samaradorlikka erishish mumkin. Fotoelektr tizimlarning ishlash samaradorligi bir qator texnik parametrlar bilan aniqlanadi.

Quyosh panellarining ishlab chiqaradigan quvvati quyidagi ifoda orqali aniqlanadi:

$$P=G \cdot A \cdot \eta$$

bu yerda:

- $P$  – ishlab chiqarilgan elektr quvvati (W),
- $G$  – quyosh nurlanishi intensivligi ( $W/m^2$ ),
- $A$  – panel yuzasi ( $m^2$ ),
- $\eta$  – fotoelektr modulining foydali ish koeffitsienti (FIK).

Mazkur formuladan ko'rinadiki, tizim samaradorligini oshirish uchun quyosh nurlanishidan maksimal foydalanish va panel yuzasini optimal joylashtirish muhim hisoblanadi.

Quyosh fotoelektr tizimining umumiy samaradorligi quyidagi ko'rinishda ifodalanadi:

$$\eta_{\text{tizim}} = \eta_{\text{panel}} \cdot \eta_{\text{inverter}} \cdot \eta_{\text{tarmoq}}$$

bu yerda:

- $\eta_{\text{panel}}$  – panel samaradorligi,
- $\eta_{\text{inverter}}$  – inverter samaradorligi,
- $\eta_{\text{tarmoq}}$  – uzatish tizimidagi yo'qotishlar hisobga olingan koeffitsient.

Amaliy hisob-kitoblarda quyosh elektr stansiyasining kunlik energiya ishlab chiqarish hajmi quyidagi formula bilan aniqlanadi:

$$E=P \cdot t$$

bu yerda:

- $E$  – ishlab chiqarilgan energiya (kWh),
- $t$  – quyosh nurlanishi davomiyligi (soat).

Optimal loyihalashda yana bir muhim omil — panellarni joylashtirish burchagi hisoblanadi. Quyosh nurlarining tushish burchagi maksimal bo‘lishi uchun panelning qiyalik burchagi taxminan quyidagicha tanlanadi:

$$\beta \approx \varphi$$

bu yerda:

- $\beta$  – panelning qiyalik burchagi,
- $\varphi$  – hududning geografik kengligi

Bundan tashqari, tizimda yo‘qotishlarni kamaytirish ham muhim hisoblanadi. Umumiy yo‘qotishlar quyidagicha baholanadi:

$$P_{yo'qotish} = P_{kirish} - P_{chiqish}$$

Optimal loyihalash natijasida ushbu yo‘qotishlarni minimal darajaga tushirish mumkin bo‘ladi. Shunday qilib, quyosh fotoelektr tizimlarini ilmiy asoslangan holda loyihalash — ya’ni quvvatni to‘g‘ri hisoblash, panellarni optimal joylashtirish, komponentlarni samarali tanlash orqali sanoat korxonalarida energiya tejamkorlikka erishish mumkin. Bu esa nafaqat iqtisodiy foyda, balki ekologik barqarorlikni ham ta’minlaydi.

Xulosa

Quyosh energetikasini joriy etish energiya tejamkorlikni ta’minlaydi va iqtisodiy samaradorlikni oshiradi.

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## **TA'LIM MUASSASALARIDA JISMONIY TARBIYA JARAYONINI OPTIMALLASHTIRISHNING PEDAGOGIK ASOSLARI**

**Annotatsiya:** *Mazkur maqolada ta'lim muassasalarida jismoniy tarbiya jarayonini samarali tashkil etish, uni optimallashtirishning pedagogik asoslari, zamonaviy yondashuvlar va innovatsion metodlarning ahamiyati yoritilgan. Shuningdek, o'quvchilarning jismoniy rivojlanishini ta'minlashda individual yondashuv, motivatsiya va sog'lom turmush tarzini shakllantirish masalalari tahlil qilingan*

**Kalit so'zlar:** *jismoniy tarbiya, pedagogika, optimallashtirish, sog'lom turmush tarzi, innovatsion metodlar, ta'lim jarayoni.*

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## **PEDAGOGICAL BASIS OF OPTIMIZING THE PROCESS OF PHYSICAL EDUCATION IN EDUCATIONAL INSTITUTIONS**

**Annotation:** *This article discusses the pedagogical foundations of effective organization of the process of physical education in educational institutions, its optimization, the importance of modern approaches and innovative methods. Also, the issues of individual approach, motivation and formation of a healthy lifestyle in ensuring the physical development of students are analyzed*

**Keywords:** *physical education, pedagogy, optimization, healthy lifestyle, innovative methods, educational process.*

Ta'lim muassasalarida jismoniy tarbiya jarayonini optimallashtirish — innovatsion texnologiyalar, o'quvchilarning yosh va jismoniy xususiyatlariga mos yondashuvlar, hamda sog'lomlashtirish tadbirlarini tizimli tashkil etishni nazarda tutadi. Bu jarayon jismoniy tayyorgarlik sifatini oshirish, nazariy bilim va amaliy ko'nikmalarni integratsiyalash orqali komil insonni tarbiyalashga xizmat qiladi.

Jismoniy tarbiya jarayonini optimallashtirishning asosiy pedagogik asoslari quyidagilardan iborat:

- **Innovatsion yondashuvlar:** An'anaviy usullardan voz kechib, interfaol metodlar, raqamli texnologiyalar va o'yin texnologiyalarini dars jarayoniga tatbiq etish.

- **Tabaqalashtirilgan ta'lim:** O'quvchilarning jismoniy rivojlanish darajasi, sog'lig'i holati va qiziqishlariga ko'ra individual va guruhli mashg'ulotlarni tashkil etish.



• **Sog'lomlashtirish yo'nalishi:** Jismoniy tarbiya darslarini faqat sport natijasi uchun emas, balki organizmni chiniqtirish, to'g'ri qomatni shakllantirish va sog'lom turmush tarzini targ'ib qilishga yo'naltirish.

• **Motivatsiyani oshirish:** O'quvchilarda jismoniy mashqlar bilan muntazam shug'ullanishga bo'lgan qiziqishni shakllantirish, sport turlarini tanlash erkinligini ta'minlash.

• **Monitoring va baholash:** Jismoniy tayyorgarlik darajasini muntazam diagnostika qilish va natijalar asosida o'quv dasturlarini tuzatib borish.

Jismoniy tarbiya jarayonini optimallashtirish – bu mavjud sharoitlardan maksimal darajada samarali foydalanib, o'quvchilarning jismoniy rivojlanishini ta'minlashga qaratilgan pedagogik faoliyatdir. Bu jarayon quyidagilarni o'z ichiga oladi:

- darslarni to'g'ri rejalashtirish;
- o'quv yuklamasini me'yorlash;
- o'quvchilarning individual xususiyatlarini hisobga olish;
- zamonaviy metod va vositalardan foydalanish.

O'quvchi va talabalar jismoniy tarbiyasi ularni jismoniy harakatlarini amalga oshirishning tashkil etilgan pedagogik jarayonidir. Ta'lim muassasasidagi jismoniy tarbiyaga oid ishlar o'quvchi va talabalardan xavaskorlikni, tashabbuskorlikni, uyushqoqlikni talab qiladigan juda hilma—hil shakllari bilan farq qiladi. Ular o'quvchi va talabalarda tashkilotchilik ko'nikmalari, faollik, topqirlikni tarbiyalashga yordam beradi.

Ta'lim muassasasida o'quvchilar jismoniy tarbiyasining maqsadi:

1. Sog'lomlashtirish.
2. Har tamonlama etuk inson qilib tarbiyalash.
3. Vatan mudofaasiga hamda mexnatga tayyorlash.

Jismoniy tarbiyaning maqsadidan kelib chiqqan holda o'quvchi va talabalarni sog'lomlashtirish, chiniqtirish, jismoniy rivojlantirish, harakat malaka va ko'nikmalarini shakllantirish bo'yicha Jismoniy tarbiyaning asosiy vazifalari belgilanadi:

Jismoniy mashqlar va sportga oid maxsus bilimlar berish, Jismoniy mashq deb, jismoniy tarbiya qonuniyatlari talablariga javob beruvchi, ongli ravishda bajariladigan ixtiyoriy harakat faoliyatlarining turli turkumi tushuniladi. Bunday harakat faoliyatlari gimnastika, o'yinlar, sport, turizm mashqlari sifatida tarixan tizimlashtirildi, to'plandi va usluban to'ldirildi. Ularga gigienik bilim va ko'nikmalarni singdirish. Bu vazifa o'quvchi va talabalarga jismoniy mashg'ulotlarning foydasi xaqidagi, gigenik qoidalarga, dasturda ko'zda tutilgan barcha jismoniy mashqlarni to'g'ri bajarish qoidalariga rioya qilish xaqidagi zarur bilimlarni berishdan iborat. Bularning hammasi sog'liqni mustaxkamlashga, ularning gigiena qoidalarini bilishlari va ularga amal qilishlariga bevosita daxldor bo'lib, bunga maktab, oila, jamoatchilik hamda bolalarning o'zlarining birgalikdagi harakat bilan erishiladi. Jismoniy mashqlarga va sport mashqlariga jismoniy tarbiya darslari, kun tartibidagi tadbirlar hamda to'garak mashg'ulotlarida o'rgatiladi. Uning

natijasida jismoniy rivojlanish ta'minlanadi. Shuningdek, o'quvchi va talabalarda sportga qiziqishlar shakllantirilib, sport turlariga jalb etiladi.

Sog'liqni mustaxkamlash, o'quvchilarni to'g'ri jismoniy rivojlantirishga va chiniqtirishga yordam berish. Tabiat omillari suv, quyosh, havo ta'sirida o'quvchilarni sog'ligini mustaxkamlash, chiniqtirish hamda organizmni kasalliklarga chidamliligini orttirish. Jismoniy tarbiya mashg'ulotlarini imkoni boricha toza xavoda o'tkazish yoki sport zallarini toza havo bilan ta'minlanishini tashkil etish. O'quvchi va talabalarni suv muolajalari, suzish va cho'milish mashg'ulotlarini olib borish hamda quyoshga toblanish tadbirlarini boshqarish. Bu tadbirlarni sayrlar, ekskurstiyalar va turizm mashg'ulotlarida amalga oshiriladi. Bu vazifa ta'lim muassasasidagi barcha jismoniy madaniyat va sport ishlarining eng muhimi xisoblanadi. U xar bir o'qituvchining, pedagoglar jamoasining diqqat markazida bo'lish kerak. Shuning uchun o'quvchi va talabalarning jismoniy jixatdan normal rivojlanishi kerak.

Harakat, malakalari va ko'nikmalarini shakllantirish va takomillashtirish, yangi harakat turlariga va harakat faoliyatiga o'rgatish. O'quvchi va talabalarning jismoniy madaniyat dasturi mazmuni shunday tuzilganki, o'quvchilar jismoniy madaniyat darslarida, uyda, jismoniy madaniyat to'garaklarida va sport to'garaklarida muntazam shug'ullanib, yurish, yugurish, uloqtirish, tirmashish, muvozanat saqlash kabi hayotiy zarur harakat ko'nikmalarini sistemali tarzda egallay boradilar. Sanab o'tilgan barcha tadbirlar xar tomonlama jismoniy rivojlanishiga, ularni mexnatga tayyorlashga yordam beradi. O'quvchi va talabalarda harakat malaka va ko'nikmalarini shakllantiri shda ularni jinsi, yoshi va jismoniy tayyorgarligi hamda shaxsiy qobiliyatiga qarab yondashish zarur. Jismoniy fazilatlarni takomillashtirish. Tezkorlik, kuch, epchillik va chidamlilik hamda egiluvchanlik xar bir kishi uchun zarur bo'lgan si fatlardir. Ular o'quvchi va talabalarda harakat ko'nikmalarining shakllanishi bilan uzviy bog'liqdir. Jismoniy mashqlarni qisqa yoki uzoq vaqt davomida turli sur'atda, turli

murakkabliklar bilan o'tkazish yuqoridagi sifatlaming rivojlanishiga yordam beradi. Jismoniy fazilatlarni bir—biriga muvofiq holda rivojlantirish. Mashg'ulotlarni shug'ullanuvchilar shaxsiy qobiliyatlariga muvofiq tashkil etish hamda o'quvchilarni sport turlariga jalb etish.

Ta'lim muassasalarida jismoniy tarbiya jarayonini optimallashtirish o'quvchilarning sog'lom, jismonan barkamol bo'lib voyaga yetishida muhim omil hisoblanadi. Bu jarayonni samarali tashkil etish pedagoglardan yuqori malaka, zamonaviy yondashuvlar va innovatsion metodlardan foydalanishni talab qiladi. Natijada o'quvchilarning nafaqat jismoniy, balki umumiy rivojlanish darajasi ham oshadi.

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## **SPORT FAOLIYATI ORQALI O'QUVCHILARDA IJTIMOIIY VA IRODAVIY KOMPETENSIYALARNI SHAKLLANTIRISH MEXANIZMLARI**

**Annotatsiya:** Mazkur maqolada sport faoliyatining o'quvchilar shaxsini rivojlantirishdagi o'rni, ayniqsa ijtimoiy va irodaviy kompetensiyalarni shakllantirishdagi ahamiyati tahlil qilinadi. Shuningdek, ushbu kompetensiyalarni rivojlantirish mexanizmlari va pedagogik omillar yoritiladi.

**Kalit so'zlar:** sport, kompetensiya, ijtimoiy rivojlanish, iroda, jismoniy tarbiya, tarbiya jarayoni, sport turlari.

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## **MECHANISMS OF FORMING SOCIAL AND WILL COMPETENCES IN STUDENTS THROUGH SPORTS ACTIVITIES**

**Annotation:** This article analyzes the role of sports activities in the development of the personality of students, especially in the formation of social and will competencies. The mechanisms and pedagogical factors for the development of these competencies are also highlighted.

**Keywords:** sports, competence, social development, will, physical education, educational process, sports.

Hozirgi zamon ta'lim tizimida o'quvchilarni nafaqat bilimli, balki ijtimoiy faol, mustaqil fikrlovchi va kuchli irodaga ega shaxs sifatida shakllantirish muhim ahamiyat kasb etadi. Sport faoliyati bu borada samarali vositalardan biri hisoblanadi. Chunki sport jarayonida o'quvchilar nafaqat jismonan, balki ruhiy va ijtimoiy jihatdan ham rivojlanadi.

Oliy ta'lim muassasalarida sport to'garaklarini tashkil etishda kompetensiyaviy yondashuv va innovatsion texnologiyalardan foydalanish samarali bo'lsa-da, ushbu jarayonda qator muammolar va qiyinchiliklar mavjud. Ularni hal etish sport ta'limining sifatini oshirish va talabalarning jismoniy rivojlanishiga ko'proq foyda keltirish imkonini beradi. Quyida ushbu yondashuvni amaliyotga joriy etishda uchraydigan asosiy muammolar keltirilgan:

1. Infratuzilma va moddiy-texnik baza yetishmovchiligi:

– Ko'pgina oliy ta'lim muassasalarida sport zallari, zamonaviy jihozlar va innovatsion texnologiyalar yetishmovchiligi kuzatiladi.

– Raqamli sport platformalari, interaktiv simulyatorlar va sun'iy intellektga asoslangan trening tizimlarini joriy etish uchun maxsus texnik baza talab etiladi.

2. An'anaviy yondashuvga haddan tashqari bog'lanib qolish:  
– Oliy ta'lim muassasalarida sport ta'limi ko'p hollarda an'anaviy usullar bilan olib boriladi, bu esa zamonaviy talab va ehtiyojlarga to'liq javob bermaydi.  
– Kompetensiyaviy yondashuv talabalarni faqat jismoniy rivojlantirish bilan cheklanmay, ularga muayyan kasbiy ko'nikmalarni ham singdirishni talab qiladi, biroq bu yondashuv hali keng miqyosda qo'llanilmagan.

3. Talabalar motivatsiyasining yetishmovchiligi:  
– Ba'zi talabalar jismoniy faollikka bo'lgan qiziqishning pastligi sababli sport to'garaklarida ishtirok etmaydilar.  
– Sportga innovatsion texnologiyalarni joriy etish orqali ularning motivatsiyasini oshirish mumkin bo'lsa-da, bu usullar hamma joyda ham qo'llanilmaydi.

4. Ta'lim dasturlarining moslashuvchan emasligi:  
– Sport to'garaklari oliy ta'lim muassasalari o'quv rejalariga moslashtirilishi lozim, biroq ba'zi universitetlarda bunday muvofiqlashtirish ishlari yetarlicha yo'lga qo'yilmagan.  
– Kompetensiyaviy yondashuv asosida ishlab chiqilgan sport dasturlarining amaliyotga tatbiq etilishi uchun aniq mexanizmlar va baholash tizimi ishlab chiqilishi zarur.

5. Moliyaviy resurslarning yetishmovchiligi:  
– Innovatsion texnologiyalarni joriy etish, murabbiylarni qayta tayyorlash va zamonaviy sport jihozlarini xarid qilish katta mablag' talab etadi. – Ko'pgina oliy ta'lim muassasalarida ushbu soha uchun ajratilayotgan moliyaviy resurslar cheklangan.

6. Monitoring va baholash tizimining mukammal emasligi:  
– Kompetensiyaviy yondashuv asosida sport to'garaklarining natijadorligini baholash tizimi hali to'liq ishlab chiqilmagan.  
– Innovatsion texnologiyalarning samaradorligi, talabalar jismoniy rivojlanishiga ta'siri va mashg'ulotlarning individual yondashuv asosida tashkil etilish darajasi bo'yicha aniq monitoring tizimi mavjud emas.

Ushbu muammolarni hal etish uchun sport ta'limiga zamonaviy innovatsion texnologiyalarni kengroq joriy etish, trener va pedagoglarning malakasini oshirish, sport infratuzilmasini yaxshilash va talabalarining motivatsiyasini oshirish bo'yicha tizimli choratadbirlar ishlab chiqish lozim. Shu bilan birga, davlat va xususiy sektor hamkorligini kuchaytirish, xorijiy ilg'or tajribalarni o'rganish va ularni milliy sport ta'limiga tatbiq etish maqsadga muvofiq bo'ladi.

Sport o'yinlari va jamoaviy mashg'ulotlar o'quvchilarda quyidagi ijtimoiy ko'nikmalarni rivojlantiradi:

- jamoada ishlash qobiliyati
- muloqot madaniyati
- o'zaro hurmat va hamkorlik
- liderlik va mas'uliyat hissi

Jamoaviy sport turlari (futbol, basketbol, voleybol) ayniqsa samarali bo'lib, o'quvchilarni ijtimoiy muhitga moslashishga yordam beradi.

Sport faoliyati o'quvchilarda irodaviy sifatlarni shakllantirishda muhim rol o'ynaydi. Jumladan:

- qat'iyatlilik
- sabr-toqat
- maqsadga intilish
- o'zini nazorat qilish

Mashg'ulotlar davomida yuzaga keladigan qiyinchiliklar va musobaqalardagi bosim o'quvchini ruhiy jihatdan chiniqtiradi.

Samarali natijaga erishish uchun quyidagi omillar muhim:

- o'quvchilarning yosh va individual xususiyatlarini hisobga olish
- motivatsion muhit yaratish
- murabbiy va o'qituvchining professional yondashuvi
- zamonaviy sport metodlaridan foydalanish

Sport faoliyati o'quvchilarda ijtimoiy va irodaviy kompetensiyalarni shakllantirishning samarali vositasidir. To'g'ri tashkil etilgan sport mashg'ulotlari orqali o'quvchilar hayotiy muhim ko'nikmalarni egallaydi va har tomonlama barkamol shaxs sifatida shakllanadi.

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**YAKKABOG' TUMANI IJTIMOIIY-IQTISODIY RIVOJLANISHI VA  
GEOGRAFIK SALOHİYAT DINAMIKASI TAHLILI (2015–2025-  
YILLAR)**

**Annotatsiya.** *Ushbu maqolada Qashqadaryo viloyatining Yakkabog' tumani misolida hududiy iqtisodiyotning 2015–2025-yillar oralig'idagi o'n yillik rivojlanish dinamikasi tadqiq etilgan. Maqolada tumanning geografik joylashuvi, tabiiy resurslar salohiyati va ularning iqtisodiy o'sishdagi o'rni tahlil qilinadi. Shuningdek, agrosanoat majmuasidagi tarkibiy o'zgarishlar, sanoatlashuv jarayonlari va eksport salohiyatining kengayishi statistik ma'lumotlar asosida yoritib berilgan. Tadqiqot yakunida tumanni istiqbolda barqaror rivojlantirish bo'yicha ilmiy taklif va tavsiyalar ilgari surilgan.*

**Kalit so'zlar:** *Yakkabog' tumani, iqtisodiy dinamika, geografik o'rin, agrosanoat, eksport, tabiiy resurslar, tahlil, barqaror rivojlanish.*

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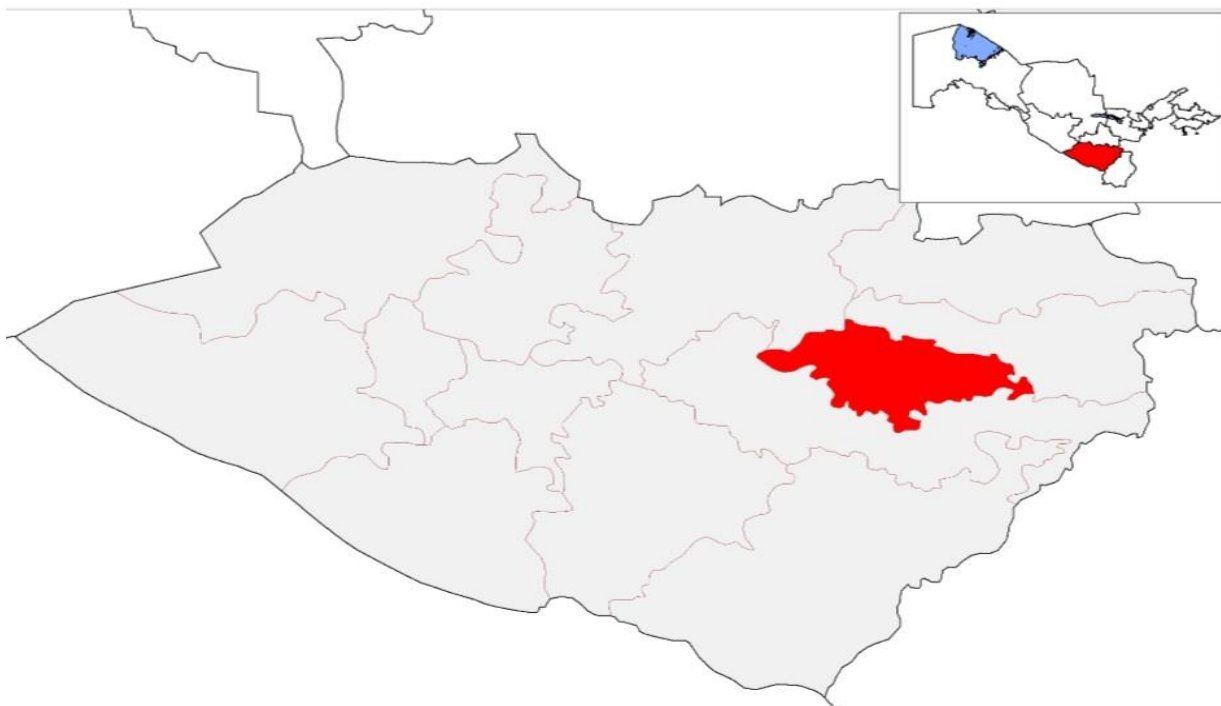
## ANALYSIS OF THE DYNAMICS OF SOCIO-ECONOMIC DEVELOPMENT AND GEOGRAPHICAL POTENTIAL OF YAKKABOG DISTRICT (2015–2025)

**Abstract.** *This article analyzes the dynamics of socio-economic development of the regional economy over the period 2015–2025 using the example of Yakkabog district in the Kashkadarya region. The study examines the geographical location of the district, the potential of natural resources, and their role in economic growth. Based on statistical data, structural changes in the agro-industrial complex, industrialization processes, and the expansion of export potential are highlighted. The study concludes with scientifically grounded recommendations aimed at ensuring the sustainable development of the district in the future.*

**Keywords:** *Yakkabog district, economic dynamics, geographical location, agro-industrial complex, export, natural resources, analysis, sustainable development.*

**Kirish.** O‘zbekiston Respublikasida amalga oshirilayotgan keng ko‘lamli iqtisodiy islohotlar sharoitida hududlarning ijtimoiy-iqtisodiy salohiyatidan samarali foydalanish, aholi turmush darajasini oshirish va barqaror iqtisodiy o‘sishni ta‘minlash ustuvor vazifalardan biri hisoblanadi. Xususan, Qashqadaryo viloyatining o‘ziga xos tabiiy-geografik va demografik xususiyatlariga ega bo‘lgan Yakkabog‘ tumani misolida hududiy rivojlanish dinamikasini tahlil qilish, mavjud resurslardan oqilona foydalanish yo‘llarini belgilash ilmiy va amaliy jihatdan muhim ahamiyat kasb etadi.

**Muhokama.** Hududiy iqtisodiyot va geografik joylashuvning ishlab chiqarishga ta‘siri masalalari ko‘plab iqtisodchi va geograf olimlar tomonidan tadqiq etilgan bo‘lsa-da, aynan Yakkabog‘ tumanining 2015–2025 yillar oralig‘idagi o‘n yillik transformatsiyasi, sanoatlashuv jarayonlari va agrosanoat majmuasidagi tarkibiy o‘zgarishlar alohida tizimli tahlilga muhtoj.



### **1-rasm. Qashqadaryo viloyati kartasida Yakkabog' tumani joylashuvi**

Yakkabog' tumanining so'nggi o'n yillikdagi ijtimoiy-iqtisodiy rivojlanish ko'rsatkichlarini statistik ma'lumotlar asosida qiyosiy tahlil qilish, tuman iqtisodiyotining drayver sohalarini aniqlash va kelgusidagi rivojlanish istiqbollari bo'yicha ilmiy takliflar ishlab chiqishdan iborat.

Maqolani tayyorlash jarayonida tizimli yondashuv, qiyosiy-statistika, iqtisodiy-geografik tahlil va prognozlash usullaridan foydalanildi. Tahlillar davomida tuman statistika bo'limi ma'lumotlari va hududiy rivojlanish dasturlari natijalariga tayanildi.

Maqolada Yakkabog' tumanining agrar yo'nalishdan agrosanoat va xizmat ko'rsatish markaziga aylanish bosqichlari ochib berilgan. Shuningdek, tumandagi demografik o'sishning mehnat bozori va infratuzilmaga ta'siri 2025-yilga qadar bo'lgan dinamikada yoritilgan.

*Yakkabog' tumanining geografik o'rni va tabiiy resurslari tahlili.* Geografik o'rni: Yakkabog' tumani Qashqadaryo viloyatining janubi-sharqiy qismida, Hisor tizmasining g'arbiy tarmoqlari va Qashqadaryo vohasining tutashgan qismida joylashgan. Tuman shimoldan Kitob va Shahrisabz, g'arbdan Chiroqchi va Qarshi, janubdan esa Qamashi tumanlari bilan chegaradosh. Uning geografik joylashuvi "tog'-tekislik" profiliga ega bo'lib, bu hududda ham dehqonchilik, ham chorvachilik, ham tog'-kon sanoatini rivojlantirishga zamin yaratadi.



**2-rasm. Tuman hududini landshaft tuzilishi**

Relyefi va tuproq qoplami: Tuman relyefi sharqdan g'arbga qarab pasayib boradi. Sharqiy qismi baland tog'lar (Hisor tizmasi) va tog' oldi adirlaridan iborat bo'lsa, markaziy va g'arbiy qismi keng tekisliklardan tashkil topgan. Hududda asosan bo'z tuproqlar tarqalgan bo'lib, ular daryo qayirlarida o'ta unumdor allyuvial-o'tloqi tuproqlar bilan almashadi. Bu esa tumanda bog'dorchilik (ayniqsa, mashhur Yakkabog' olmalari) va g'allachilikning yuqori samaradorligini ta'minlaydi.

Gidrografik tarmoqlari: Tuman iqtisodiyotining "qon tomiri" uning gidrografik resurslari, xususan, Yakkabog'daryo hisoblanadi. Daryo o'z boshlanishini Hisor tog'laridan oladi va tuman hududini obihayot bilan ta'minlaydi. Shuningdek, tumandagi yer osti suvlari zaxiralari ham qishloq xo'jaligini diversifikatsiya qilishda (masalan, artezian quduqlar orqali sug'orish) muhim manba bo'lib xizmat qiladi.

Iqlimiy salohiyati: Yakkabog' tumani keskin kontinental iqlimga ega, ammo tog' oldi hududi bo'lgani uchun viloyatning markaziy tekislik qismlariga nisbatan yog'ingarchilik miqdori yuqoriroq (yiliga 400–500 mm). Bu ko'rsatkich lalmi dehqonchilik va chorvachilik uchun tabiiy yaylovlar mavjudligini anglatadi.

Tabiiy boyliklari: Tuman yer osti va yer usti boyliklariga boy. Bu yerda qurilish materiallari (tosh, qum-shag'al, gips), shuningdek, Hisor tog'lari etaklarida foydali qazilma konlari mavjudligi sanoat korxonalarini xomashyo bilan ta'minlash imkonini beradi. So'nggi yillarda tuman hududidagi rekreatsiya resurslari (so'lim tog' manzaralari va shifobaxsh suvlari) ekoturizm va sog'lomlashtirish turizmi uchun yangi iqtisodiy resurs sifatida

Yakkabog' tumanining 10 yillik iqtisodiy rivojlanish tahlili (2015–2025). So'nggi o'n yillikda tuman iqtisodiyoti faqatgina qishloq xo'jaligiga tayanib qolmasdan, sanoat va xizmat ko'rsatish sohalari hisobiga ham sezilarli darajada diversifikatsiya qilindi.

#### 1. Sanoat va Tadbirkorlikning o'sishi

2015-yilda tumanda sanoat korxonalari asosan paxta va g'allani qayta ishlash bilan cheklangan bo'lsa, 2025-yilga kelib:

Kichik sanoat zonalari: Tumanda 3 ta yangi kichik sanoat zonasi tashkil etildi.

Meva-sabzavotni qayta ishlash: "Yakkabog' olmasi" brendi ostida mahsulotlarni quritish, saralash va qadoqlash korxonalari soni 2,5 baravarga ortdi.

Tadbirkorlik: 2015-yilda 1000 nafar aholiga to'g'ri keladigan tadbirkorlar soni kam bo'lgan bo'lsa, 2025-yilga kelib oilaviy tadbirkorlik va o'zini-ozini band qilish ko'rsatkichi viloyatda yetakchi o'rinlarga chiqdi.

#### 2. Qishloq xo'jaligidagi tarkibiy o'zgarishlar

Yakkabog' - viloyatning eng yirik bog'dorchilik markazi. 10 yillik dinamika shuni ko'rsatadiki:

Intensiv bog'lar: Eskirgan past hosilli bog'lar o'rniga intensiv va yarim intensiv bog'lar barpo etildi. Bu esa hosildorlikni har gektardan 15-20 sentnerdan 40-50 sentnergacha oshirdi.

Suv tejovchi texnologiyalar: 2015-yilda tomchilatib sug'orish deyarli qo'llanilmagan bo'lsa, 2025-yil holatiga ko'ra tuman bog'larining 35-40 foizi aynan tejamkor texnologiyalar asosida sug'orilmoqda.

#### 3. Eksport va tashqi savdo aylanmasi

Tuman eksport salohiyati 10 yil ichida sifat jihatidan o'zgardi:

2015-yil: Eksport tarkibining 80 foizini xomashyo (meva-sabzavot) tashkil etgan.

2025-yil: Eksportda tayyor mahsulotlar (sharbatlar, quritilgan meva mikslari, to'qimachilik mahsulotlari) ulushi 45 foizdan oshdi.

Geografiya: Eksport manzillari MDHdan tashqari Germaniya, Polsha va BAA kabi davlatlarga kengaydi.

#### 4. Ijtimoiy-demografik rivojlanish

Aholi sonining ortishi (o'rtacha yillik o'sish 1.8-2.0%) infratuzilmaga bo'lgan talabni oshirdi:

Uy-joy: So'nggi 10 yilda yangi massivlar (masalan, zamonaviy ko'p qavatli uylar) qurilishi jadallashdi.





**3-rasm. Tuman hududini landshaft tuzilishi (turizm rivoji uchun eng maqbul hudud)**

Ta'lim va tibbiyot: Tuman aholisining raqamli savodxonligi oshishi natijasida servis va xizmat ko'rsatish sohasi (bank, IT, logistika) ulushi yalpi hududiy mahsulotda 30 foizga yetdi.

**Xulosa va takliflar.** O'tkazilgan tahlillar shuni ko'rsatadiki, Yakkabog' tumani agrosanoat markaziga aylanib bormoqda. Kelgusida iqtisodiy samaradorlikni yanada oshirish uchun:

Tog'li hududlarda ekoturizmni rivojlantirish;

Suv tejovchi texnologiyalarni (tomchilatib sug'orish) keng joriy etish;

Mahsulotlarni chuqur qayta ishlash texnologiyalarini (klaster tizimi) kuchaytirish lozim.

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## **YUQORI QASHQADARYO HAVZASINING SUV RESURSLARI VA ULARDAN OQILONA FOYDALANISH MASALALARI**

**Annotatsiya.** Mazkur maqolada Yuqori Qashqadaryo havzasining suv resurslari va ulardan oqilona foydalanish masalalari tahlil qilinadi. Havzaning suv resurslarini tizimli ravishda o'rganilib, ularning shakllanish omillari, hududiy taqsimlanishi hamda hozirgi ekologik holati kompleks yondashuv asosida tahlil qilinadi. Shuningdek, suv resurslaridan oqilona va samarali foydalanishning dolzarb muammolari, xususan, suv tanqisligi, antropogen bosimning ortishi hamda iqlim o'zgarishining ta'siri ilmiy jihatdan asoslab beriladi. Tadqiqot natijalari asosida suv resurslarini boshqarish va muhofaza qilishning istiqbolli yo'nalishlari taklif etiladi.

**Kalit so'zlar:** Suv resurslari, Yuqori Qashqadaryo havzasi, oqilona foydalanish, suv tanqisligi, antropogen bosim, iqlim o'zgarishi, ekologik holat, gidrologik tizim.

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## **WATER RESOURCES OF THE UPPER KASHKADARYA BASIN AND ISSUES OF THEIR RATIONAL USE**

**Annotation:** This article analyzes the water resources of the Upper Kashkadarya basin and issues related to their rational use. The basin's water resources are systematically studied, considering the factors of their formation, spatial distribution, and current ecological condition based on a comprehensive approach. Particular attention is given to the pressing challenges of rational and efficient water use, including water scarcity, increasing anthropogenic pressure, and the impacts of climate change.

Based on the research findings, prospective directions for water resource management and conservation are proposed.

**Keywords:** *water resources, Upper Kashkadarya basin, rational use, water scarcity, anthropogenic pressure, climate change, ecological condition, hydrological system.*

**Kirish.** Hozirgi kunda suv resurslaridan oqilona va samarali foydalanish masalasi global miqyosda dolzarb ekologik va ijtimoiy-iqtisodiy muammolardan biri hisoblanadi. Ayniqsa, iqlim o'zgarishi, aholi sonining ortishi hamda xo'jalik faoliyatining kengayishi natijasida suv resurslariga bo'lgan ehtiyoj tobora ortib bormoqda. Shu nuqtai nazardan, alohida hududlar kesimida suv resurslarining holatini chuqur o'rganish va ularni boshqarishning ilmiy asoslangan mexanizmlarini ishlab chiqish muhim ahamiyat kasb etadi. Yuqori Qashqadaryo havzasi O'zbekistonning muhim gidrologik hududlaridan biri bo'lib, uning suv resurslari mintaqaning qishloq xo'jaligi, sanoati va aholi turmushini ta'minlashda muhim rol o'ynaydi. Mazkur hududda suv resurslarining shakllanishi tabiiy-geografik omillar, jumladan, relyef, iqlim va gidrologik sharoitlar bilan chambarchas bog'liqdir. Shu bilan birga, suv resurslaridan foydalanish jarayonida antropogen omillar ta'siri ortib borayotgani, suv tanqisligi va ekologik muammolarning kuchayishiga olib kelmoqda. Mazkur maqolaning asosiy maqsadi Yuqori Qashqadaryo havzasining suv resurslarini tizimli tahlil qilish, ulardan oqilona foydalanishning mavjud muammolarini aniqlash hamda ularni bartaraf etishning ilmiy asoslangan yo'nalishlarini ishlab chiqishdan iborat. Tadqiqot jarayonida suv resurslarining shakllanishi, hududiy taqsimlanishi, ularning hozirgi holati va ulardan foydalanish samaradorligi kompleks yondashuv asosida o'rganiladi.

**Asosiy qism:** Daryo Tojikistonning Sug'd viloyatidagi Hisor tizmasining g'arbiy tarmog'i bo'lgan Obixunda tog'larining shimoliy yon bag'ridan boshlanadi. Daryo havzasining umumiy maydoni 12 ming km<sup>2</sup> ni tashkil etadi. Qashqadaryo havzasida 3122 ta daryo va soylar mavjud. Ulardan 149 ta daryoning uzunligi 10 km dan ortiq, 33 tasining uzunligi 20 km va undan uzunroq. O'lkaning asosiy daryosi Qashqadaryo hisoblanadi. Uning uzunligi 378 km<sup>2</sup>. Daryo Hisor tog'ining g'arbiy qismidan kichik soy tarzida boshlanib, Muborakka yetmasdan qumlarga singib ketadi. Qashqadaryoning Oqsuv, Tanxoz, Yakkabog', G'uzordaryo kabi katta irmoqlari uni suv bilan ta'minlaydi.

Yuqori Qashqadaryo havzasining suv resurslari asosan tog'li hududlarda shakllanadi. Havzaning suv manbalari quyidagi tabiiy omillardan kelib chiqadi. Yog'in-sochinlar miqdori hududning yuqori qismida sezilarli darajada yuqori bo'lib, havzaning suv balansini ta'minlaydi. Qor va muzliklarning erishi bahor va yoz oylarida suv hajmining ortishi asosan tog' tizmalari va qor qoplamlari erishi bilan bog'liq. Yer osti suvlari pasttekislik va qishloq hududlarda ichimlik va sug'orish suvi manbai sifatida ahamiyatlidir.



**1.-rasm. Qarshi ko‘prigidan  
Qashqadaryo daryosini ko‘rinishi**



**2-rasm. Qahqadaryo  
daryosini Kitob tumani hududidan  
oqib o‘tishi**

Havzaning suv resurslari shakllanishida relyefi va iqlim sharoiti muhim rol o‘ynaydi. Mavsumiy o‘zgaruvchanlik, ya’ni bahorda qorlarning erishi bilan suv hajmining ko‘payishi va qish-kuz fasllarda kamayishi, suv resurslarining taqsimlanishida sezilarli nomutanosiblikni yuzaga keltiradi. Havzada suv resurslari hududiy jihatdan notekis taqsimlangan. Tog‘li va tog‘oldi hududlarda suv manbalari ko‘p bo‘lsa, pasttekislik va qurg‘oqchil hududlarda suv tanqisligi mavjud. Bu hududiy nomutanosiblik suv resurslaridan foydalanishning samaradorligini pasaytiradi. Qishloq xo‘jaligida suvning katta qismi sug‘orish tizimlarida sarflanadi. Ichimlik va sanoatda sarflanishi aholining va sanoat korxonalarining ehtiyojlarini qondiradi. Biroq suvdan foydalanish samaradorligi past bo‘lib, eskirgan sug‘orish tizimlari, yuqori darajada suv yo‘qotish va texnologik yetishmovchilik mavjud. Shu sababli hududda suv resurslarini barqaror boshqarish dolzarb masala sifatida namoyon bo‘ladi. Yuqori Qashqadaryo havzasida suv resurslaridan oqilona foydalanish bir qator muammolar bilan bog‘liq.

Suvning cheklanganligi: tabiiy manbalar cheklanganligi va aholining ortib borishi suvga bo‘lgan talabni oshiradi.

Antropogen tasir: qishloq xo‘jaligi, sanoat va shahar infratuzilmasi suv resurslariga ortiqcha yuk tushirmoqda.

Iqlim o‘zgarishi: yog‘in miqdorining kamayishi, haroratning oshishi va ekstremal ob-havo hodisalari suv resurslariga salbiy ta’sir ko‘rsatmoqda.

Ekologik muammolar: suv sifati yomonlashuvi, tabiiy ekotizimlarning buzilishi va biologik xilma-xillikning kamayishi kuzatilmoqda.

Suvning samarasiz yo‘qotilishi: eskirgan sug‘orish tizimlari va texnologik yetishmovchiliklar natijasida katta miqdorda suv isrof bo‘lmoqda.

Suv resurslarini samarali boshqarish va muhofaza qilish bo‘yicha muammolarni bartaraf etish va suvdan oqilona foydalanishni ta’minlash uchun quyidagi strategiyalar ilmiy asosda taklif etiladi 1-jadval ma’lumotlarida tahlil qilindi.

## Suv resurslarini samarali boshqarish va muhofaza qilish bo'yicha tahlil va tavsiya

| T/r | Strategiyalar                          | Asosiy yo'nalishlar                                                                  | Kutilayotgan natijalar                                                      |
|-----|----------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1   | Innavatsion irigatsiya texnologiyalari | Tomchilatib sug'orish, suv tejovchi texnologiyalar                                   | Suv sarfi kamayadi, qishloq xo'jaligida samaradorlik oshadi                 |
| 2   | Hududiy va ekologik monitoring         | Suv hajmi va sifatini kuzatish va monitoring qilish                                  | Antropogen bosim kamayadi, tabiiy ekotizimlarni himoyada bo'adi             |
| 3   | Barqaror boshqaruv strategiyasi        | Hududlar bo'yicha suv resurslarini taqsimlash va muvofiqlashtirish                   | Suv ta'minoti barcha hududlar uchun yaxshilanadi                            |
| 4   | Qonunchilik va meyoriy-huquqiy baza    | Suvni muhofaza qilish va foydalanish tartibini tartibga soluvchi normativ hujjatlar. | Qonuniy nazorat kuchayadi, suvdan samarali foydalanish intizomi shakilanadi |
| 5   | Iqlim o'zgarishga moslashish           | Suv yig'ish, saqlash va taqsimlash tizimlarini iqlim o'zgarishiga moslashtirish      | Ekstremal holatlarga tayyorlik, barqaror suv ta'minoti shakillanadi         |

**Xulosa.** Xulosa qilib aytganda, Yuqori Qashqadaryo havzasining suv resurslari va ulardan oqilona foydalanish masalalari hal qiluvchi ahamiyatga ega bo'lgan sohalardan biridir. Yuqori Qashqadaryo havzasining suv resurslari hududning ijtimoiy-iqtisodiy rivojlanishida muhim ahamiyatga ega. Ushbu suv manbalari asosan tog' hududlarida yog'in-sochinlar, qor va muzliklarning erishi natijasida shakllanadi hamda qishloq xo'jaligi, ichimlik suvi ta'minoti va boshqa xo'jalik tarmoqlarida keng foydalaniladi. Biroq suv resurslaridan samarasiz foydalanish, sug'orish tizimlarining eskirganligi, suvning ifloslanishi va iqlim o'zgarishi kabi omillar suv tanqisligi muammosini kuchaytirmoqda. Shu sababli suv resurslarini muhofaza qilish, ulardan oqilona foydalanish va zamonaviy suv tejovchi texnologiyalarni joriy etish muhim vazifalardan biri hisoblanadi. Kelajakda Yuqori Qashqadaryo havzasining suv resurslarini samarali boshqarish, suv manbalarini ifloslanishdan himoya qilish hamda suvdan foydalanish madaniyatini oshirish orqali hududning ekologik barqarorligini ta'minlash mumkin. Bu esa nafaqat bugungi kun ehtiyojlarini qondirish, balki kelajak avlodlar uchun ham suv resurslarini saqlab qolishda muhim ro'l o'ynaydi.

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## **GREEN ACCOUNTING IN UZBEKISTAN'S ENVIRONMENTAL AUDITS: AN OPERATIONAL ANALYSIS**

**Abstract.** *This article examines four interconnected methodological failures that prevent Uzbekistan's environmental auditing system from functioning at the quality level that effective environmental governance requires. The central failure is the near-total absence of green accounting systems within domestic industrial enterprises, which deprives auditors of the financial data necessary for reliable environmental liability assessment.*

**Keywords:** *green accounting, environmental audit methodology, lifecycle assessment, IoT emissions monitoring, carbon pricing, SEEA, ESG reporting, Uzbekistan industrial sector*

For environmental auditing practice, the intersection of these three traditions points toward the same conclusion: audit quality is bounded above by the quality of enterprise environmental data systems. Improving auditor skills, refining audit protocols, and strengthening regulatory consequences for non-compliance all have value, but they operate within constraints set by the underlying data. The most important lever for improving audit quality in Uzbekistan is improving the enterprise data systems that auditors depend on.

The final stage of an environmental audit of a company's financial activities is determining the reliability of environmental and statistical reporting indicators.

The audit of environmental reporting of an enterprise is a systematic review aimed at assessing the reliability of accounting, tax and government statistical data in the context of their impact on the environment, as well as their compliance with the legislation of Uzbekistan. First of all, the audit includes reconciliation of the environmental reporting section with the accounting policy, permits and limits, primary measurement documents on emissions and waste streams (certificates, laboratory protocols), statistical forms and accounting registers. At the next stage, the indicators are recalculated and their logical consistency is checked with the basis for calculating compensation payments and taxes on the use of subsoil and water resources; the corresponding transactions (2010/2310, 2510/2520, 9420, 9710/9720, 6410, 6430, 4930) are correct. Criteria for assessing environmental liabilities (reclamation, disposal, etc.) are defined; if necessary, the formation and disclosure of information on reserves is checked. The final report assesses the completeness of the reporting, identifies any discrepancies and areas requiring



correction, and provides recommendations for strengthening internal controls, integrating indicators with digital sources, and strengthening controls over reporting deadlines.

Failure to submit state statistical data in accordance with the established procedure or the submission of false statistical reports is a violation of the legislation of the Republic of Uzbekistan. Failure to submit state statistical data in accordance with the established procedure or the submission of inaccurate statistical reports constitutes an administrative offense under the Law on State Statistics and the Code of Administrative Responsibility of the Republic of Uzbekistan. Therefore, the verification of statistical reports on environmental statistics is carried out using a comprehensive approach.

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## **IMPROVING THE GREEN ACCOUNTING IN UZBEKISTAN'S ENVIRONMENTAL AUDITS**

**Abstract.** *This article examines four interconnected methodological failures that prevent Uzbekistan's environmental auditing system from functioning at the quality level that effective environmental governance requires.*

**Keywords:** *green accounting, environmental audit methodology, lifecycle assessment, IoT emissions monitoring, carbon pricing, SEEA, ESG reporting, Uzbekistan industrial sector*

In the Republic of Uzbekistan, the management of these information systems and their representation in certain bodies is regulated by the Law "On Nature Protection," the Law "On Waste," the Law "On Atmospheric Air Protection," the Law "On Water and Water Use," and is also supported by government and departmental decrees. In practice, the company maintains records of environmental indicators within the state statistical republic, permits (for wastewater discharge), and documents based on the results of state environmental assessments.

To systematically collect environmental data, the company can create an "environmental passport" (an internal regulatory and methodological document). This represents a unified database of data on the company's production processes, resource use, emitted pollutants, waste streams, treatment facilities, and environmental protection costs.

This practice of maintaining passports is carried out in accordance with the methodological recommendations of the Ministry of Ecology, Environment and Climate Change, as well as statistical forms and requirements issued as a result of permits from state statistical authorities in the United Kingdom.

A 2023 evaluation by Kazakhstan's Ministry of Ecology assessed the impact of this requirement on environmental audit quality for the enterprises that had implemented it. The evaluation methodology compared audit finding accuracy - measured by the rate of concordance between initial audit findings and subsequent independent regulatory inspection results - before and after implementation of green accounting requirements. The finding was unambiguous: enterprises with implemented green accounting systems showed a 34 percent improvement in audit finding accuracy. The improvement came entirely from better data; the audit methodology and auditor skill levels were unchanged.

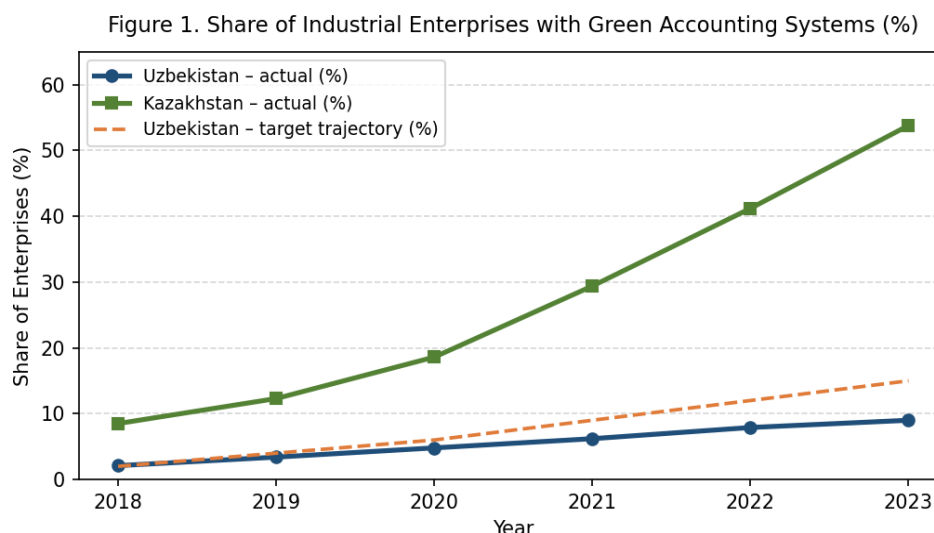


*Figure 1. Share of Industrial Enterprises Maintaining Green Accounting Systems: Uzbekistan vs. Kazakhstan (%)*

Figure 1 shows the diverging trajectories since 2018. Kazakhstan's adoption rate climbed steeply after the 2021 mandatory requirement, reaching 53.8 percent of targeted enterprises by 2023. Uzbekistan's rate grew slowly in the absence of a legal mandate, reaching approximately 9 percent - almost entirely concentrated among the handful of enterprises with international joint venture partners or foreign listing requirements that imposed their own green accounting standards. The gap between the two countries' adoption rates is not primarily a capacity or awareness gap. It is a regulatory mandate gap.

*Table 1. Green Accounting Implementation: International Comparison*

| Country     | Mandatory?        | Scope               | Adoption Rate (2023) | Audit Accuracy Impact | Env. Liability Reporting |
|-------------|-------------------|---------------------|----------------------|-----------------------|--------------------------|
| Uzbekistan  | No                | Voluntary           | 9%                   | Baseline              | 6%                       |
| Kazakhstan  | Yes (Cat. I-II)   | High-impact firms   | 53.8%                | +34%                  | 44%                      |
| Georgia     | Voluntary         | Listed companies    | 17%                  | +11%                  | 12%                      |
| South Korea | Yes (listed cos.) | All listed firms    | 89%                  | +41%                  | 78%                      |
| Germany     | Yes               | All regulated firms | 97%                  | +48%                  | 91%                      |

*Source: OECD Environmental Performance Reviews; World Bank Green Accounting Reports; National audit association surveys (2022–2024). Author's compilation.*

For implementation, the "environmental passport" is being introduced as an internal regulatory and methodological document of the enterprise. Although it is not established as a mandatory standard for civil servants, it must be maintained in methodological forms for approval with representatives of the Ministry of Ecology, Environmental Protection, and Climate Change (and relevant agencies), state statistical forms, and permitting and accounting requirements.

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## INTERNATIONAL STANDARD ISO-50001 ENERGY MANAGEMENT STANDARD

**Abstract:** *ISO 50001 is an international standard developed by the International Organization for Standardization (ISO) for establishing effective energy management systems in organizations. The standard aims to improve energy efficiency, reduce energy consumption, and optimize energy costs. It provides a systematic framework for planning, implementing, monitoring, and continuously improving energy management practices. The implementation of ISO 50001 helps organizations enhance operational efficiency, reduce environmental impact, and increase competitiveness through effective energy use.*

**Keywords:** *ISO 50001, energy management system, energy efficiency, energy consumption, energy audit, sustainable development, energy performance.*

### Introduction

Energy efficiency has become one of the most important issues in modern industrial and economic development. Increasing energy consumption, limited energy resources, and growing environmental problems require organizations to use energy more efficiently and responsibly. In this context, the implementation of effective energy management systems plays a key role in improving energy performance and reducing operational costs. ISO 50001 is an international standard developed by the International Organization for Standardization to help organizations establish, implement, maintain, and improve energy management systems. This standard provides a systematic approach to monitoring energy consumption, improving energy efficiency, and reducing environmental impacts. By applying ISO 50001, organizations can identify opportunities for energy savings, optimize energy use, and support sustainable development. The adoption of ISO 50001 not only helps organizations reduce energy costs but also improves their competitiveness and environmental responsibility. Therefore, the implementation of this standard is becoming increasingly important for enterprises and institutions aiming to achieve long-term energy efficiency and sustainability. ISO 50001 is an international standard for energy management systems that was adopted in 2011 by the International Organization for Standardization (ISO). This standard was developed to improve energy efficiency, reduce energy consumption, and optimize energy costs.

This standard includes the following main stages. The table below presents the processes of the ISO 50001 energy management standard.

| Stages                     | Description                                                                                                                                             |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Energy Policy              | Conducting energy analysis, setting goals and indicators, determining energy performance indicators, and developing a plan for energy management.       |
| Implementation             | Applying the planned energy management system in practice, involving resources and employees, and conducting energy monitoring and awareness campaigns. |
| Monitoring and Measurement | Regularly monitoring and measuring energy use, evaluating performance indicators, and recording any changes.                                            |
| <b>Checking</b>            | Auditing all processes, evaluating their compliance with the standard, identifying nonconformities, and taking corrective actions.                      |
| Review and Improvement     | Continuously improving the energy management system, analyzing the level of achievement of objectives, and implementing necessary updates.              |

**The main objectives of the ISO 50001 standard include the following:**

- 1. Efficient energy management:** Creating opportunities for organizations to effectively monitor and manage energy consumption.
- 2. Energy saving:** Reducing costs for organizations by decreasing energy consumption.
- 3. Reducing environmental impact:** Decreasing carbon dioxide and other emissions through efficient energy use.
- 4. Increasing competitiveness among organizations:** Improving the economic benefits of organizations by enhancing energy efficiency.

**The main principles of the ISO 50001 standard are as follows:**

- 1. Leadership role of management:** The success of the energy management system depends on the active participation and support of top management.
- 2. Systematic approach:** Implementing energy management processes systematically and managing energy resources efficiently.
- 3. Energy measurement and analysis:** Collecting and analyzing data to improve energy efficiency by monitoring energy consumption and usage.
- 4. Continuous improvement:** Continuously updating and improving the energy management system.

**The structure of the ISO 50001 standard consists of the following main sections:**

- 1. Introduction:** Defines the purpose and scope of the standard.
- 2. Terminology:** Presents the main terms used in the standard and their definitions.

**3. Energy management system:** Provides information about the establishment, implementation, and improvement of the energy management system.

**4. Energy management processes:** Includes recommendations for analyzing, planning, and implementing energy management processes.

**5. Monitoring and measurement:** Continuous monitoring and evaluation of energy consumption and use.

**6. Continuous improvement:** Processes for continuously updating and improving the system.

**The implementation process of the ISO 50001 standard includes several stages:**

**1. Planning the Energy Management System**

- **Setting goals and objectives:** Determining the organization's goals for improving energy efficiency.

- **Conducting an energy audit:** Analyzing energy consumption and identifying problems.

- **Identifying processes:** Establishing processes to monitor energy consumption and usage.

**2. Implementing the Energy Management System**

- **Employee involvement:** Engaging and training employees to improve energy efficiency.

- **Developing practical measures:** Defining strategies and measures to improve energy efficiency.

**3. Monitoring and Evaluation**

- **Monitoring energy consumption:** Continuously controlling and analyzing energy use.

- **Evaluating results:** Assessing the achieved results in improving energy efficiency.

**4. Continuous Improvement**

- **Updating the energy management system:** Continuously improving and updating the system.

- **Optimizing energy management processes:** Continuously improving processes and striving to enhance energy efficiency.

**Results and Discussion**

The implementation of the ISO 50001 energy management standard demonstrates significant improvements in organizational energy performance. Organizations that adopt this standard are able to systematically monitor, analyze, and control their energy consumption. As a result, energy efficiency increases and operational costs are reduced.

The results show that the introduction of ISO 50001 helps organizations identify inefficient energy use and implement effective corrective measures. Through continuous monitoring and measurement of energy performance indicators, organizations can track energy consumption trends and make data-driven decisions.

Another important result of implementing ISO 50001 is the reduction of environmental impact. Efficient energy management contributes to the reduction of greenhouse gas emissions and supports sustainable development goals. In addition, the implementation of this standard strengthens the competitiveness of organizations by improving productivity and optimizing resource use.

From the discussion perspective, the success of ISO 50001 implementation largely depends on strong management commitment, employee involvement, and the integration of energy management practices into organizational processes. Continuous improvement and regular monitoring play a key role in maintaining the effectiveness of the energy management system.

#### **Literature Review**

Many researchers have studied the importance of energy management systems and the role of the ISO 50001 standard in improving energy efficiency. Studies indicate that structured energy management practices significantly contribute to reducing energy consumption and operational costs in industrial enterprises.

Previous research highlights that the ISO 50001 standard provides a systematic framework for monitoring energy use and improving energy performance. According to various studies, organizations implementing ISO 50001 have achieved measurable improvements in energy efficiency and environmental performance.

Several authors emphasize that the integration of energy management systems into organizational strategy enhances decision-making processes related to energy use. Furthermore, research shows that the application of ISO 50001 promotes sustainable energy use and supports global efforts to mitigate climate change.

Overall, the literature confirms that ISO 50001 is an effective tool for organizations aiming to improve energy efficiency, reduce environmental impact, and achieve sustainable development objectives.

#### **References Analysis**

The analysis of scientific literature shows that ISO 50001 plays an important role in modern energy management practices. Researchers emphasize that the implementation of this standard contributes to systematic energy monitoring, improved efficiency, and better resource management.

Many studies demonstrate that organizations implementing ISO 50001 can reduce energy consumption by 10–30 percent depending on the scale of implementation and operational conditions. In addition, researchers highlight that the standard supports continuous improvement through the Plan–Do–Check–Act (PDCA) cycle.

Scientific publications also underline the importance of energy audits, performance indicators, and employee involvement in the successful implementation of ISO 50001. The analysis of available literature confirms that the standard is widely recognized as an effective approach for improving energy performance and achieving long-term sustainability goals.

## Conclusion

In conclusion, the ISO 50001 energy management standard provides a comprehensive and systematic framework for improving energy performance in organizations. Its implementation enables enterprises to efficiently monitor, control, and optimize energy consumption, leading to significant cost savings and enhanced operational efficiency. The standard not only supports the reduction of environmental impacts through decreased greenhouse gas emissions but also strengthens organizational competitiveness in the global market. The study confirms that successful implementation of ISO 50001 depends on strong leadership commitment, active employee involvement, and continuous monitoring and improvement processes. By applying the Plan–Do–Check–Act (PDCA) cycle, organizations can achieve sustainable energy management and long-term efficiency improvements. Therefore, ISO 50001 serves as a valuable tool for organizations striving toward energy sustainability, economic efficiency, and environmental responsibility.

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## **MANAGING HUMAN RESOURCES IN THE DIGITAL ECONOMY: CHALLENGES, OPPORTUNITIES, AND WORKFORCE ENHANCEMENT STRATEGIES**

**Abstract:** This paper examines how organizations manage human resources under conditions of accelerating digital transformation. Through a case-informed narrative review of 13 peer-reviewed sources, the study maps the principal challenges organizations face, including skill gaps, employee resistance, and wellbeing risks, alongside the opportunities generated by people analytics, digital talent management, and agile HR structures. Practical workforce enhancement strategies are synthesized for HR managers operating in both advanced and emerging digital economies.

**Keywords:** digital economy, human resource management, digital transformation, workforce development, people analytics, organizational challenges, HR strategy

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## **RAQAMLI IQTISODIYOTDA INSON RESURLARINI BOSHQARISH: XODIMLAR SAMARADORLIGINI OSHIRISH CHORALARI, IMKONIYATLARI VA STRATEGIYALARI**

**Annotatsiya:** Ushbu maqolada tashkilotlarning tezlashib borayotgan raqamli transformatsiya sharoitida inson resurslarini boshqarish yondashuvlari o'rganilgan. Tadqiqotda narrativ tahlil qilish asosida asosiy muammolar — ko'nikmalar taqchilligi, raqamli iste'dod boshqaruvi va moslashuvchan HR



*tuzilmalari tomonidan yaratilayotgan imkoniyatlar o'rganilgan. Rivojlangan va shakllanayotgan raqamli iqtisodiyotlarda faoliyat yurituvchi HR-menejerlar uchun ish kuchini rivojlantirishning amaliy strategiyalari tahlil qilingan.*

**Kalit so'zlar:** *raqamli iqtisodiyot, inson resurslarini boshqarish, raqamli transformatsiya, ish kuchini rivojlantirish, HR tahlil, tashkiliy muammolar, strategiya*

## Introduction

The digital economy is distinct from the manufacturing economy in which we traditionally lived. Digital transformation is the process by which new technologies transform the ways business is done, reverberating through competitive ability and whole industries. Digital transformation is no longer an optional strategy for businesses, it is a process industries need to embrace if they are to continue to exist [1]. Manufacturers are deploying robots in their factories, firms in service industries are substituting artificial intelligence for traditional approaches, and even age-old industries that have long managed to avoid technology, such as healthcare and education, are changing their organizations to accommodate the emergence of new digital technologies and data systems.

Human Resource Management is central to enabling successful transformation towards the digital economy. Very often organizations fail to adopt and roll out technology because those organizations are unable to build the required capacity and competency on part of their human resources in order for those technologies to succeed, because they are unready for the cultural and behavioral shifts that must occur in the adoption and rollout of those technologies, and because they are unable to keep their workforces adequately engaged during times of disruption in transition [2]. However, most organizations tend to assess HR in the Digital Economy with HR frameworks suited to very different environments characterized by hierarchical structures, elongated cycles of planning, competency profiles organized around specific functions or groups of jobs, and training around skill sets which have a life measured in decades. Such models are not appropriate for environments characterized by rapid technological advances, constant shifts in what the timelines for developing technologies ought to be, and constant redefinition of competencies required for getting the work done.

Although the importance of HRM in successfully embedding technology into organizations has been discussed broadly in the literature, the literature is a bit fragmented in that research on challenges and opportunities in HR in the Digital Economy typically does not connect to the evidence on what is actually working in practice. This study aims to address the fragmentation, in part via case study approach informed “narrative literature review”, explicitly addressing the challenges and opportunities of digital HRM, drawing on some cases that include human resources (however abstracted and removed) in the discussion of HR managerial needs that these cases reflect: cases that are grounded in the lived practice of embedding information technology into organizations rather than reflecting prescriptive postulates.

## Literature Review.

The literature provides a clear definition of the term “digital economy.” It refers to the use of digital technologies (such as AI, cloud computing, the Internet of Things, big data analytics, and automation) to transform the processes of production, distribution, and consumption of goods [14].

We can identify three main stages of transformation: digitization, digitalization, and digital transformation [1]. Most organizations in developed countries have already completed stage 1 and are now undergoing stages 2 and 3. Countries with developing economies face the challenge of shortening the timeline for this transformation due to institutional and infrastructure constraints.

The digital revolution differs from previous technological transitions in terms of its scale and speed. While previous industrial revolutions affected a single industry or production process over the course of decades, the current digital revolution is simultaneously impacting numerous sectors, such as sales, manufacturing, and so on [1]. Studies have shown that there is a significant gap between the pace of technological progress and the pace at which people develop the skills to use new technologies. This presents organizations with a significant challenge in the area of human resource management in the digital economy [2].

The digital skills gap is generally identified as the major obstacle facing organizations today. The gap occurs when there is a difference between the skills/competencies that an organization requires and the skills and/or competencies currently possessed by its employees. However, the gap does not refer solely to the lack of IT skills in workers; studies show that there is a systematic divergence in how managers and employees perceive their organization’s capability, regardless of level of individual capability and identified barriers to innovation [3].

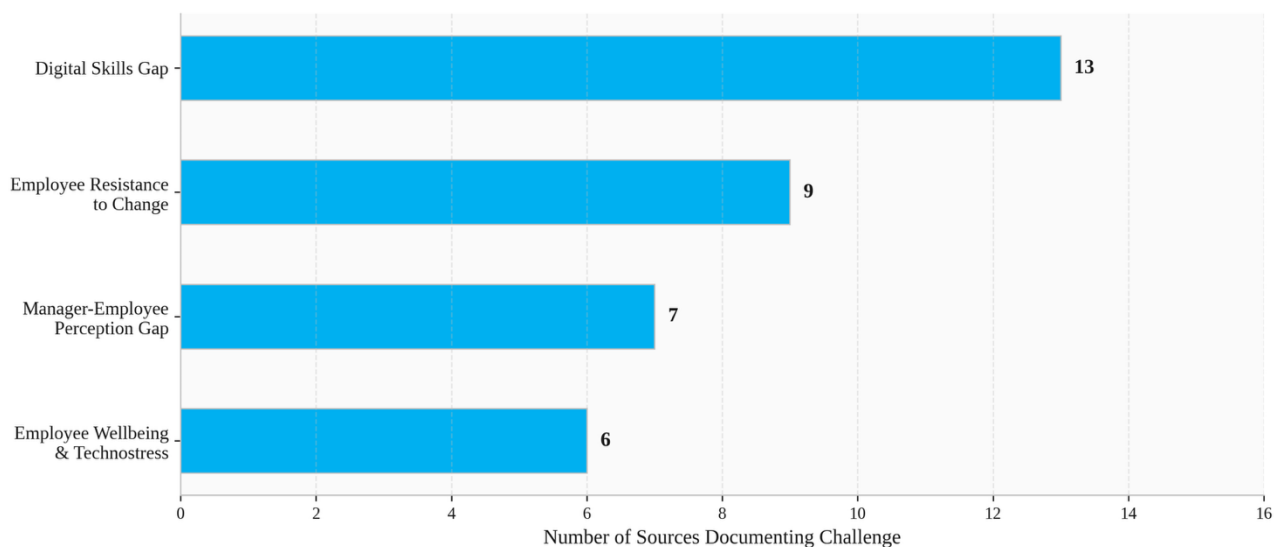
Literature indicates that resistance to technology by employees is often misdiagnosed. In a case study on small and medium-sized enterprises, it was found that employee resistance to digitisation occurs largely as a result of structural factors rather than employee attitudes. Employees will resist digitisation due to the perceived threat to their job security, if they do not have the structural capacity to develop the new capabilities required for digitisation, and if their conversational norms do not provide them with psychological safety to experiment as part of the transition to digitisation as a result of using digital technology [4].

A further consideration regarding the effect of digitalization on employee wellbeing is the effect of digitalization on employee wellbeing. A recent review of the literature examining the effect of artificial intelligence on employee skill and wellbeing found that reskilling employees on a continual basis due to rapid advancements in technology has created a significant increase in stress for employees; in fact, employees have expressed a high level of anxiety concerning their ability to retain their current skill set, their loss of autonomy, and uncertainty regarding the longevity of their job [5].

An analysis of recent trends in employment indicates that digitalization has resulted in a decline of soft skills in the workforce (e.g., critical thinking, adaptability, interpersonal coordination), which negatively impacts the ability of

employees to manage the psychological demands placed upon them in rapidly changing work environments [6]. Therefore, any digital transformation strategy that fails to consider employee wellbeing is at risk of creating employee disengagement and turnover that will undermine the investment required to improve employee performance.

*Figure 1. Frequency of HR Challenges Documented Across 13 Reviewed Sources.*

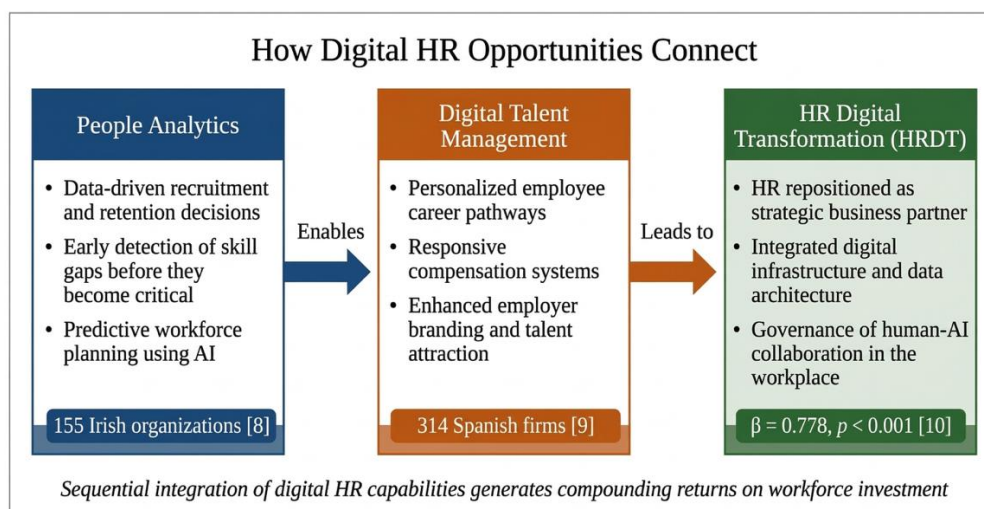


*Source: compiled by the authors.*

Besides current HR management concerns involving respective technology forces that have led to the above, particularity of the new abilities that organizations can gain within the same technology forces are significant. One of the relevant examples will be demonstrated by the development of People Analytics, using data analytics and artificial intelligence when making HR decisions. The Big Data Analytics Doctrine demonstrates how this platform provides the HR with a chance to manage the workforce in a strategic, rather than reactive, manner founded on experience, as well as finding out high potential employees before their exit, forecasting where skills gaps are likely to arise, and creating measurable interventions to serve the intended purpose of closing the skills gaps [7]. This statement will be supported by referring to the structural equation modeling in 155 Irish Organizations that provide empirical evidence to prove that the availability of technology by HR has facilitated people analytics, thus enhancing decision making by HR in comparison to evidence-based management, and positively affecting the organizational performance [8].

So-called digital talent management platforms can also offer organizations additional opportunities. They enable organizations to develop their ability to attract and retain talented employees. A study involving 314 Spanish companies undergoing digital transformation revealed a strong positive correlation between a company's level of digital maturity and its ability to attract and retain talented employees by strengthening its employer brand, creating flexible compensation systems, and developing more personalized career paths [9].

Figure 2. How Digital HR Opportunities Connect: From Analytics to Strategic Transformation.



Source: compiled by the authors.

The digital transformation of human resource management (HRM) provides organizations with enhanced data about the value employees place on their jobs, which makes them easier to respond to the needs of individual employees faster than traditional HR systems allow; HR systems that are digitally transformed have the added benefit of reducing friction costs associated with employee movement and development within an organization. Structural equation modeling has demonstrated that digital HR transformation has a direct positive impact ( $\beta = 0.778$ ,  $p < 0.001$ ) upon organizational effectiveness as evidenced through the experiences of 284 HR professionals, with talent acquisition and training/development being the most significant aspects [10].

Accordingly, the extent to which HRM has itself morphed into a digitally enabled strategic function as a result of its digital transformation – referred to as human resource digital transformation (HRDT) – represents a very significant long-term value creation opportunity [11]. Organizations that successfully build out an HRDT initiative by integrating digital infrastructure, data architecture and development of individual capabilities such that there is a cohesive HRDT capability will enable HRM to function as a true strategic partner to the business and not just as an administrative support function. This strategic shift for HR professionals will require a fundamental change in skillsets from those traditionally required in process management and compliance to new skills necessary for effective data literacy, strategic foresight and governance of human-AI collaboration in the workplace.

While there is no shortage of literature related to the challenges and opportunities of digital HR management, two primary gaps exist. First, the majority of published research addresses only the challenge or opportunity components of the digital HR management equation as opposed to researching how organizations address these two dimensions concurrently. In reality, the challenges and

opportunities associated with implementing digital HR systems are not sequential but instead are concurrent endeavors that have to be managed. For example, as organizations strive to close skill gaps they are also developing analytic capabilities; while managing resistance to the new digital tools they are moving to implement; and while improving employee well-being they are also accelerating the timelines associated with HR transformation. Organizations need a framework that encompasses a complete picture. Second, there is very limited empirical evidence relative to HR challenges and opportunities in emerging and transition economies where there is weak institutional support, under-developed digital infrastructure, and often much stronger competitive pressure to digitalize than in advanced western economies [12].

### **Methodology.**

Our study employs a narrative review methodology based on specific examples. We analyzed peer-reviewed literature published between 2020 and 2025 using the Scopus search platform and three targeted search terms: “digital economy, human resources management, challenges, skills shortage, resistance to change, employee well-being,” “HR analytics, automation, flexible approach to HR management, opportunities of digital transformation,” and “digital transformation of HR, case studies, manufacturing and service companies, HR management strategy.” The search was limited to Q1 and Q2 journals. Sources were selected based on their direct relevance to the challenges or opportunities of digital HR management, resulting in a final corpus of 13 peer-reviewed articles.

The examples examined cover various sectors: organizations in the banking sector [3], manufacturing companies [12], Italian industrial enterprises [13], and small and medium-sized enterprises [4]. The analytical procedure consisted of three stages. First, we classified the problems and opportunities by topic. Second, we identified patterns common to all examples by examining which problems and opportunities consistently arose in different organizations. Third, we developed a model by mapping the relationships between specific problems and organizational responses—strategic, structural, or technological—which, based on the available data, are the most effective for addressing them.

### **Results.**

The synthesis of the reviewed literature produces an integrated framework of five principal challenges and five corresponding opportunities in digital HR management (Table 1). The framework shows the relationship between the challenge and opportunity dimensions that most existing literature treats separately. Each challenge identified in the literature has a corresponding organizational capability or strategic response.



*Table 1. Integrated Framework of Digital HR Management Challenges and Opportunities.*

| Challenges                                                         | Opportunities                                                     |
|--------------------------------------------------------------------|-------------------------------------------------------------------|
| Digital skills gap among existing workforce                        | People analytics for evidence-based HR decisions                  |
| Employee resistance to technological change                        | Automation of administrative HR processes                         |
| Perception gap between managers and employees on digital readiness | Digital talent management and retention systems                   |
| Employee wellbeing and technostress under rapid digitalization     | Agile HR structures enabling continuous organizational adaptation |
| Ethical and privacy risks from data-driven HR systems              | Virtual HRD platforms for scalable workforce development          |

*Source: compiled by the authors based on reviewed literature.*

The explicit finding that is present across the body of literature examined is that organisations that are approaching their digital HR challenges in isolation (e.g. using analytics but not developing the skills required to analyse the data or building talent platforms but not addressing resistance received) consistently underperform compared to organisations that address the challenge and opportunity dimensions of the digital HR space as an integrated system. This finding was documented in the analysis of 26 major manufacturing companies. These companies exhibited a pattern of only focusing on operational efficiencies gained by implementing digital technologies while not developing the capability to innovate with digital tools had achieved operational improvements as a result of the digitalisation but had not achieved the growth and competitive repositioning that a more holistic digital approach would have produced [12]. Consistently, the ability to manage the human element of digital transformation, as opposed to the technology itself, has been shown to be the constraining factor affecting the performance of organisations in their digital performance.

### **Discussion.**

In this review, we have attempted to present a comprehensive framework that highlights dynamics that are not mentioned in the existing literature. It is important to note that the challenges and opportunities of digital human resources management are structurally interconnected. For example, the lack of digital skills is a significant issue, as organizations are unable to fully implement their data-driven HR solutions due to employees' lack of sufficient digital literacy skills [7]. In addition, employee resistance to technological change serves as both a challenge and a diagnostic signal that the organization has failed to create the necessary psychological safety, developmental support, and role clarity for the transition to digital technologies [4].

The relationship between these two dynamic streams affects HR strategy. Organizations that build their digital HR strategy sequentially will not be able to keep up with technological advancements compared to those organizations that adopt a comprehensive, parallel strategy for developing new capabilities while simultaneously implementing the necessary cultural and structural changes [2]. A



sequential approach, where each dynamic component is considered in isolation from the others, leads to organizations continuing to address the challenges associated with previous dynamic components in the future.

Special attention should be given to the aspect of employee well-being, as it is one of the least developed in practice. Research clearly shows that the constant need for re-skilling in the digital economy leads to high levels of stress, and that unmanaged "tech stress" directly undermines organizations' ability to achieve the increased productivity and reduced turnover that they rely on as part of their digital HR strategy investments [5]. Organizations that allocate significant resources to developing and supporting digital tools and analytics systems, but create an environment of constant change and stress for their employees, face a paradox: the opportunities they gain from their technology investments are diminished by the lack of engagement and turnover caused by chronic stress.

The importance of HRM in AI-based transformation strengthens the argument for an integrated digital HR strategy. As organizations become increasingly reliant on AI to facilitate work processes and HR faces the dual challenge of appropriately governing these systems while developing the competencies necessary for employees to successfully leverage the systems [2].

### **Conclusion.**

This article presents three main conclusions regarding human resources management in the modern digital economy.:

**First**, digital HR challenges and opportunities are structurally interconnected and must be addressed simultaneously rather than sequentially. **Second**, the human factor drives the digital performance of an organization (e.g., leadership commitment, HR strategic positioning and capability development in the workforce) and that the technology itself is not the limiting term in an organization's digital performance.

**Third**, employee wellbeing is not a secondary concern but a prerequisite for transformation success. For HR practitioners, five priorities emerge from the evidence: build diagnostic capability before investing in solutions; address resistance structurally rather than through communication campaigns; treat people analytics as a precondition for evidence-based decisions; integrate wellbeing management from the outset of any transformation initiative; and position HR as a governance function for human-AI collaboration as AI embeds into organizational decision-making. Organizations should develop their people analytics infrastructure as a requisite condition for making evidence-based development decisions; this is not merely a destination of effort.

There are a number of limitations present within this study. The narrative review methodology used within this study was appropriate for the purpose of consolidating heterogeneous evidence; however, the results do not provide the same level of statistical precision that would be available through the meta-analytic methodology of analysis. Furthermore, the case examples are derived from the literature that was reviewed and not independently collected field research, which limits the contextual support available for organizations within this study. Future

studies may need to explore longitudinal designs for evaluating the success of digital HR transformation, conducting comparative studies of the various institutional contexts where this research has been limited, particularly in the developing and transitional countries, as well as conducting experimental studies on specific HR interventions developed to address the challenges and opportunities that were described within this framework.

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## **QISHLOQ XO'JALAGI ZARARKUNANDALARI BILAN BOG'LIQ FAVQULODDA VAZIYATLARNING OLDINI OLISHDA UCHUVCHISIZ UCHAR APPARATLARNING O'RNI**

**Annotatsiya:** *Ma'lumki, bugungi kunda qishloq xo'jaligi ekinlari zararkunandalari bilan bog'liq favqulodda vaziyatlarning oldini olish va ularning oqibatlarini bartaraf etish masalasi dolzarb muammolardan biri bshlib turibdi. Maqolada ushbu muammoning yechimi sifatida qishloq xo'jalagida keng qo'llanilayotgan, zararkunandalarga qarshi kurashda foydalanib kelinayotgan, an'anaviy texnik vositalarga nisbatan iqtisodiy jihatdan samarali bo'lgan uchuvchisiz uchar apparatlardan foydalanish imkoniyatlari va samaradorligi yoritilib, ulardan qishloq xo'jaligi ekinlari zararkunandalari bilan bog'liq favqulodda vaziyatlarning oldini olish va oqibatlarini barataraf etishda foydalanish masalalari yoritilgan.*

**Kalit so'zlar:** *zararkunanda, chigirtka, favqulodda vaziyat, uchuvchisiz uchar apparat, qishloq xo'jaligi.*

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## **THE ROLE OF UNMANNED AERIAL VEHICLES IN PREVENTING EMERGENCY SITUATIONS RELATED TO AGRICULTURAL PESTS**

**Abstract:** *The prevention and mitigation of emergencies caused by agricultural pests remains a highly relevant issue today. This paper explores the application of unmanned aerial vehicles (UAVs) in agriculture for the prevention and management of such emergencies. UAVs demonstrate greater economic efficiency compared to conventional technical methods used to combat agricultural pests.*

**Keywords:** *pest, locust, emergency, unmanned aerial vehicle.*

Dunyo miqyosida olganda zararkunandalar soni shunchalik ko'p va ular keltiradigan zarar shunchalik katta miqdordaki, ko'p hollarda ularning ko'payishi favqulodda vaziyat deb baholanadi. Bundan tashqari zararkunandalarning iqtisodiy zarar miqdor-mezoni va ularga qarshi kurash chora-tadbirlari yetarlicha

o'rganilmagan. Bunday vaziyat zararkunandalardan himoyalanişning samarali, iqtisodiy tejamkor va xavfsiz tizimini ishlab chiqishni talab qiladi [9].

Mutaxassislarning fikricha hozirgi paytda o'simlik zararkunandalari tufayli butun dunyoda qishloq xo'jaligi mahsulotlarining 40 % yaqini nobud bo'lmoqda [3]. Respublikamizda keng tarqalgan zararkunandalardan biri chigirtka bo'lib, u barcha qishloq xo'jalik o'simliklarini zararlaydi: arpa, bug'doy, oq jo'xori, tariq, makkajo'xori, tamaki, beda, g'o'za va poliz ekinlariga ayniqsa katta zarar yetkazadi. Yoppasiga ko'paygan yillarda tok va mevali daraxtlarning barglari bilan ham oziqlanadi. Ushbu zararli hasharotlar O'zbekiston hududida qadim zamonlardan buyon mavjud. Tarixiy ma'lumotlarga ko'ra, o'tgan asrning birinchi yarmida ko'plab ocharchiliklarga sabab bo'lgan. Respublikamizda 150 dan ortiq chigirtka turi tarqalgan bo'lib, shulardan 10 turi qishloq xo'jalik ekinlari, yaylovlar va boshqa o'simliklarga katta zarar yetkazishi mumkin. Chigirtkalarining yashash tarziga qarab 2 guruhga ajratiladi. Bular to'da hosil qilib yashovchi marokash, osiyo va voxa chigirtkalari hamda to'da hosil qilmaydigan (mahalliy) chigirtkalardir.

Chigirtkalar barcha qishloq xo'jalik o'simliklarini zararlaydi: arpa, bug'doy, oq jo'xori, tariq, makkajo'xori, tamaki, beda, g'o'za va poliz ekinlariga ayniqsa katta zarar yetkazadi. Yoppasiga ko'paygan yillarda tok va mevali daraxtlarning barglari bilan ham oziqlanadi [10].

Har yili respublikamizda 600 000ga yaqin maydonda zararli chigirtkalar tarqaladi va tegishli chora-tadbirlar ishlab chiqilib, bu joylarda kimyoviy ishlov ishlari olib boriladi.

Kimyoviy ishlov tadbirlari uchun kamida 152 ta traktor va OVX purkagichlari, 301 ta motorli qo'l purkagichlari, 35 ta avtomashinaga o'rnatilgan UMO purkagichlari, 7 ta motodeltaplan, 1 ta gaz-66-01 o'rnatilgan FM-40 purkagichi, 2 ta tritsiklga o'rnatilgan shlangli purkagich, 55 ta suv tashish mashinasi jalb etiladi. Bu ishlarni amalga oshirish uchun 700 ga yaqin ishchi jalb etiladi [7].

Oxirgi vaqtlarda iqlim keskin o'zgarib bormoqda. Joriy yildagi issiq va quruq iqlim chigirtkalarining urug' ochishi, palak otishi imkonini kuchaytirib yubordi. Chigirtkalar har doimgidan ertaroq tuxum ochdi. Ularning keskin ko'payishi bilan bog'liq favqulodda vaziyatlarning oldini olish maqsadida ko'plab hududlarda kuzatuv ishlari olib borildi. Xususan, birgina Samarqand viloyatida 71 ming 760 gektar maydonda kuzatuvlar tashkil etilib, mavsum davomida 66 000 gektar maydonga kimyoviy ishlov berish taxmin qilindi [8].

Bunday sharoitda qishloq xo'jaligi ekinlarini zararkunandalardan muhofazada zamonaviy texnologiyalardan, shu jumladan, uchuvchisiz uchar apparatlardan foydalanish katta ahamiyatga ega [2,4,6].

So'nggi yillarda qishloq xo'jaligi ekinlariga dori sepish, o'g'itlash ishlarida uchuvchisiz uchar apparatlardan keng foydalanilmoqda. Bu borada olib borilgan tadqiqot natijalari quyidagicha bo'lgan [1]:

### Monitoring sohasida

| An'anaviy usul                                                                                                                                                                   | Uchuvchisiz uchar apparatlardan foydalanish                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Yer usti razvedkasini olib borish (piyoda yurib tekshirish)                                                                                                                      | Aerofototasvir va maydonning sifatli tasviri                                               |
| O'simliklarni ko'zdan kechirish                                                                                                                                                  | Katta maydonlar holati haqida tezda ma'lumot to'plash                                      |
| Tahlillar uchun qo'l bilan boshqariladigan vositalardan foydalanish                                                                                                              | Kengspektrli, infraqizil kameralar yordamida o'simliklarning holatini o'rganish imkoniyati |
| Uchuvchisiz uchuvchi vositalarning afzalligi: kerakli ma'lumotga tez ega bo'lish, yetib borish qiyin bo'lgan joylar haqida ma'lumotlarga ega bo'lish. Qo'l mehnatining kamayishi |                                                                                            |

### Tuproq tahlili sohasida

|                                                                                                                                                                                         |                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Qo'l mehnati yordamida tuproqdan olingan namunalarni laboratoriya tahlilidan o'tkazish<br>Tahlillar o'tkaziladigan nuqtalarning cheklanishi va natijada xaritada ularning aks etmasligi | Sensorlar va kameralar yordamida tuproq holatini o'rganish<br><br>Hududlar bo'yicha ozuqa moddalar va namlikning tarqalish xaritasini yaratish |
| Uchuvchisiz uchuvchi vositalarning afzalligi: vaziyatning keng va chuqur qamrab olinishi, o'zgarishlarga tez munosabat bildirish imkoniyati                                             |                                                                                                                                                |

### O'g'itlar va pestitsidlar bilan boyitish sohasida

|                                                                                                                                         |                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Tuproqqa o'g'it va pestitsidlarni qo'l yordamida kiritish<br>Katta maydonlarga ishlov berishda vaqt va resurslarning ko'p sarf bo'lishi | O'g'it va kimyoviy moddalarni havodang sepil imkoniyatining mavjudligi |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|

Qishloq xo'jaligida uchuvchisiz uchar apparatlarni qo'llash samaradorlikni oshirish uchun almashtirib bo'lmaydigan vosita bo'lib qoldi. Qishloq xo'jaligi mahsulotlarini yetishtirishning turli bosqichlarida uchuvchisiz apparatlardan foydalanish mablag' va vaqtni tejashga xizmat qilmoqda. Natijada qishloq xo'jaligida zamonaviy texnologiyalarni qo'llash rivojlanib bormoqda. Qishloq xo'jaligida uchuvchisiz uchar apparatlari ko'pchilik vazifalarni avtomatlashtirishga katta yordam berdi.

Qishloq xo'jaligida qo'llanilayotgan uchuvchisiz uchar apparatlari bajaradigan vazifasiga qarab xilma-xil bo'lib, qo'yiladigan barcha talablarga javob bera oladi. Ular yuqorifunksionalligi, ishonchliligi va qo'llashda qulayligi bilan ajralib turadi [10].

Chigirtkalar tarqalishining oldini olish uchun olib boriladigan chora-tadbirlarga birlashtirilgan odamlarga to'lanayotgan mablag'larni, ajratilayotgan texnik vositalar, ularga xizmat ko'rsatadigan odamlarga to'lanadigan mablag'larni umumlashtirgan holda, ushbu sarflangan mablag'larni uchuvchisiz uchar apparatlardan foydalanishga sarflanadigan mablag'lar bilan solishtirilsa ancha katta farq kelib chiqadi. Zarakunandalarga qarshi kurashda uchuvchisiz apparatlardan foydalanish iqtisodiy jihatdan ancha samarali hisoblanadi [5].

Shundan kelib chiqib, qishloq xo'jaligi ekinlari zarakunandalariga qarshi kurash uchun ishlab chiqiladigan uchuvchisiz uchar apparatlari ishlab chiqish tizimini yaratish lozim bo'ladi.



Agar qishloq xo‘jaligi ekinlari zararkunandalariga qarshi kurash barcha davlatlarda olib borilishini hisobga oladigan bo‘lsak, ishlab chiqarilgan mahsulotni eksport qilish yo‘li bilan ham ancha mablag‘ ishlab topish mumkin bo‘ladi.

Zararkunandalar bilan bog‘liq favqulodda vaziyatlarning oldini olish va oqibatlarini bartaraf etish maqsadida qo‘llaniladigan uchuvchisiz uchar apparatlar quyidagi talablarga javob berishi zarur [3]:

- uchuvchisiz uchar apparat bir ucharda yetarlicha uzoq muddat davomida havoda qolishi;

- zarur miqdordagi yukni ko‘tara olishi;

- monitoring olib borish uchun aniq tasvirni ta‘minlaydigan yuqori sifatli kameraga ega bo‘lishi;

- kameraning o‘simliklar, tuproq va zararkunandalar haqidagi ma‘lumotlarni to‘play olishi

- uchuvchisiz uchar apparatining harakat radiusi imkon darajasida keng bo‘lishi;

- turli xil ob havo sharoitida ishlash imkonini beruvchi mustahkam va ishonchli konstruksiyaga ega bo‘lishi;

- avtouchar va yo‘nalishlarni avtonom rejalashtira olishi;

- ishga tushirish tizimi va qo‘nishning qulay bo‘lishi;

Xulosa qilib shuni aytish mumkinki, ko‘payayotgan zararkunandalarni aniqlash yoki ularga qarshi maxsus dori vositalarini qo‘llashda qishloq xo‘jaligida ishlatiladigan uchuvchisiz uchar apparatlardan foydalanish mumkin. Buning uchun uchuvchisiz uchar apparatlarni takomillashtirish, geolokatsion (georadar) vositalar bilan jihozlagan holda zararkunandalarning ko‘payishini oldindan aniqlash, shu yo‘l bilan sodir bo‘lishi mumkin bo‘lgan favqulodda vaziyatlarning oldini olish mumkin.

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## **QISHLOQ XO'JALIGIDA KOLLEKTOR-ZOVUR SUVLARIDAN FOYDALANISHNING DOLZARB MASALALARI**

**Annotatsiya:** Hozirgi kunda suv resurslarining taqchilligi kundan-kunga ortib bormoqda. Bu xolat arid hududlarda sug'oriladigan yerlarda suv balansining muammolarini, kollektor-zovur suvlaridan qayta foydalanish va takomillashtirish, ulardan samarali tejamkorlik bilan foydalanishga qaratilgan tadqiqotlarni olib borish masalalari muhim hisoblanadi. Respublikada qolaversa Buxoro viloyatida ham suvga bo'lgan talab kundan-kunga oshib bormoqda. Natijada, kollektor-zovur suvlaridan qishloq xo'jalik ekinlarini sug'orish va ulardan samarali foydalanish bo'yicha fikr mulohazalar yuritilgan.

**Kalit so'zlar:** Suv resurslari, sug'oriladigan maydonlar, suv taqchilligi, suv balansi, qayta foydalanish, kollektor-zovurlar, xo'jalik ekinlari, sho'rlanish va botqoqlanish.

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## **CURRENT ISSUES OF THE USE OF COLLECTOR-DRAINAGE WATER IN AGRICULTURE**

**Abstract:** Water resource shortages are currently increasing daily. This situation necessitates research into water balance issues in irrigated areas of arid regions, the reuse and improvement of watersheds and drainage systems, and their efficient and economical use. Water demand is also growing daily in the Bukhara region. As a result, issues related to the efficient use of watersheds and drainage systems for crop irrigation were examined.

**Key words:** water resources, irrigated areas, water scarcity, water balance, reuse, water catchments, agricultural crops, salinization and waterlogging.

Hozirgi kunda suv resurslarini taqchilligi sababli va sug'oriladigan maydonlarning kengayishi ta'sirida suvga bo'lgan talab yildan-yilga keskinlashib

global muammolardan biriga aylanib bormoqda. Bu xolat arid hududlarda sug'oriladigan yerlarda suv balansining muammolarini, kollektor- zovur suvlaridan qayta foydalanish va takomillashtirish, ulardan samarali tejamkorlik bilan foydalanishga qaratilgan tadqiqotlarni olib borish masalalari muhim hisoblanadi.

Sho'rlangan sizot suvlar yetarli darajada oqib keta olmaydigan yerlarda dalani tekislash bilan birga zovur suvlari bilan qishloq xo'jalik yerlarni sho'rini yuvish, muhim tadbirlardan biri hisoblanadi.

Sug'oriladigan yerlarning zovur tarmoqlari yaxshi ishlaydigan yerlarda suv – xo'jalik va aglomeliorativ tadbirlardan to'g'ri foydalanilganda yangidan o'zlashtirilgan, shuningdek, eskidan sug'orilib kelingan yerlarni yanada xosildor qilish oson bo'ladi. Zovur tarmoqlari yerlarning sho'rlanishi va botqoqlanishiga qarshi kurashdagi aktiv vosita bo'lib, undan chet ellarda (AQSH, Avstraliya, Misr, Hindiston, Jazoir, Italiya va boshqa mamlakatlarda) keng foydalanib kelinmoqda. Drenajsiz qurilgan yangi sug'orish tizimlari Shimoliy Afrika, Markaziy Osiyo, Shimoliy Amerika, Janubiy Yevropa va boshqa joylarda minerallashtirilgan yer osti suvlarining ko'tarilishiga va bug'lanishiga hamda ilgari sho'rlanmagan tuproqlarning sho'rlanib ishdan chiqib qolishiga sabab bo'lganligiga juda ko'plab misol keltirish mumkin. Sho'rlangan sizot suvlar yetarli darajada oqib keta olmaydigan yerlarda dalani tekislash bilan birga zovur ham yerlarning sho'rini yuvish, tuproqni chuqur qatlamlarigacha sho'rsizlantirish, sizot suvini chuqurlashtirishda asosiy hal qiluvchi tadbirlardan hisoblanadi.

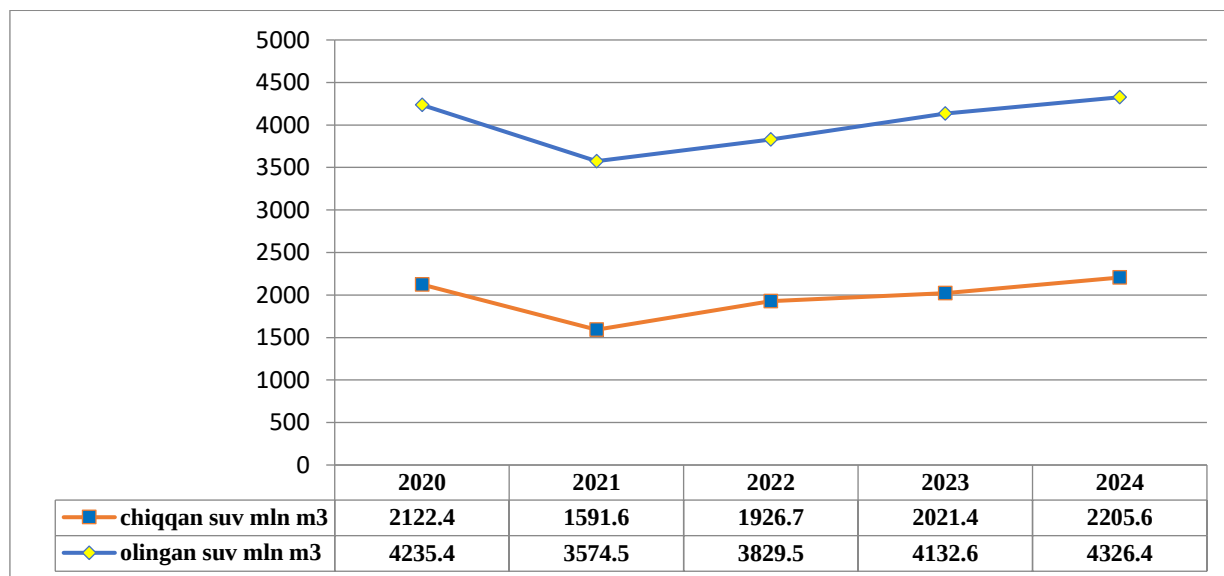
Kollektor- zovur tizimlaridan hozirda Respublikamizda qolaversa Buxoro viloyatida ham keng miqyosida foydalanib kelinmoqda. Tabiiy va sun'iy zovurlar yordamida sizot suvlar qancha chuqurlikga tushurilsa va sizot suvlarning oqimi kuchli bo'lsa, tuproqning sho'ri ham shuncha yaxshiroq samaraliroq bo'ladi.

Ma'lumki, sug'oriladigan yerlarda tuproqning sho'rlanishi ekinlar xosilini keskin kamaytiradi. Masalan, kuchsiz sho'rlangan tuproqlar xosildorlikni 10-20 foiz, kuchli sho'rlangan tuproqlar esa 50 foizgacha pasaytiradi. Hozirgi kunda sug'oriladigan yerlar tuproqlari hozirgi sho'rlanishining asosiy sabablari quyidagilardan iborat;

- dehqonchilikda har bir joyning o'ziga xos tabiiy va tuproq sharoiti xususiyatlarini yetarlicha hisobga olmaslik;

- sug'orish sistemalari qurilishini arzonga tushirishni uyulab drenaj (zovur) inshootlarini o'z vaqtida barpo qilmaslik;

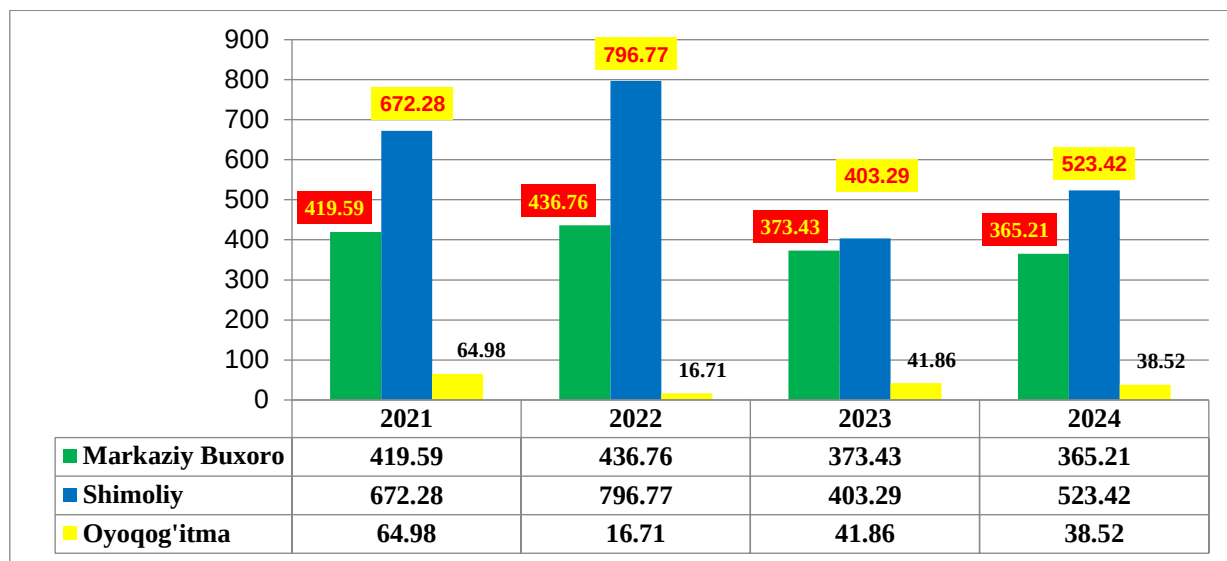
- dalalarda kanallarda va sug'orish sistemalarida sug'orish suvining ko'p sarflanishi, ortiqcha suv sarfi, jumladan, yer osti suvlari sathini ko'taradi. Tabiiy ravishda suv yaxshi oqib ketadigan, ya'ni nishabi yaxshi bo'lgan yerlarda drenajsiz sug'orish mumkin. Tuproq sho'rlanishining oldini olish va sho'r yuvishning eng sinalgan tizimi hozirda keng qo'llanilayotgan chuqur vertikal va gorizontal drenajlar o'tkazishdir. Sho'rlanishni butunlay to'xtatish uchun drenaj tizimi barpo qilishdan tashqari irrigatsiya kanallarini betonlashtirish, sug'orish suvlarini beton ariqlar-lotoklar orqali yuborish, sug'orish me'yoriga qat'iy amal qilish lozim.



#### 2020-2024-yillarda olingan va chiqqan suv miqdori

Grafikdan ma'lumki, 2020–2024-yillar davomida viloyatda chiqqan suv va olingan suv hajmi (mln m<sup>3</sup>) ko'rsatib o'tilgan. Yillar kesimida oladigan bo'lsak, 2020-yilda olingan suv 4235,4 mln m<sup>3</sup>, chiqqan suv esa 2122,4 mln m<sup>3</sup> ni tashkil qilgan. 2021-yilda esa har ikkala ko'rsatkich ham kamayib borgan. Ya'ni, olingan suv 3574,5 mln m<sup>3</sup> ni, chiqqan suv esa 1591,6 mln m<sup>3</sup> ga tushgan. 2022-yildan boshlab suv hajmlarida o'sish suratlari kuzatilgan. Olingan suv 3829,5 mln m<sup>3</sup> ga, chiqqan suv 1926,7 mln m<sup>3</sup> ga yetgan. 2023–2024-yillarda ham o'sish davom etib, 2024-yilda olingan suv 4326,4 mln m<sup>3</sup>, chiqqan suv esa 2205,6 mln m<sup>3</sup> ni tashkil qilgan. Umuman olganda, 2021-yilda pasayish kuzatilgan bo'lsa-da, keyingi yillarda barqaror o'sish qayd etilgan. Har yili olingan suv miqdori chiqqan suv miqdoridan ancha yuqori bo'lib qolgan.

Sug'oriladigan yerlarda irrigatsiya qurilishlariga saqlanadigan katta xarajatlar g'alla, texnika ekinlaridan olinadigan yuqori xosil bilan tez qoplanadi. Umuman yerlarni sug'orish qishloq xo'jalik ekinlarni hosildorligini keskin oshirishda oziq-ovqat muammosini muvaqqiyatli hal qilishda nihoyatda muhim ahamiyatga ega. Suv tanqis bo'lgan vaqtlarda kollektor-zovur suvlari nasos agregatlari yordamida sug'orish kanallariga kutarilib beriladi. Agar zovur suvlari sug'orishda ishlatish talabiga javob bermasa, ularni sug'orish suvlari bilan aralashtirilib, mineralizatsiyasini kerakli miqdorgacha kamaytirib, sug'oriladigan maydonlarga oqiziladi. Bunda suvdan foydalanish koeffitsiyenti oshadi. Kollektor-zovurlarni qazishda to'g'ri joylashtirishning muhim ahamiyati bor.



### 2021-2024 yillarda Kollektor-zovurlarning suv miqdori

Grafikda 2021–2024-yillar davomida Markaziy Buxoro, Shimoliy va Oyoqog'itma hududlari bo'yicha ko'rsatkichlar taqqoslangan.

2021-yilda eng yuqori ko'rsatkich Shimoliy kollektorda ( $672,28 \text{ m}^3$ ) ko'zatilgan. Markaziy Buxoro kollektori  $419,59 \text{ m}^3$  ni, Oyoqog'itma zovuri esa  $64,98 \text{ m}^3$  ni tashkil etgan.

2022-yilda Shimoliy zovurda suv miqdorida keskin o'sish kuzatilgan bo'lib,  $796,77 \text{ m}^3$  ga yetgan va bu butun davrdagi eng yuqori natija hisoblanadi. Markaziy Buxoro zovurida ham 2022 yilda biroz o'sish ( $436,76 \text{ m}^3$ ) qayd etilgan, Oyoqog'itma kollektor-zovurida esa keskin kamayish ( $16,71 \text{ m}^3$ ) kuzatilgan.

2023-yilda barcha hududlarda pasayish kuzatiladi: Markaziy Buxoro –  $373,43$ , Shimoliy zovurda –  $403,29 \text{ m}^3$ , Oyoqog'itma zovurida –  $41,86 \text{ m}^3$ .

2024-yilda esa Shimoliy zovurida ( $523,42 \text{ m}^3$ ) va Oyoqog'itma zovurida ( $38,52 \text{ m}^3$ ) hududlarida o'sish qayd etilgan, Markaziy Buxoroda esa biroz kamayish ( $365,21 \text{ m}^3$ ) davom etgan.

Umuman olganda, tahlil qilingan yillarda eng yuqori ko'rsatkichlar Shimoliy hududiga to'g'ri keladi. Oyoqog'itma hududida ko'rsatkichlar boshqa hududlarga nisbatan ancha past va o'zgaruvchan bo'lib qolgan.

Zovur chuqurlashtirgan sari sizot suvlar bosimining ta'miri ham zurrayib boradi va zovurda suv oqimining ko'payishiga sharoit yaratadi. Zovur qancha chuqur bo'lsa sizot suvlar sathi ham shunchalik pasayadi va zovurning ta'siri doirasi shuncha uzoq bo'ladi.

Qishloq xo'jaligi va ichimlik suvi yetishmovchiligi yildan-yilga bezovta qilmoqda. Sug'oriladigan yerlarning toboro kengayishi bilan suv taqchilligi kuchli sezilmoqda. Shu boisdan qishloq xo'jaligida mahalliy suv resurslari- kollektor-zovur suvlaridan keng foydalanish suv xo'jaligi va meliorativ nuqtai nazardan katta ahamiyat kasb etadi. Sho'rlangan yerlarda kollektor-zovur suvlari turlicha minerallashtiruvchi asosiy manbalardan biri hisoblanadi.

Kollektor-zovur suvlaridan qishloq xo'jaligida foydalanish quyidagi afzalliklarga ega. Suv zaxiralari ko'payadi, tarkibida oqiziqlar kam va tuzlar ko'p bo'lmaganligidan sug'orish tarmoqlarini loyqa va begona o'tlar kam bosadi.

Sug'orishda minerallashtirish darajasi 5-6 g/l gacha bo'lgan kollektor-zovur suvlaridan jahonning ko'plab mamlakatlarida keng foydalanib kelmoqda. O'zbekistonda kollektor-zovur suvlaridan foydalanish miqdori yilning suv bilan ta'minlanganlik darajasiga bevosita bog'liq bo'lib qoldi. Kollektor-zovur suvlari tuproq va o'simlikka zararli ta'sir etishini ko'rsatsa, ayrimlari ijobiy natijalarga erishish mumkinligini ko'rsatdi. Minerallashtirishgan suvlardan foydalanish samarasiga ekinning biologik xususiyati va tuz ta'siriga chidamliligi, tuproqning suv-fizik xossalari va zovurlashganlik darajasi, suvning minerallashtirishganlik va tuz tarkibi kabi omillar kuchli ta'sir etadi. Viloyatda kollektor-zovur suvlaridan qayta foydalanishda tumanlararo, xo'jaliklararo va xo'jalik ichki kollektor-zovur suvlaridan foydalaniladi.

Viloyatimizda yer osti sizot suvlarining suv-tuz muvozanatini normal holatga keltirish uchun ushbu maydonlardagi sho'rlanishni va sizot suvlar sathini kamaytirish maqsadida jami 2024-yilda 8743,04 km kollektor-drenaj tarmoqlari mavjud bo'lgan bo'lsa, 2025-yilda bu ko'rsatkich 8851,60 km uzunlikni tashkil qildi. Jumladan, davlat hisobida xo'jalik ichki ochik kollektorlar 182,04 km, yopiq kollektorlar 17,93 km va tik drenajlar 42,82 km ni suv iste'molchilar uyushmasiga tegishli ochiq kollektorlar 444,14 km, yopiq-yotiq drenajlar 995.03 km ni tashkil qiladi.

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## **LOTIN TILI EVOLYUTSIYASI: ARXAIK DAVRDAN POSTKLASSIK DAVRGACHA BO‘LGAN BOSQICHLAR TAHLILI**

**Annotatsiya:** Ushbu maqolada lotin tilining miloddan avvalgi XII asrdan boshlab Uyg‘onish davrigacha bo‘lgan rivojlanish bosqichlari tahlil qilingan. Tilning arxaik, klassik (oltin), postklassik (kumush) va o‘rta asrlar davridagi fonetik va grammatik o‘zgarishlari, shuningdek, Rim imperiyasining kengayishi natijasida yuzaga kelgan romanizatsiya jarayonlari yoritilgan. Maqolada lotin tilining xalqaro fan va tibbiyot terminologiyasi shakllanishidagi fundamental o‘rni alohida ta’kidlangan.

**Kalit so‘zlar:** Lotin tili, arxaik davr, rotasizm, klassik lotin, romanizatsiya, Vulgata, Uyg‘onish davri tibbiyoti, terminologiya.

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## **EVOLUTION OF THE LATIN LANGUAGE: ANALYSIS OF STAGES FROM THE ARCHAIC TO THE POST-CLASSICAL PERIOD**

**Abstract:** This article analyzes the stages of development of the Latin language from the 12th century BC to the Renaissance. Phonetic and grammatical

*changes in the archaic, classical (golden), post-classical (silver) and medieval periods, as well as the processes of Romanization as a result of the expansion of the Roman Empire, are highlighted. The article emphasizes the fundamental role of Latin in the formation of international scientific and medical terminology.*

**Keywords:** *Latin language, archaic period, rhotacism, classical Latin, Romanization, Vulgate, Renaissance medicine, terminology.*

Lotin tili – antik madaniyat, huquq va zamonaviy tibbiyotning poydevori hisoblanadi. Garchi hozirda u "o'lik til" sifatida tasniflansa-da, uning ilmiy qiymati va mantiqiy tuzilishi bugungi kunda ham jahon ilm-fani, xususan tibbiyot terminologiyasining asosi bo'lib xizmat qilmoqda. Lotin tilining tarixiy evolyutsiyasini o'rganish talabalarga terminlarning etimologiyasini tushunish va fanni chuqurroq o'zlashtirish imkonini beradi.

Lotin tilining shakllanishi va arxaik davr (mil. avv. xii – iii asrlar)

Lotin-falisk tilining umumiy proto-italik tilidan ajralib chiqishi mil. avv. XII asrlarga borib taqaladi. Dastlab Tiber daryosi quyi oqimidagi kichik Latsiy (Latium) mintaqasida shakllangan bu tilda lotin qabilalari so'zlashgan. Arxaik davrdagi eng muhim fonetik jarayon rotasizm (unlilar orasidagi "s"ning "r"ga o'tishi) bo'lib, u tilning morfologik qurilishini o'zgartirdi (masalan: moses > mores, ama-se > amare). Ushbu davrning qadimgi yodgorliklari sifatida "Lapis Niger" (Qora tosh) va "Prenezte fibulasi" kabi osori-atiqalarni ko'rsatish mumkin.

Klassik va postklassik davr: "oltin" va "kumush" lotin tili

Mil. avv. I asrda lotin tili Tsitseron va Sezar (nasrda), Virgiliy va Goratsiy (she'riyatda) ijodi orqali o'zining eng yuksak cho'qqisiga erishdi. Bu davrda til sintaktik uyg'unlik va me'yoriy barqarorlikka ega bo'ldi.

Rim imperiyasining kengayishi natijasida romanizatsiya jarayoni kuchaydi:

German qabilalari lotin tilidan kuchli ta'sirlandi va bu orqali lotincha o'zlashmalar (masalan, vinum, garit) protoslavyan tillariga ham o'tdi.

Postklassik (milodiy I-II asrlar) yoki "Kumush davr"da (Seneka, Tatsit, Apuley) uslubiy bezaklar ko'paysa-da, tilning grammatik asosi klassik me'yorlarda qoldi.

O'rta asrlar va ilm-fan tili sifatida saqlanib qolishi

III-VI asrlarda (Kechki lotin tili) xristian adabiyoti paydo bo'ldi. IV asrda Jerom Stridonskiy tomonidan Bibliyaning lotincha tarjimasi — "Vulgata" yaratilishi lotin tilining muqaddas tillardan biriga aylanishiga sabab bo'ldi.

Uyg'onish davrida (XVI asr) lotin tili tibbiyotning "Oltin davri"ni boshlab berdi. Andreas Vezaliy (Inson tanasining tuzilishi to'g'risida), Gabriel Fallopiy va Bartolomey Evstaxiy kabi buyuk anatomlar o'zlarining fundamental asarlarini lotin tilida yaratdilar. Bu an'ana Nyuton, Spinoza va Lomonosov kabi olimlar tomonidan XVIII asrgacha davom ettirildi.

XULOSA

Lotin tilining arxaik qatlamlaridan boshlab klassik va keyingi davrlargacha bo'lgan rivojlanishi uning nafaqat adabiy, balki qat'iy ilmiy til sifatida shakllanishini ta'minladi. Zamonaviy tibbiyot nomenklaturasi (anatomik, klinik va

farmatsevtik) aynan klassik lotin tilining barqaror grammatik va leksik bazasiga tayanadi. Shunday qilib, lotin tili tibbiyot olamining universal va muloqot tili bo'lib qolmoqda.

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## **CREATING AN INTERNET RESOURCE FOR IMPLEMENTING AND MANAGING E-COMMERCE TRANSACTIONS**

**Abstract.** *The rapid development of information and communication technologies has significantly transformed traditional commercial activities into digital business models. E-commerce has become an essential component of modern economic systems, enabling businesses to conduct transactions, manage product distribution, and interact with customers through online platforms. This article examines the theoretical and practical aspects of creating an internet resource for implementing and managing e-commerce transactions. The study focuses on the architectural design of web-based systems, database integration, transaction security, user interface optimization, and logistics management. The findings emphasize that a well-designed internet resource enhances transaction efficiency, improves customer satisfaction, and ensures secure and scalable business operations.*

**Keywords:** *e-commerce, internet resource, online transactions, web platform, digital commerce, database management, transaction security*

### **Introduction**

In the context of digital transformation, electronic commerce has emerged as one of the most influential sectors of the global economy. The integration of internet technologies into business processes has enabled organizations to expand market reach, reduce operational costs, and improve customer service efficiency.

The creation of an internet resource for e-commerce transactions involves more than simply designing a website. It requires the development of an integrated system capable of product management, customer interaction, secure payment processing, and distribution control. Such resources play a crucial role in facilitating business continuity and competitiveness in the digital marketplace.

The objective of this study is to analyze the scientific and technological foundations of developing an internet resource for implementing and managing e-commerce transactions.

**Materials and Methods.** The present study employed a methodological approach aimed at investigating the principles of designing an internet resource for e-commerce transaction implementation and management. To ensure the scientific validity of the research, several complementary methods were applied.

First, a comparative analysis of existing e-commerce platforms was conducted in order to identify their structural features, functional capabilities, and

technological advantages. This method made it possible to evaluate the best practices currently used in digital commerce systems.

Second, a system design methodology was applied for developing the web architecture of the proposed internet resource. This approach enabled the modeling of the platform as an integrated and scalable system consisting of interconnected functional modules.

Third, database modeling techniques were employed to organize and optimize transaction-related information, including customer data, product information, payment records, and delivery status. Particular attention was paid to data integrity, consistency, and rapid retrieval [2, 11].

In addition, a functional analysis of payment and distribution modules was carried out to determine the operational efficiency of the proposed system and its ability to support secure financial transactions and product logistics.

Based on the conducted analysis, the proposed internet resource was designed using a modular architecture, which includes the following structural layers:

1. **front-end interface layer**
2. **application logic layer**
3. **database management layer**
4. **payment processing module**
5. **distribution and delivery management module**

Such an architecture ensures system flexibility, maintainability, and scalability.

The front-end layer serves as the primary environment for user interaction with the system. It is designed to ensure accessibility, usability, and a positive user experience. The interface includes several essential components, namely: homepage, product catalog, shopping cart, customer registration and login section, payment interface, order history section.

These elements collectively provide users with convenient navigation and seamless transaction processing.

For the development of a responsive and adaptive interface, modern web technologies such as **HTML5, CSS3, JavaScript, and React** were utilized. These technologies significantly enhance interface performance, responsiveness, and compatibility across multiple devices.

The back-end infrastructure represents the core operational layer of the system, responsible for managing business logic and transaction workflows.

This layer performs the following major functions:

- ✓ product data management
- ✓ user authentication and authorization
- ✓ order processing
- ✓ inventory and stock control
- ✓ delivery status updates

The back-end ensures the stability and reliability of the entire e-commerce platform.

Programming environments such as **Python (Django/Flask)**, **PHP (Laravel)**, and **Node.js** are considered highly effective for implementing this infrastructure due to their scalability and robust framework support.

**Conclusion.** In conclusion, the creation of an internet resource for implementing and managing e-commerce transactions represents a significant advancement in digital business infrastructure. The integration of secure payment systems, user-centered interface design, and automated logistics management contributes to the effectiveness and sustainability of online commercial operations.

The study confirms that internet-based transaction platforms are essential tools for modern enterprises seeking to enhance competitiveness in the digital economy.

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## EKSPERIMENTAL GLYUKOKORTIKOSTEROID TA'SIRIDA NAYSIMON SUYAKLAR DIAFIZINING MORFOLOGIK QAYTA TUZILISHI

**Annotatsiya:** Glyukokortikosteroidlar zamonaviy klinik amaliyotda keng qo'llanilishiga qaramay, ularning suyak to'qimasiga uzoq muddatli ta'siri jiddiy morfologik va funksional o'zgarishlarga olib keladi. Mazkur ob'ekt maqolada eksperimental sharoitlarda glyukokortikosteroidlarning naysimon suyaklar diafiziga ta'siri chuqur tahlil qilinadi. Osteoblast va osteoklast faoliyatining disbalansi, suyak mikroarxitekturasining buzilishi hamda mineral almashinuvdagi o'zgarishlar asosiy patogenetik omillar sifatida ko'rib chiqiladi. Tahlil natijalari glyukokortikosteroidlar suyakning strukturaviy mustahkamligini pasaytirishini va osteoporoz rivojlanishiga zamin yaratishini ko'rsatadi.

**Kalit so'zlar:** glyukokortikosteroidlar, suyak diafizi, morfologik qayta tuzilish, osteoporoz, suyak remodelyatsiyasi.

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## MORPHOLOGICAL REMODELING OF THE DIAPHYSIS OF LONG BONES UNDER EXPERIMENTAL GLUCOCORTICOID EXPOSURE

**Abstract .** This review analyzes morphological changes in the diaphysis of long bones under experimental glucocorticoid exposure. Glucocorticoids disrupt the balance between bone formation and resorption, leading to decreased osteoblast activity and increased osteoclast-mediated bone degradation. Structural alterations, including cortical thinning and trabecular disorganization, contribute to reduced bone strength and increased fracture risk.

**Keywords:** glucocorticoids, bone diaphysis, morphology, osteoporosis, bone remodeling.

**Kirish.** So'nggi yillarda glyukokortikosteroid preparatlarining qo'llanilishi kengayib borayotgani bilan birga, ularning uzoq muddatli nojo'ya ta'sirlari ham

dolzarb muammoga aylanmoqda. Ayniqsa, suyak to'qimasi GKS ta'siriga sezgir bo'lib, bu holat nafaqat mineral zichlikning kamayishi, balki murakkab morfologik qayta tuzilishlar bilan kechadi.

Naysimon suyaklarning diafiz qismi organizmning asosiy yuk ko'taruvchi segmentlaridan biri bo'lib, uning strukturaviy yaxlitligi buzilishi klinik jihatdan katta ahamiyatga ega. Shu sababli glyukokortikosteroidlar ta'sirida aynan diafiz darajasida yuz beradigan o'zgarishlarni o'rganish fundamental va amaliy ahamiyatga ega.

**Materiallar va metodlar.** Mazkur maqola tizimli obzor xarakterga ega bo'lib, oxirgi yil davomida chop etilgan eksperimental va klinik tadqiqotlar ta'hlil qilindi. Ilmiy manbalar PubMed, Scopus va boshqa xalqaro bazalardan tanlab olindi. Tanlashda tadqiqotlarning metodologik sifat darajasi, reprezentativligi va klinik ahamiyati inobatga olindi.

**Natijalar va muhokama.** Glyukokortikosteroidlarning suyak remodelyatsiyasiga ta'siri

Suyak to'qimasi doimiy ravishda yangilanib turuvchi tizim bo'lib, unda osteoblastlar va osteoklastlar o'rtasidagi muvozanat muhim rol o'ynaydi. Glyukokortikosteroidlar ushbu muvozanatni buzadi: ular osteoblastlarning proliferatsiyasini susaytiradi, differensiyalanishini cheklaydi va apoptozini tezlashtiradi. Shu bilan birga osteoklastlar faoliyati nisbatan ortadi, bu esa suyak rezorbsiyasining kuchayishiga olib keladi [1,2]. Natijada suyak hosil bo'lish jarayoni keskin sekinlashadi va destruktiv o'zgarishlar ustunlik qiladi.

Diafizda kuzatiladigan morfologik o'zgarishlar. Eksperimental tadqiqotlar shuni ko'rsatadiki, glyukokortikosteroidlar ta'siri ostida diafizning kortikal qatlamida sezilarli strukturaviy o'zgarishlar yuz beradi. Bu o'zgarishlar bir vaqtning o'zida ham makro-, ham mikro darajada namoyon bo'ladi. Avvalo, kortikal plastinkaning yupqalashuvi kuzatiladi, bu esa suyakning mexanik mustahkamligini pasaytiradi. Osteonlarning tartibli tuzilishi buzilib, ularning soni kamayadi, suyak kanallari esa kengayadi. Osteotsitlar sonining kamayishi esa suyak metabolizmining buzilganidan dalolat beradi [3].

Shuningdek, suyakning ichki arxitektonikasi o'zgarib, trabekulyar elementlar siyraklashadi va notekis joylashadi. Bu esa suyakning elastikligi va chidamliligini keskin kamaytiradi.

Mikrotsirkulyatsiya va metabolik omillar, Glyukokortikosteroidlar nafaqat hujayraviy darajada, balki to'qima trofikasiga ham ta'sir ko'rsatadi. Ular qon tomir devoriga salbiy ta'sir qilib, mikrotsirkulyatsiyani susaytiradi. Bu esa suyak ichida gipoksik sharoitning yuzaga kelishiga olib keladi. Bundan tashqari, kalsiy almashinuvi buziladi: ichakdan so'rilish kamayadi, buyrak orqali chiqarilish ortadi. Natijada suyak mineralizatsiyasi pasayadi va suyak zichligi kamayadi [4].

Osteoporoz rivojlanishining patogenetik asoslari. Glyukokortikosteroid-induksiyalangan osteoporoz ko'p omilli jarayon bo'lib, unda quyidagi mexanizmlar asosiy rol o'ynaydi: osteoblast faoliyatining susayishi; osteoklast faolligining ortishi; suyak matriksining degradatsiyasi; gormonal muvozanatning buzilishi;

mikrotsirkulyator yetishmovchilik. Bu omillar birgalikda suyak zichligining pasayishiga va patologik sinishlar xavfining oshishiga olib keladi [5,6].

Klinik va amaliy ahamiyati. Diafiz darajasida yuz beradigan morfologik o'zgarishlar klinik jihatdan juda muhimdir. Ular suyakning yuk ko'tarish qobiliyatini kamaytiradi va hatto kichik travmalarda ham sinishlarga olib kelishi mumkin. Shuningdek, suyakning regeneratsiya qobiliyati pasayadi, bu esa jarrohlik aralashuvlaridan keyingi tiklanish jarayonini sekinlashtiradi. Shu sababli glyukokortikosteroidlar bilan davolanayotgan bemorlarda suyak tizimini himoya qilish muhim hisoblanadi.

Xulosa. Eksperimental sharoitlarda glyukokortikosteroidlar naysimon suyaklar diafizida chuqur morfologik qayta tuzilishlarga olib keladi. Ushbu o'zgarishlar osteoblast va osteoklast faoliyatining buzilishi, mikrotsirkulyatsiya yetishmovchiligi va mineral almashinuvidagi o'zgarishlar bilan bog'liq. Natijada suyakning strukturaviy yaxlitligi buzilib, uning mustahkamligi pasayadi.

Mazkur holat glyukokortikosteroid terapiyasi davomida profilaktik choralarni qo'llash zarurligini asoslaydi.

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## IMPROVING THE TEACHING OF "ECOLOGY AND ENVIRONMENTAL PROTECTION" IN HIGHER EDUCATION

**Abstract.** *This article discusses the teaching of the subject "Ecology and Environmental Protection" in the higher education system, which is currently one of the urgent issues of the education system, since it is important to form an ecological culture in students. It is argued that the teaching of ecology should not be limited to providing only theoretical knowledge, but should also be aimed at instilling practical skills, analytical thinking, and the principles of environmental safety.*

**Keywords.** *Ecology, water, climate, culture, education, globalization, industrialization, urbanization.*

Nowadays, environmental problems on a global scale affect all spheres of human life. Processes such as atmospheric, water and soil pollution, climate change, and biodiversity loss pose a serious threat to sustainable development. Therefore, the formation of an ecological culture, raising environmental awareness, and the development of environmental education are among the urgent issues. Teaching ecology in the higher education system is the most important stage of this process. Nowadays, environmental problems on a global scale affect all spheres of human life. Therefore, the formation of an ecological culture, raising environmental awareness, and the development of environmental education are among the urgent issues. Teaching ecology in the higher education system is the most important stage of this process. One of the most urgent problems facing humanity in the 21st century is the disruption of the ecological balance and environmental pollution. As globalization, industrialization, urbanization, and technological progress expand the scope of human activity, pressure on natural resources is increasing. In this context, the formation of an ecological culture in every citizen, especially in the future generation, and their upbringing in the spirit of ecological responsibility have become an important task at the level of state policy. Teaching ecology in the higher education system is one of the most effective ways to achieve this goal. Because higher education institutions prepare specialists for society not only professionally qualified, but also environmentally conscious and with a culture of nature conservation.

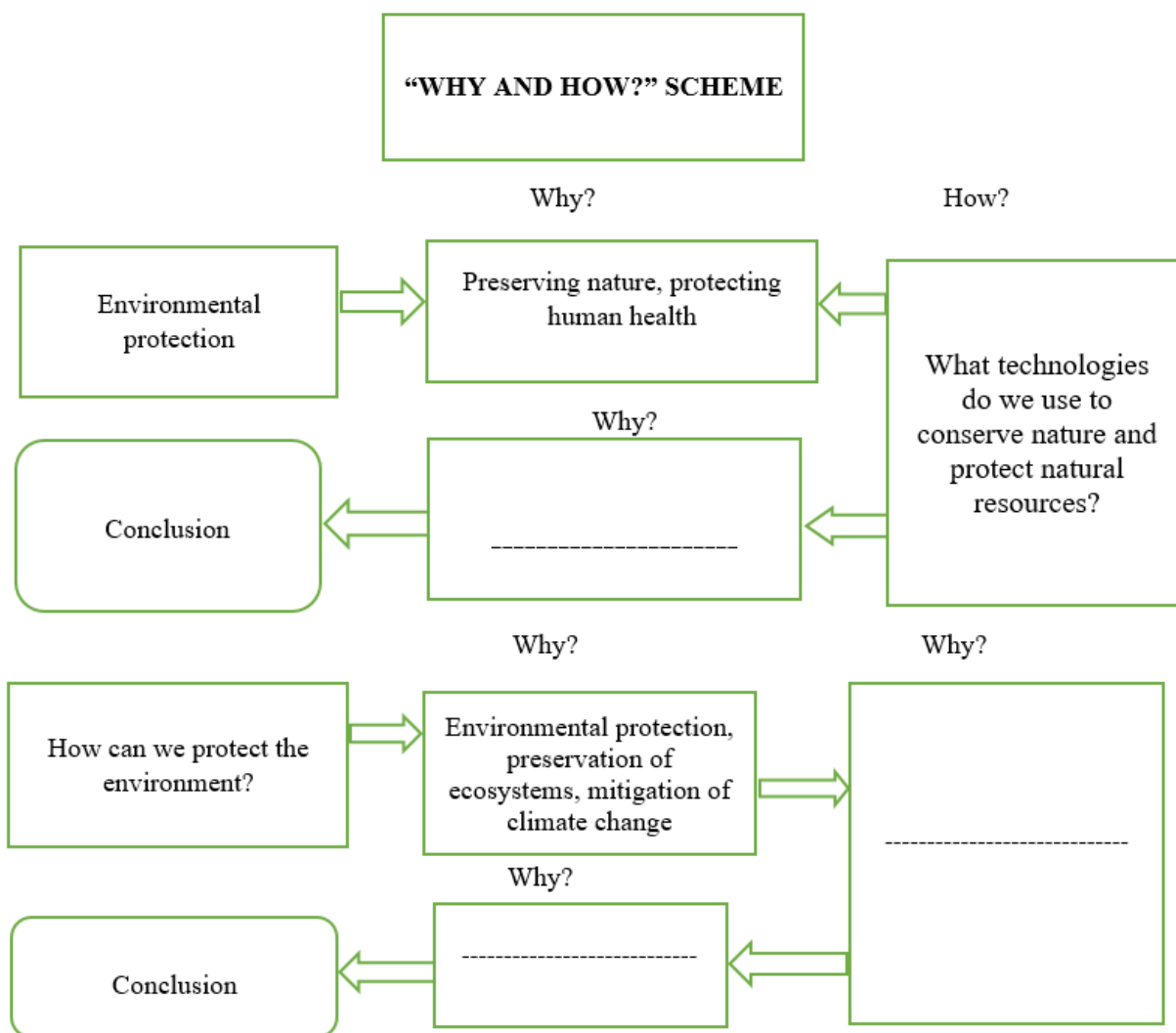


**Figure 1. "Why and how?" scheme**

In the process of globalization today, environmental problems are becoming increasingly acute, and their solution is becoming an urgent task not only for environmental specialists, but also for every citizen. Therefore, it is important to teach ecology in higher education based on modern requirements, to form an ecological culture and responsibility in students. The teaching of ecology should not be limited to providing only theoretical knowledge, but should be aimed at instilling practical skills, analytical thinking, and the principles of environmental safety.

**Table 1**

**Features that develop students' understanding of the subject "Ecology and the Environment"**

| No. | Direction             | Content and Essence                                                               |
|-----|-----------------------|-----------------------------------------------------------------------------------|
| 1   | Spiritual and moral   | A conscious attitude and responsibility towards the environment is formed.        |
| 2   | Theoretical-practical | <b>Possess important and fundamental knowledge of environmental safety.</b>       |
| 3   | Analytical skills     | The ability to identify and analyze existing environmental problems is developed. |

|   |                              |                                                                                  |
|---|------------------------------|----------------------------------------------------------------------------------|
| 4 | <b>Ideological</b>           | The ideas of sustainable development are instilled in the minds of young people. |
| 5 | <b>Professional training</b> | Future professionals learn to apply ecological principles in their field.        |

*Note: The table was developed by the author.*

Ecology today is directly related to almost all areas: economics, industry, agriculture, medicine, architecture, technology, etc. There are some shortcomings in teaching the subject "Ecology and Environmental Protection" in the higher education system, including:

**1. The dominance of traditional teaching methods.** Lectures are often theoretical in nature and do not engage the student in an active learning process.

**2. Lack of modern laboratory equipment.** Practical training may be ineffective.

**3. Limited practice in environmental monitoring.** Insufficient access to real-world experience.

**4. Insufficient digital learning resources.** Virtual labs and simulations are rarely used.

**5. Weak interdisciplinary integration.** Although ecology is a highly interdisciplinary discipline, it is not sufficiently interconnected with other disciplines.

The above problems can be an obstacle to students developing knowledge, skills and competencies within the subject and may prevent the teacher from achieving the goals he or she has set for himself or herself in education. We offer the following recommendations as solutions to the above problems:

**Introduction of innovative pedagogical technologies:** Interactive methods (cluster, debate, case study, project method). Connecting ecology lessons with technology, mathematics and engineering through the STEAM approach. Developing students' analytical thinking by creating problem situations. Using the "Why and How" scheme in teaching the subject "Ecology and Environmental Protection" plays an important role in forming knowledge, skills and competencies in students.

**Use of digital learning platforms:** Organization of practical exercises based on Geographic Information Systems (GIS). Virtual laboratories: modeling of water, air, soil pollution. Implementation of online educational content, video lessons and animations in the teaching process.

**Practice-oriented training:** Expeditions on ecological monitoring. Practical visits to industrial enterprises, treatment plants, reserves and national parks. Involvement of students in ecological projects, startups and volunteer activities.

**Strengthening interdisciplinary integration:** Ecology and economics: ecological audit, green economy. Ecology and biology: biomonitoring. Ecology and chemistry and working with ecological data.

**Teacher training:** Study of international experience and implementation of new methodologies. Organization of special seminars and trainings for specialists.



**Expected results:** The improved education system will lead to the following results. The ecological literacy and ecological culture of students will increase. Practical skills and analytical thinking will be strengthened, future specialists will actively participate in ensuring ecological safety, conditions will be created for the development of innovative ecological solutions, and the science of ecology in higher education will develop in accordance with modern requirements.

**Conclusion.** Improving the science of ecology in higher education is not only a renewal of the education system, but also an important factor serving the ecologically sustainable development of society. Through modern methods, digital technologies, a practice-oriented approach and interdisciplinary integration, it is possible to raise the science of ecology to a new level. This will serve as a key factor in shaping the ecological thinking and responsibility of the future generation.

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***Maktabgacha ta'lim yo'nalishi 2- kurs talabasi***

## **KICHIK VA O'RTA GURUHLARDA TABIAT BURCHAGINI TASHKIL ETISH**

**Annotatsiya:** Ushbu maqolada maktabgacha ta'lim tashkilotida kichik va o'rta guruhlarda tabiat burchagini tashkil samarali tashkil etish masalalari yoritilgan. Maqolada tabiat burchagining ta'limiy va tarbiyaviy ahamiyati, uni o'tkazish bosqichlari, bolalarda kuzatuvchanlik, tafakkur va nutqni rivojlantirishdagi o'rni tahlil qilinadi. Tabiat burchagiga qo'yiladigan talablari haqida batafsil yoritiladi.

**Kalit so'zlar:** maktabgacha ta'lim, tabiat burchagi, tabiat, bilish faoliyati, ekologik tarbiya, kuzatuvchanlik, tafakkur.

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## **ORGANIZATION OF A NATURE CORNER IN SMALL AND MEDIUM GROUPS**

**Annotation:** This article examines the effective organization of nature corners in elementary and middle groups of preschool educational institutions. The educational and developmental significance of nature corners, their implementation stages, and their role in developing children's observation skills, thought, and speech are analyzed. The requirements for nature corners are discussed in detail.

**Keywords:** preschool education, nature corner, nature, cognitive activity, ecological education, observation, thinking.

Tabiat burchagi uchun hayvon va o'simliklarni tanlashga qo'yiladigan talablar. 1. O'simlik yoki hayvon u yoki bu tizimli yoki ekologik gurux uchun xos bo'lish lozim. Bunday holda bolalarni o'simlik va hayvonlarning katta guruxi uchun xarakterli bo'lgan asosiy, o'ziga xos belgilari, yashail sharoiti yoki tarzlari bilan tanishtirish imkoni yaratiladi.

2. Tabiat burchagida yashovchilarni parvarish qilish mehnatning sifati, xarakteri, unga sarflanadigan kuch va vaqtga ko'ra maktabgacha yoshdagi bolalarning qo'ldan keladigan (tarbiyachining ishtiroki va rahbarligi ostida)

bo'lishi lozim. Shuning o'chun «beor» o'simliklar va ovqatni tanlamaydigan hayvonlar tanlanadi.

3. Tabiat burchagidagi hayvon va o'simliklar tashqi ko'rinishidan yorqin, jozibador, maktabgacha yoshdagi bolaning hali unchalik barqaror bo'lmagan diqqatini o'ziga jalb qilib tura oladigan bo'lishi kerak.

4. Bir turdagi o'simlik va hayvonlarning bir necha xili mavjud bo'lishi lozim, bolalar kuzatish ob'ektida faqat umumiy belgilarnigina emas, balki individual belgilarni ham ko'ra oladilar, bu bolalarni tirik organizmlarning xilma-xilligi hamda takrorlanmasligini anglashlariga olib keladi.

5. O'simlik va hayvonlar tamoman xavfsiz bo'lishi, bolalarning sog'liqlariga hech qanday zarar yetkazmasligi lozim.

6. O'simlik va hayvonlarning bolalar tashkiloti binosidagi normal hayot faoliyati, o'sishi va rivojlanishida, binoning doimiy temperaturasini, karbonat angidrid gazining katta konsentratsiyasini, quruqligi, shovqin-suronning mavjudligini hisobga olish lozim.

Maktabgacha ta'lim tashkilotida tabiat burchagini tashkil qilish tartibi quyidagi bosqichlarda amalga oshiriladi.

**JOY TANLASH:**Guruh xonasining yorug', shamollatish mumkin bo'lgan qismida joylashishi kerak. Bolalar bemaolol yaqinlashib ko'rishlari uchun past balandlikda bo'lishi lozim. Elektr jihozlari yaqinida bo'lmasligi kerak

Kuylash, o'yin zonasi bilan aralashib ketmasligi maqsadga muvofiq

#### **MAQSADNI ANIQLASH**

1. Tabiat burchagi quyidagi vazifalarni bajarishi kerak:
2. bolalarda tabiatga qiziqish uyg'otish
3. kuzatish, parvarish qilish ko'nikmalarini shakllantirish
4. ekologik tarbiya berish
5. mas'uliyat hissini rivojlantirish

#### **JIHOZLARNI TAYYORLASH**

**Tabiat burchagida quyidagilar bo'lishi tavsiya etiladi:**

##### **Asosiy jihozlar**

- stend yoki stollar
- yorliq va nomlash kartochkalari
- suv quygich, spreysi
- tuproq, qum, drenaj

##### **O'simliklar**

- xonaki gullar (mustahkam, tez so'nmaydigan)
- tez unib chiqadigan urug'lar (bug'doy, loviya, suli)
- faslga mos o'simlik namunalar

##### **Tabiiy materiallar**

- tosh, shoxcha, barg, urug', mevdan urug'
- herbariy

##### **Mini akvarium/terratrium (agar imkon bo'lsa)**

- baliq, suv o'tlari

- qurt-qumursqa kuzatish shishasi

#### **4. O'simlik va hayvonlarni to'g'ri tanlash**

- zaharli va tikonli o'simliklardan foydalanilmaydi
- allergiya chaqiradigan turlar qo'yilmaydi
- murakkab parvarish talab qilmaydigan turlar tanlanadi

**Qisqa xulosa. Tabiat burchagi – bu shunchaki bezak emas, balki:**

Tarbiyaviy rivojlantiruvchi, didaktik, ekologik makon

Kichik guruh tabiat burchagi uchun o'simlik va hayvonlarni tanlashda eng avvalo bolalarning narsalarni idrok etish xususiyatlari shuningdek, ta'limiy masalalar nazarda tutiladi. Kichikintoylar 2—3 xil o'simlikni bilib olishlari va ularning asosiy qismlarini (bargi, poyasi, guli) farqlay olib, nomlarini aytishlari lozim. Kichik guruhdagi bolalar o'simliklarni parvarish qilishga jalb qilinadilar: ular o'simlikJarga suv quyadilar (suvni kattalar tayyorlab beradi, qancha quyish lozimligini ham ular ko'rsatishadi), nam latta bilan o'simliklarning barglarini artadilar. Hayvonlarni kuzatar ekanlar, bolalar hayvonlarni tashqi aniq belgilariga: gavda qismlari, harakatlanish xarakteri, chiqaradigan ovozlari va hokazolarga ko'ra tanib olishni, tanasining asosiy qismlarini farqlashni o'rganib oladilar. Tarbiyachi bolalarni kuzatishga, savolni anglashga, diqqatni kuzatilayotgan narsaga qaratib, uncha murakkab bo'lmagan harakatlaridan foydalanishga, kuzatish jarayonida berilgan savollarga javob qaytarishga o'rgatadi.

Kichik yosh guruhlarining tabiat burchagida qushlarni ham saqlash mumkin. Qushning patlari chiroyli, o'zi xushchaqchaq bo'lishi, ovqat tanlamasligi, qafasda ham sayrashi maqsadga muvofiqdir. Kanareyka xuddi shunday qushlardandir. Biroq imkon bo'lsa, sa'va, snegirni saqlash lozim. Kichik yosh guruh tabiat burchagida sut emizuvchilarni doimo saqlash mumkin emas.

**O'rta yosh guruh tabiat burchagi.** O'rta yosh guruhdagi bolalarda narsalarning xususiyat va sifatlarini (shaklining xilmaxilligi, rangi, kattaligi, sathining xarakteri va shu kabilar) ko'ra olish malakasi hosil qilinadi. Bolalar solishtirib ko'rishning murakkabroq usullarini egallaydilar, narsalarning farqi va o'xshashligini aniqlashni, ularni u yoki bu belgilariga ko'ra umumlashtirishni o'rganadilar. O'simlik va hayvonlar haqidagi bilimlar murakkablashadi. Bolalar o'simliklarning xususiyatlarini aniq farqlashni boshlaydilar, ularning hayotlari uchun zarur bo'lgan sharoitlari bilan tanishadilar. Shu bilan bolalar ko'rganda taniydigan hamda nomlarini biladigan o'simliklar soni ortib boradi.

Besh yoshga qadam qo'ygan bola hayvonlar bilan tanishar ekan, ularning tashqi ko'rinishi, tuzilishi, harakat qilishi, ovqatlanishining o'ziga xosligini va dastlabki bog'liqlik — harakat qilish xarakteri oyoqlarining tuzilishiga bog'liq ekanligini bilib oladi. Jonli tabiat burchagida yashovchilarni parvarish qilish jarayonida bolalar unchalik murakkab bo'lmagan ko'nikmalarni egallaydilar: bular — o'simlikni toza saqlash, uni to'g'ri sug'orish, suvdon va oxur (donxo'rak)larni yuvish, ozuqa berish kabi. Bu yoshdagi bolalar o'simlik va hayvonlarni kuzatar ekanlar, ularning o'sishi va rivojlanishidagi o'zgarishlarni qayd qiladilar, o'z kuzatishlarini to'g'ri gapirib berishni o'rganadilar. O'rta yosh guruhdagi bolalarning jonli tabiat haqidagi

dunyoqarashlarini kengaytirish maqsadida tabiat burchagining aholisini to'ldirib, boyitib turish talab qilinadi. Xona o'simliklari turli shakl va hajmdagi barglarga ega bo'lishi lozim, chunki bolalar o'simliklarni ozoda saqlashning o'zlari uchun yangi bo'lgan usullarini egallaydilar, egilgan barglarni mo'yqalam bilan artadilar, gullarga suv purkaydilar. Bunda bolalar parvarish qilish usulini barglarning xarakteriga: kattaligi, miqdori, sathining xarakteri, pishiqligiga ko'ra aniqlashni o'rganadilar. O'rta yosh guruh jonli tabiat burchagida doimiy yashovchilar sifatida sut emizuvchilarni ham saqlash mumkin. Bu yoshdagi bolalar ularni parvarish qilishning oddiy malakalarini bemalol egallay oladilar.

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## **RAQAMLI IQTISODIYOTNING RIVOJLANISHI VA UNING O'ZBEKISTON IQTISODIYOTIGA TA'SIRI**

**Annotatsiya:** Mazkur maqolada raqamli iqtisodiyotning mohiyati, uning asosiy tarkibiy qismlari hamda O'zbekiston iqtisodiyotiga ko'rsatayotgan ta'siri kompleks tarzda tahlil qilingan. Tadqiqot davomida raqamli texnologiyalar, jumladan, sun'iy intellekt, blokcheyn va katta ma'lumotlar (Big Data)ning iqtisodiy jarayonlardagi o'rni o'rganildi.

**Kalit so'zlar:** Raqamli iqtisodiyot, raqamli transformatsiya, elektron tijorat, fintech, sun'iy intellekt, Big Data, raqamli infratuzilma, iqtisodiy o'sish, IT xizmatlar, kiberxavfsizlik, O'zbekiston iqtisodiyoti

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## **DEVELOPMENT OF THE DIGITAL ECONOMY AND ITS INFLUENCE ON THE ECONOMY OF UZBEKISTAN**

**Abstract:** This article comprehensively analyzes the essence of the digital economy, its main components, and its impact on the economy of Uzbekistan. During the study, the role of digital technologies, including artificial intelligence, blockchain, and big data (Big Data), in economic processes was studied.

**Keywords:** Digital economy, digital transformation, e-commerce, fintech, artificial intelligence, Big Data, digital infrastructure, economic growth, IT services, cybersecurity, economy of Uzbekistan

### **KIRISH**

Bugungi kunda raqamli iqtisodiyot jahon iqtisodiy tizimining eng muhim tarkibiy qismlaridan biriga aylanib bormoqda. Axborot-kommunikatsiya texnologiyalarining jadal rivojlanishi natijasida ishlab chiqarish, xizmat ko'rsatish va boshqaruv jarayonlari tubdan o'zgarib, iqtisodiyotning yangi modeli shakllanmoqda. Raqamli iqtisodiyot nafaqat iqtisodiy samaradorlikni oshiradi, balki yangi ish o'rinlarini yaratish, innovatsiyalarni joriy etish va global raqobatbardoshlikni kuchaytirishga xizmat qiladi.

Hozirgi kunda O'zbekiston ham raqamli transformatsiyani ustuvor yo'nalish sifatida belgilab, ushbu sohada keng ko'lamli islohotlarni amalga oshirmoqda.

Xususan, raqamli infratuzilmani rivojlantirish, elektron hukumat tizimini kengaytirish va IT xizmatlarini eksport qilishga alohida e'tibor qaratilmoqda. Bu jarayonda IT Park Uzbekistan muhim rol o'ynamoqda.

Mazkur maqolaning maqsadi — raqamli iqtisodiyotning mohiyatini tahlil qilish, uning O'zbekiston iqtisodiyotiga ta'sirini o'rganish hamda rivojlanish istiqbollarini aniqlashdan iborat.

#### ADABIYOTLAR SHARHI

Raqamli iqtisodiyot tushunchasi ilk bor Nicholas Negroponte tomonidan ilgari surilgan bo'lib, u iqtisodiyotning "atomlardan bitlarga o'tishi" jarayonini ta'riflab bergan [1, 2].

**World Bank** raqamli iqtisodiyotni iqtisodiy o'sishning muhim omili sifatida baholaydi

**OECD** uni innovatsion rivojlanishning asosiy drayveri deb hisoblaydi

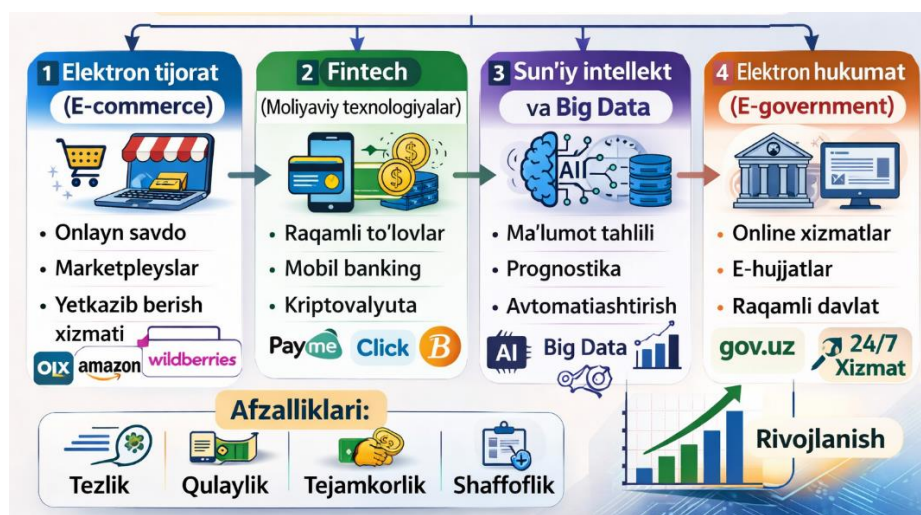
**International Monetary Fund** esa raqamli moliya tizimlarining barqarorlikka ta'sirini tahlil qiladi

#### 1-rasm. Raqamli iqtisodiyot xalqaro tashkilotlar nazarida

Bugungi kunda bu tushuncha kengayib, xalqaro tashkilotlar tomonidan chuqur o'rganilmoqda. Jumladan:

Raqamli iqtisodiyotga o'tish nafaqat texnologik jarayon, balki iqtisodiy va ijtimoiy o'zgarishlarni ham o'z ichiga oladi. Bu, o'z navbatida, yangi ish o'rinlari yaratish, iqtisodiy faollikni oshirish va jamiyatda raqamli tengsizlikni kamaytirish imkoniyatlarini beradi. Shunday qilib, ushbu maqola O'zbekiston iqtisodiyotining raqamli transformatsiyasi va uning iqtisodiy o'sishdagi roli haqida batafsil ma'lumot beradi.

Raqamli iqtisodiyotning O'zbekistonning kelgusi iqtisodiy taraqqiyotidagi o'rni, strategik rejalari va joriy holati tahlil qilinadi, bu esa mamlakatning raqamli iqtisodiyotdan foydalanishida yangi yo'nalishlarni belgilaydi.



2-rasm. Raqamli iqtisodiyot tarkibiy qismlari.

O'zbekistonning raqamli iqtisodiyotga o'tish jarayoni mamlakatning moliyaviy va iqtisodiy tizimini modernizatsiya qilish bilan bog'liq bo'lib, bu jarayonda davlat va xususiy sektor hamkorligi alohida ahamiyat kasb etmoqda [3]. Tadqiqotda O'zbekistonning raqamli valyutalari bo'yicha olib borilgan islohotlar, raqamli to'lov tizimlari va elektron savdo platformalarining iqtisodiy o'sishga ta'siri o'rganildi [4].

Shuningdek, ilmiy tadqiqotlar shuni ko'rsatadiki, raqamlashtirish darajasi yuqori bo'lgan davlatlarda yalpi ichki mahsulot o'sish sur'atlari ham yuqori bo'ladi.

So'nggi yillarda statistik ma'lumotlarga ko'ra O'zbekistonda raqamli iqtisodiyot jadal rivojlanmoqda. Bunga misol sifatida quyidagilarni keltirishimiz mumkin:

2018-yilda internet foydalanuvchilari soni 20 million bo'lgan bo'lsa, 2024-yilga kelib bu ko'rsatkich 32 milliondan oshdi bu esa raqamli xizmatlarga talab keskin ortayotganini ko'rsatadi.

Shuningdek:

Raqamli to'lovlar hajmi 2020-yildagi 150 trillion so'mdan, 2024-yilda 600 trillion so'mga yetgan. Bundan tashqari, IT xizmatlar eksporti ham sezilarli darajada oshib, yuzlab million dollarga yetgan [3].

Bu jarayonlarda **IT Park Uzbekistan** rezidentlari tomonidan eksport qilinayotgan IT xizmatlar muhim ahamiyat kasb etmoqda.

O'zbekistonning raqamli iqtisodiyotdagi rivojlanishi va uning iqtisodiy o'sishga ta'sirini tahlil qilish natijasida quyidagi muhim xulosalarga kelindi:

1. *Raqamli texnologiyalarning joriy etilishi.* 2020-yildan boshlab O'zbekistonda blokcheyn, sun'iy intellekt va katta hajmdagi ma'lumotlar (Big Data) kabi ilg'or raqamli texnologiyalar keng joriy etila boshlandi. Ushbu texnologiyalar, ayniqsa, moliya-bank tizimi, savdo va xizmat ko'rsatish sohalari hamda davlat boshqaruvida samaradorlikni sezilarli darajada oshirishga xizmat qildi.

2. *Iqtisodiy o'sishga qo'shilgan hissa.* Raqamli iqtisodiyot mamlakat iqtisodiy o'sishining muhim omillaridan biriga aylandi. Xususan, 2021–2023-yillar

davomida raqamli xizmatlar va texnologiyalar yalpi ichki mahsulot (YAIM) o'sishiga taxminan 2–3 foiz atrofida qo'shimcha hissa qo'shgan kuzatildi.

3. *Raqamli savodxonlik darajasi.* Tahlillar shuni ko'rsatadiki, raqamli iqtisodiyotning barqaror rivojlanishi uchun aholi va tadbirkorlarning raqamli savodxonligini oshirish muhim ahamiyatga ega. Hozirgi vaqtda bu boradagi ko'rsatkichlar yetarli darajada emas. Shu sababli ta'lim tizimida zamonaviy raqamli ko'nikmalarni rivojlantirish ustuvor vazifa hisoblanadi.

4. *Sanoat va xizmatlar sektoriga ta'siri.* Raqamli texnologiyalar sanoat va xizmat ko'rsatish sohalarida yangi imkoniyatlar yaratdi. Xususan, innovatsion startaplar sonining ortishi, ayniqsa raqamli xizmatlar yo'nalishida faoliyat yurituvchi korxonalar sonining ko'payishi iqtisodiy diversifikatsiya va raqobatbardoshlikni oshirishga ijobiy ta'sir ko'rsatdi.

5. *Xalqaro hamkorlik va tajriba almashuvi.* O'zbekiston raqamli iqtisodiyotni rivojlantirishda xalqaro tajribani faol o'rganmoqda hamda global hamkorlikni kengaytirmoqda. Xususan, xalqaro raqamli platformalar bilan hamkorlikni kuchaytirish orqali mamlakatning global iqtisodiyotdagi o'rnini mustahkamlashga alohida e'tibor qaratilmoqda.

6. *Raqobat muhitining transformatsiyasi.* Raqamli iqtisodiyotning rivojlanishi natijasida raqobat muhiti sezilarli darajada o'zgardi. Yangi kompaniyalar va startaplarning paydo bo'lishi bozor dinamikasini kuchaytirdi. Shu bilan birga, bozorda muvaffaqiyatga erishish uchun innovatsiyalarni tezkor joriy etish va yuqori raqobatbardoshlikni ta'minlash zarurati ortib bormoqda [5,6,7].

1-jadval. 2024-2026-yillarda raqamli texnologiyalarning iqtisodiyotga ta'siri

| Soha                                                | 2024-yildagi o'sish ko'rsatkichi | 2025-yildagi o'sish ko'rsatkichi | 2026-yildagi prognoz o'sish ko'rsatkichi |
|-----------------------------------------------------|----------------------------------|----------------------------------|------------------------------------------|
| <b>Raqamli iqtisodiyot (YAIMga hissasi)</b>         | ~5–6%                            | ~7–8%                            | ~9–10%                                   |
| <b>Elektron tijorat (E-commerce)</b>                | ~25%                             | ~30%                             | ~35%                                     |
| <b>Sanoatni raqamlashtirish (avtomatlashtirish)</b> | ~15%                             | ~18–20%                          | ~22–25%                                  |
| <b>Yangi ish o'rinlari (IT va raqamli sektor)</b>   | ~12–15%                          | ~15–18%                          | ~18–22%                                  |
| <b>Raqamli infratuzilma (internet va 5G)</b>        | ~60%<br>aholi qamrovi            | ~70–75%<br>qamrov                | ~80–85%<br>qamrov                        |

Ushbu jadval ma'lumotlari shuni ko'rsatadiki, O'zbekistonda raqamli iqtisodiyot barqaror o'sish tendensiyasiga ega. Xususan, elektron tijorat va raqamli infratuzilma eng tez rivojlanayotgan yo'nalishlar hisoblanadi. Shu bilan birga, yaqin yillarda raqamli iqtisodiyotning yalpi ichki mahsulotdagi ulushi sezilarli darajada oshishi prognoz qilinmoqda.

Prognozlarga ko'ra, O'zbekistonda raqamli iqtisodiyotning YAIMdagi ulushi 2024-yildagi 5–6 foizdan 2026-yilga borib 9–10 foizgacha oshishi kutilmoqda. Bu

esa mamlakat iqtisodiyotining raqamli transformatsiya jarayonlari jadal sur'atlarda rivojlanayotganini ko'rsatadi.

### **XULOSA VA TAKLIFLAR**

O'zbekistonda raqamli iqtisodiyotning shakllanishi va jadal rivojlanishi milliy iqtisodiy o'sishning muhim drayverlaridan biriga aylanmoqda. Raqamli texnologiyalar va innovatsion yechimlarning keng joriy etilishi ishlab chiqarish samaradorligini oshirish, mehnat bozorini transformatsiya qilish hamda aholi turmush darajasini yaxshilashga xizmat qilmoqda.

O'tkazilgan tahlillar natijasida aniqlanishicha, raqamli infratuzilmani rivojlantirish, institutsional muhitni takomillashtirish va davlat tomonidan qo'llab-quvvatlovchi siyosatni izchil amalga oshirish mamlakatning xalqaro iqtisodiy raqobatbardoshligini oshirishda hal qiluvchi ahamiyat kasb etadi.

Shuningdek yuqoridagi tahlillar shuni ko'rsatadiki, raqamli iqtisodiyot O'zbekiston iqtisodiy rivojlanishining muhim drayveriga aylanmoqda. Internet foydalanuvchilari sonining ortishi, raqamli to'lovlarning kengayishi va IT xizmatlar eksportining oshishi ushbu jarayonning ijobiy natijalarini ko'rsatadi.

Raqamli iqtisodiyotning barqaror rivojlanishini ta'minlash uchun kompleks yondashuv asosida quyidagi strategik yo'nalishlarni amalga oshirish maqsadga muvofiq:

-  zamonaviy va yuqori tezlikdagi internet infratuzilmasini kengaytirish;
-  raqamli kompetensiyalarni rivojlantirishga yo'naltirilgan ta'lim tizimini modernizatsiya qilish;
-  startup ekotizimini rivojlantirish va innovatsion faoliyatni rag'batlantirish;
-  milliy kiberxavfsizlik tizimini kuchaytirish va axborot xavfsizligini ta'minlash;
-  xalqaro raqamli integratsiyani chuqurlashtirish va global hamkorlikni kengaytirish.

Mazkur chora-tadbirlarning samarali amalga oshirilishi O'zbekistonning raqamli transformatsiya jarayonlarini jadallashtirib, uni global raqamli iqtisodiyotda munosib o'rin egallashiga xizmat qiladi.

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## ХИМИЧЕСКИЙ СОСТАВ И ПРИМЕНЕНИЕ ТАБЛЕТОК АНДИПАЛ

***Аннотация:** Андипал — комбинированный лекарственный препарат с анальгезирующим и спазмолитическим действием, содержащий четыре активных компонента: метамизол натрия (анальгин), фенобарбитал, бендазол (дибазол) и папаверина гидрохлорид. Синергетическое действие этих веществ не только облегчает болевой синдром, но и снимает сосудистый спазм, а также способствует незначительному снижению артериального давления.*

*Андипал часто назначают при головной боли, мигрени, болях, связанных со спазмами сердечно-сосудистой системы, а также при состояниях, сопровождающихся повышением артериального давления. Одним из основных компонентов препарата является метамизол, обладающий выраженными анальгезирующими и жаропонижающими свойствами. Однако из-за риска серьезных побочных эффектов, таких как лейкопения и агранулоцитоз, применение Андипала рекомендуется только в течение короткого времени и под контролем врача.*

***Ключевые слова:** Андипал, метамизол натрия, папаверин, бендазол, фенобарбитал, анальгетик, спазмолитик, артериальное давление, мигрень.*

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## CHEMICAL COMPOSITION AND APPLICATION OF ANDIPAL TABLETS

***Abstract** Andipal is a combined medication with analgesic and antispasmodic effects containing four active components: metamizole sodium (Analgin), phenobarbital, bendazole (dibazole), and papaverine hydrochloride. The synergistic action of these substances not only relieves pain but also relaxes vascular spasms and slightly reduces blood pressure. Andipal is commonly*

*prescribed for headaches, migraines, pain associated with cardiovascular spasms, and conditions related to elevated blood pressure. One of the main components, metamizole, has strong analgesic and antipyretic properties and acts through mechanisms. However, due to the risk of serious side effects associated with metamizole, such as leukopenia and agranulocytosis, the use of Andipal is recommended only for short periods and under medical supervision.*

**Keywords:** *Andipal, metamizole sodium, papaverine, bendazole, phenobarbital, analgesic, antispasmodic, blood pressure, migraine.*

**Введение:** Андипал — комбинированный лекарственный препарат, обладающий выраженным анальгезирующим, спазмолитическим и сосудорасширяющим действием, широко распространённый преимущественно в странах СНГ. Он был разработан в России в 1980–1990-х годах и применяется для лечения головной боли (особенно связанной со спазмом сосудов), мигрени, а также болевых синдромов, обусловленных спазмами периферических сосудов [1;2].

Метамизол (анальгин), входящий в состав препарата, является мощным анальгетиком и жаропонижающим средством, применяемым в клинической практике с 1920-х годов [3]. Комбинация активных веществ в составе Андипала оказывает комплексное воздействие на организм. Анальгезирующие компоненты снижают интенсивность болевых импульсов, а спазмолитические вещества способствуют расслаблению гладкой мускулатуры.

Кроме того, препарат содержит компонент, воздействующий на центральную нервную систему, который уменьшает рефлекторные реакции организма и оказывает седативное действие. В результате уменьшается сосудистый спазм, улучшается кровообращение и ослабляются болевые ощущения.

В настоящее время в фармакологии и фармации изучение химического состава комбинированных препаратов, их взаимодействий и механизмов действия на организм является одним из актуальных научных направлений [4;5]. Андипал также относится к числу таких препаратов, и его состав, фармакологические свойства и клиническое применение имеют важное значение в медицинской и фармацевтической практике.

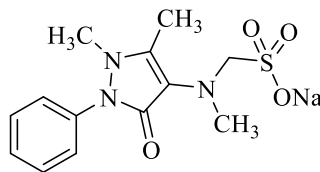
В связи с этим изучение химического состава таблеток Андипал, их фармакологических свойств и областей применения представляет собой актуальную научную и практическую задачу.

#### **Химический состав:**

Таблетка Андипал содержит четыре активных вещества. В одной таблетке присутствуют следующие компоненты:

**1. Метамизол натрия (Анальгин)** — 250 мг [6;7]. Данное вещество обладает выраженным анальгезирующим и жаропонижающим действием, подавляет активность фермента циклооксигеназы и снижает синтез простагландинов.

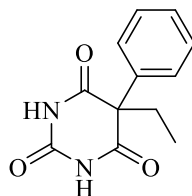
Структурная формула:



natriy ((1,5-dimetil-3-oxo-2-fenil-2,3-digidro-1*H*-pirazol-4-il)(metil)amino)metansulfonat

**2. Фенобарбитал** — 20 мг [6;7]. Фенобарбитал обычно используется как седативное (успокаивающее) и противосудорожное средство. В составе Андипала он способствует уменьшению болевых ощущений и оказывает успокаивающее действие [8].

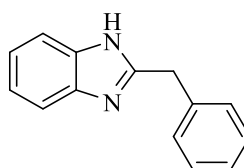
Структурная формула:



5-etil-5-fenilpirimidin-2,4,6(1*H*,3*H*,5*H*)-trion

**3. Бендазол (Дибазол)** — 20 мг [6;7]. Бендазол является выраженным сосудорасширяющим и спазмолитическим средством. Он расширяет сосудистую стенку и способствует расслаблению мышц. Применяется для устранения спазмов периферических сосудов, что способствует снижению давления при гипертензивных состояниях.

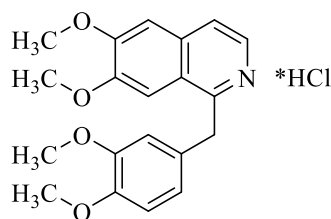
Структурная формула:



2-benzil-1*H*-benzo[*d*]imidazol

**4. Папаверина гидрохлорид** — 20 мг [6;7]. Папаверин также является сильным спазмолитиком, уменьшающим спазмы кишечника и других гладких мышц. Кроме того, он расслабляет кровеносные сосуды и оказывает гипотензивное действие.

Структурная формула:



1-(3,4-dimetoksibenzil)-6,7-dimetoksixinolin gidrokslorid

В качестве вспомогательных веществ используются крахмал, тальк, стеарат кальция и другие компоненты. Все активные вещества в совокупности обеспечивают общее фармакологическое действие препарата [9;10].

#### **Фармакологические свойства:**

Препарат Андипал обладает комплексным фармакологическим действием. Метамизол, входящий в его состав, проявляет анальгезирующие и жаропонижающие свойства, а также в определённой степени способствует снижению спастических проявлений.

Фенобарбитал снижает тонус гладкой мускулатуры желудочно-кишечного тракта и угнетает центральную нервную систему, тем самым усиливая седативный эффект препарата.

Бендазол (дибазол) и папаверин оказывают миорелаксирующее и сосудорасширяющее действие, расширяя периферические и центральные сосуды. В результате Андипал не только устраняет болевой синдром, но и способствует незначительному снижению артериального давления, а также оказывает успокаивающее воздействие на нервную систему.

Поскольку препарат является комбинированным, его синергетическая эффективность выше по сравнению с отдельным применением анальгетических и спазмолитических средств [6].

#### **Показания к применению:**

Андипал применяется в следующих случаях:

##### **1. Вазоспастическая головная боль и мигрень**

Препарат назначается для облегчения головной боли и некоторых форм мигрени, связанных со спазмом сосудов [6].

##### **2. Болевые синдромы, сопровождающиеся сосудистыми спазмами**

Например, боли, возникающие вследствие спазмов периферических артерий, сосудов сердечно-сосудистой системы, а также некоторых нарушений со стороны желудочно-кишечного тракта. В таких случаях спазмолитическое действие препарата используется как лечебный фактор [6].

##### **3. Умеренная артериальная гипертензия**

Благодаря способности расширять периферические сосуды Андипал может применяться при лёгких формах повышения артериального давления [5;6].

##### **4. Кишечные спазмы и другие состояния, сопровождающиеся спазмом гладкой мускулатуры**

Препарат может быть полезен пациентам при кишечных коликах и других состояниях, связанных со спазмами гладких мышц.

### **Способ применения и дозировка:**

Таблетки Андипал принимаются внутрь.

Для взрослых и детей старше 8 лет начальная доза составляет по 1 таблетке 2–3 раза в сутки (что соответствует 500–750 мг метамизола в сутки).

Максимальная суточная доза не должна превышать 3 таблеток (750 мг метамизола).

Препарат, как правило, применяется коротким курсом — в течение 2–3 дней, поскольку длительное использование связано с повышенным риском побочных эффектов.

После приёма внутрь действие обычно начинается через 20–40 минут и достигает максимума примерно через 2 часа.

Коррекцию дозировки рекомендуется проводить по назначению врача с учётом состояния пациента.

### **Противопоказания и предостережения:**

Применение Андипала категорически не рекомендуется в следующих случаях:

#### **1. Аллергия на метамизол или фенобарбитал**

При наличии повышенной чувствительности к препаратам пиразолонового ряда (анальгин, антипирин и др.), а также при ранее перенесённых токсических реакциях.

#### **2. Заболевания, сопровождающиеся угнетением функции костного мозга**

При подозрении или наличии лейкопении, агранулоцитоза, апластической анемии и других заболеваний крови препарат не применяется из-за риска, связанного с метамизолом [9].

#### **3. Сердечная, почечная или печёночная недостаточность**

У пациентов с тяжёлыми сердечно-сосудистыми, печёночными или почечными заболеваниями возможно накопление компонентов препарата и развитие токсических эффектов.

#### **4. Глаукома и гиперплазия предстательной железы**

Из-за расслабляющего действия на гладкую мускулатуру препарат не рекомендуется пациентам с закрытоугольной глаукомой или доброкачественной гиперплазией предстательной железы (ДГПЖ).

#### **5. Беременность и период лактации**

Метамизол и фенобарбитал легко проникают через плацентарный барьер.

Приём Андипала противопоказан в первом триместре беременности и в период грудного вскармливания. Кроме того, фенобарбитал может вызывать сонливость и угнетение нервной системы у детей и беременных женщин.

### **Побочные эффекты:**

Во время применения Андипала могут наблюдаться следующие побочные реакции:

#### **1. Нарушения со стороны желудочно-кишечного тракта**

В редких случаях возможны тошнота и запор.

## **2. Аллергические реакции**

Могут наблюдаться кожная сыпь, зуд, а в более тяжёлых случаях — даже анафилактические реакции.

## **3. Нарушения со стороны системы крови**

При длительном применении метамизол может вызывать серьёзные гематологические осложнения, такие как лейкопения и агранулоцитоз.

## **4. Седативный эффект**

Из-за содержания фенобарбитала возможны сонливость и головокружение. При применении в высоких дозах, а также в сочетании с препаратами, угнетающими центральную нервную систему, возможно выраженное седативное действие.

## **5. Нарушения со стороны сердечно-сосудистой системы**

В редких случаях возможно резкое снижение артериального давления, сопровождающееся головокружением и общей слабостью.

## **Заключение**

Таким образом, Андипал представляет собой комбинированный лекарственный препарат, в состав которого входят метамизол натрия, фенобарбитал, бендазол и папаверин. Совместное действие этих компонентов обеспечивает выраженный анальгезирующий, спазмолитический и сосудорасширяющий эффект.

Препарат в основном эффективен при головной боли (особенно связанной со спазмами), мигрени, спазмах гладкой мускулатуры и состояниях, сопровождающихся лёгкой артериальной гипертензией.

Каждый из компонентов обладает собственным фармакологическим действием:

- метамизол — сильный анальгетик и жаропонижающее средство;
- бендазол и папаверин — миорелаксанты и вазодилататоры;
- фенобарбитал — оказывает мягкое седативное действие.

Вместе с тем наличие метамизола в составе препарата повышает риск развития серьёзных побочных эффектов, таких как агранулоцитоз. Поэтому применение Андипала должно осуществляться только под наблюдением специалиста и в течение короткого периода времени.

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## **ПСИХОЛОГО-ПЕДАГОГИЧЕСКИЕ ОСНОВЫ РАЗВИТИЯ КРЕАТИВНОСТИ У ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТА**

***Аннотация:** В статье рассматривается влияние возрастных особенностей детей дошкольного возраста на развитие творческого мышления. Освещаются психологические и педагогические факторы, способствующие формированию креативности, а также роль воображения, игровой деятельности и эмоциональной сферы в данном процессе.*

***Ключевые слова:** творческое мышление, дошкольный возраст, креативность, воображение, игровая деятельность, возрастные особенности, развитие личности.*

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## **PSYCHOLOGICAL AND PEDAGOGICAL FOUNDATIONS FOR THE DEVELOPMENT OF CREATIVITY IN PRESCHOOL CHILDREN**

***Abstract:** This article examines the influence of age-related characteristics of preschool children on the development of creative thinking. It highlights psychological and pedagogical factors that contribute to creativity, as well as the role of imagination, play activity, and emotional development in this process.*

***Keywords:** creative thinking, preschool age, creativity, imagination, play activity, age characteristics, personality development.*

Дошкольный возраст является одним из важнейших этапов в жизни человека. Именно в этот период формируются основы мышления, мировоззрения и личности ребенка. Поэтому развитие творческого мышления в системе дошкольного образования приобретает особую значимость. Творческое мышление — это способность генерировать новые идеи, находить нестандартные решения и свободно выражать свои мысли.

В условиях современного общества востребованы не только образованные, но и креативные личности, способные самостоятельно мыслить и адаптироваться к изменениям. В связи с этим в дошкольных учреждениях особое внимание уделяется раскрытию творческого потенциала детей. Дети по своей природе любознательны и обладают богатым воображением. При правильной педагогической поддержке эти качества могут стать основой будущего успеха.

Одним из эффективных средств развития творческого мышления является игровая деятельность. В процессе игры ребенок чувствует себя свободно, примеряет на себя различные роли и моделирует жизненные ситуации. Сюжетно-ролевые игры помогают детям лучше понимать окружающий мир и находить решения в различных ситуациях. Кроме того, такие виды деятельности, как рисование, лепка, конструирование и сочинение сказок, способствуют развитию воображения и креативности.

Важную роль в этом процессе играет педагог. Его задача — не давать готовые ответы, а направлять ребенка к самостоятельному поиску решений. Постановка вопросов, создание проблемных ситуаций и поддержка инициативы детей способствуют формированию творческой среды. При этом необходимо учитывать индивидуальные особенности каждого ребенка.

Таким образом, развитие творческого мышления в дошкольном возрасте является залогом успешного будущего. Творчески развитый ребенок способен гибко мыслить, генерировать новые идеи и эффективно адаптироваться в обществе. Поэтому задача педагогов и родителей — создать условия для всестороннего развития творческих способностей детей.

Дошкольный возраст характеризуется интенсивным психическим развитием ребенка, что создает благоприятные условия для формирования творческого мышления. С научной точки зрения, развитие креативности в этот период напрямую связано с возрастными особенностями познавательных процессов, эмоционально-волевой сферы и социальной активности детей.

Согласно психологическим исследованиям, в раннем и дошкольном возрасте ведущую роль играет наглядно-образное мышление. Ребенок воспринимает мир через образы, эмоции и практическую деятельность. Именно поэтому творческое мышление на данном этапе проявляется в форме воображения, фантазирования и символической игры. Воображение выступает как центральный механизм творчества, позволяя ребенку преобразовывать реальные впечатления в новые образы.

Возрастные особенности также проявляются в высокой пластичности нервной системы. Это означает, что мозг ребенка обладает повышенной способностью к усвоению новой информации и формированию новых нейронных связей. В результате, при соответствующих педагогических условиях, развитие творческого мышления происходит наиболее эффективно именно в дошкольный период.

Еще одной важной характеристикой является эмоциональная восприимчивость детей. Дошкольники активно реагируют на яркие впечатления, что стимулирует их творческую активность. Эмоции выступают своеобразным «двигателем» творческого процесса, побуждая ребенка к самовыражению через различные виды деятельности: рисование, лепку, музыку и игру.

С точки зрения возрастной психологии, значительную роль играет и игровая деятельность как ведущий вид активности в дошкольном возрасте. В процессе игры ребенок осваивает социальные роли, моделирует различные

ситуации и учиться находить нестандартные решения. Это способствует развитию гибкости мышления, оригинальности и способности к импровизации.

Кроме того, в старшем дошкольном возрасте наблюдается переход от спонтанной к более осознанной творческой деятельности. Дети начинают планировать свои действия, контролировать результат и стремиться к достижению поставленной цели. Это свидетельствует о постепенном формировании элементов произвольного мышления и саморегуляции.

Таким образом, возрастные особенности дошкольников — такие как наглядно-образное мышление, развитое воображение, эмоциональная чувствительность и высокая нейропластичность — оказывают существенное влияние на развитие творческого мышления. Учет этих факторов в педагогической практике позволяет эффективно стимулировать креативные способности детей и создавать условия для их гармоничного развития.

Современное общество предъявляет высокие требования к личности, способной нестандартно мыслить, быстро адаптироваться к изменениям и находить оригинальные решения. В связи с этим особую актуальность приобретает развитие творческого мышления у детей уже на этапе дошкольного образования. Именно в этот период закладываются основы личности, формируются познавательные процессы, включая воображение и креативность.

Творческое мышление — это способность человека генерировать новые идеи, находить нестандартные решения и проявлять оригинальность в деятельности. У дошкольников оно проявляется через игру, рисование, конструирование, сочинение историй и другие виды активности.

Одним из ключевых условий развития творческого мышления является создание благоприятной образовательной среды. Воспитатель должен поощрять инициативу ребенка, поддерживать его интерес к исследованию и экспериментированию. Важно не ограничивать ребенка жесткими рамками, а наоборот — предоставлять свободу выбора и самовыражения.

Эффективными методами развития креативности являются:

- сюжетно-ролевые игры;
- творческие задания (рисование, лепка, аппликация);
- проблемные ситуации;
- мозговые штурмы (в адаптированной форме);
- сказкотерапия и драматизация.

Особую роль играет игровая деятельность, так как именно через игру ребенок познает окружающий мир и развивает воображение. В процессе игры дети учатся моделировать ситуации, придумывать новые сюжеты и выражать свои мысли.

Также важным фактором является взаимодействие с взрослыми. Педагог и родители должны выступать в роли партнеров, направляя ребенка и поддерживая его творческие проявления. При этом необходимо учитывать индивидуальные особенности каждого ребенка.

Таким образом, развитие творческого мышления у детей дошкольного возраста является важной задачей современной педагогики. Использование разнообразных методов и создание развивающей среды способствует формированию креативной, самостоятельной и уверенной личности. Раннее развитие творческих способностей закладывает основу для успешного обучения и социальной адаптации в будущем.

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## **ПРОЕКТНАЯ ВОВЛЕЧЁННОСТЬ СТУДЕНТОВ КАК ПРОБЛЕМА СОВРЕМЕННОЙ ВЫСШЕЙ ШКОЛЫ**

**Аннотация:** В статье проектная вовлечённость рассматривается как актуальная проблема современной высшей школы в условиях цифровой фрагментации образовательной среды, роста внешне мотивированного участия студентов и расширения практик формального использования проектных методов. Цель работы состоит в теоретическом уточнении понятия проектной вовлечённости, раскрытии её внутренней структуры, систематизации психологических и педагогических оснований анализа, а также в выявлении актуальных проблем её формирования в современном образовательном процессе. Исследование имеет теоретический характер и основано на анализе и сопоставлении психолого-педагогической литературы, понятийной реконструкции, логико-структурном моделировании и обобщении авторских и смежных исследований. Показано, что проектная вовлечённость не сводится ни к участию в проекте как организационной форме, ни к ситуативной учебной активности, ни к декларируемой мотивации. Она представляет собой интегративное психологическое образование, выражающее степень включённости субъекта в проектную деятельность на когнитивном, аффективном и конативном уровнях. Установлено, что современная проблематика проектной вовлечённости связана с дефицитом устойчивой внутренней мотивации, снижением концентрации внимания, усилением внешне регламентированного участия, разрывом между проектной формой и личностным смыслом деятельности, а также с недостаточной рефлексивной переработкой проектного опыта. Обосновано, что методологически продуктивным является сочетание личностно-деятельностного, аксиологического, компетентностного и социально-психологического подходов. Практические следствия сформулированы в пределах доказанного и не выходят за рамки теоретического анализа.

**Ключевые слова:** проектная вовлечённость, студент, проектная деятельность, высшая школа, внутренняя мотивация, психологическая регуляция, профессиональные компетенции, рефлексия, образовательная среда.



## **STUDENTS' PROJECT ENGAGEMENT AS A PROBLEM OF CONTEMPORARY HIGHER EDUCATION**

**Abstract:** *The article examines project engagement as a relevant problem of contemporary higher education in the context of the digital fragmentation of the educational environment, the growth of externally motivated student participation, and the expansion of practices involving the formal use of project methods. The purpose of the study is to provide a theoretical clarification of the concept of project engagement, to reveal its internal structure, to systematize the psychological and pedagogical foundations of its analysis, and to identify the current problems of its formation within the contemporary educational process. The study is theoretical in nature and is based on the analysis and comparison of psychological and pedagogical literature, conceptual reconstruction, logical-structural modeling, and the generalization of the author's and related studies. It is shown that project engagement cannot be reduced either to participation in a project as an organizational form, or to situational academic activity, or to declared motivation. It represents an integrative psychological construct expressing the degree of a subject's involvement in project activity at the cognitive, affective, and conative levels. It has been established that the contemporary problems of project engagement are associated with a deficit of stable intrinsic motivation, reduced concentration of attention, an increase in externally regulated participation, a gap between the project form and the personal meaning of activity, as well as insufficient reflective processing of project experience. It is substantiated that a combination of personality-activity, axiological, competence-based, and socio-psychological approaches is methodologically productive. The practical implications are formulated strictly within the limits of what has been demonstrated and do not go beyond the framework of theoretical analysis.*

**Keywords:** *project engagement, student, project activity, higher education, intrinsic motivation, psychological regulation, professional competencies, reflection, educational environment.*

### **Введение**

В современной высшей школе проектные формы обучения используются как один из инструментов повышения субъектной активности студента, усиления практической направленности образования и приближения учебного процесса к профессиональным задачам. Однако сама по себе включённость студента в проект ещё не означает его действительной вовлечённости. Наличие проектной группы, распределение ролей, выполнение отдельных действий и формальное участие в итоговой

презентации не позволяют автоматически заключать о психологической включённости субъекта в содержание, цели и результат деятельности [9; 10].

Именно в этой точке возникает проблема проектной вовлечённости. Она связана с тем, что проектная деятельность в образовательной практике всё чаще организуется как внешне активная, но внутренне неоднородная форма участия. Часть студентов включается в проект ситуативно, под влиянием оценки, контроля, группового давления или организационного требования. Другая часть демонстрирует поведенческое участие без устойчивого ценностного принятия деятельности. В результате проектная форма сохраняется, но её психологическое содержание ослабевает.

Актуальность темы усиливается рядом обстоятельств. Во-первых, меняется характер учебной мотивации студентов, для которой всё более типичны фрагментарность внимания, распределённость интересов и зависимость от внешних стимулов [6; 12; 13]. Во-вторых, возрастает значение личностных предикторов поведения и саморегуляции в учебной деятельности [4; 5; 7]. В-третьих, проектное обучение всё чаще включается в образовательные программы как обязательный элемент, что повышает риск формализации участия [9; 10]. Всё это требует более строгого анализа проектной вовлечённости как самостоятельного психологического и педагогического конструкта.

Цель статьи — теоретически обосновать проектную вовлечённость студентов как проблему современной высшей школы, раскрыть её структуру, проблемные зоны и педагогические следствия.

Задачи статьи

1. уточнить исходные определения
2. выделить релевантные психологические и педагогические теории
3. систематизировать научные подходы и школы
4. построить классификацию состояний и уровней проектной вовлечённости
5. раскрыть внутреннюю структуру явления
6. обозначить спорные вопросы и междисциплинарные связи
7. сформулировать практические следствия в пределах доказанного.

### **Материалы и методы**

Исследование имеет теоретико-аналитический характер. Используются методы понятийного анализа, сравнительно-сопоставительного рассмотрения научных позиций, структурно-логического моделирования и теоретического обобщения источников [1–22]. Работа не содержит экспериментальной проверки и не заявляет причинных эффектов. Все выводы ограничены рамками теоретической реконструкции и интерпретации доступных психолого-педагогических положений.

## 1. Исходные определения

Таблица 1. Исходные определения, принятые в статье

| Понятие                                     | Рабочее определение                                                                                                                                                    | Аналитическая функция                                                           |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Проектная вовлечённость</b>              | интегративное психологическое образование, выражающее степень внутреннего включения студента в проектную деятельность на когнитивном, аффективном и конативном уровнях | задаёт предмет анализа                                                          |
| <b>Проектное участие</b>                    | факт организационного включения студента в проект, независимо от глубины личностного принятия и активности                                                             | служит для разграничения внешней и внутренней включённости                      |
| <b>Проектная деятельность</b>               | форма совместной или индивидуальной активности, ориентированная на решение практической, исследовательской или социально значимой задачи с определённым результатом    | задаёт контекст проявления вовлечённости                                        |
| <b>Вовлечённость в учебной деятельности</b> | более широкий конструкт, отражающий активное, эмоционально и поведенчески поддерживаемое участие субъекта в учебном процессе                                           | позволяет соотнести проектную вовлечённость с общим полем исследований [10; 13] |
| <b>Формализованное участие</b>              | внешне наблюдаемое включение в проект без устойчивого личностного смысла, ценностного принятия и внутренней регуляции                                                  | фиксирует одну из современных проблем                                           |

Из этого следует, что проектная вовлечённость не равна ни общей учебной активности, ни мотивации в узком смысле, ни факту членства в проектной группе. Она задаёт более сложный уровень анализа, на котором пересекаются смысл, эмоция, действие и саморегуляция.

## 2. Психологические и педагогические теории

Проблема проектной вовлечённости раскрывается на пересечении психологии личности, психологии деятельности, педагогики высшей школы и компетентностного подхода.

**Таблица 2. Теоретические основания анализа проектной вовлечённости**

| Теоретическая линия                               | Представители                                 | Ключевое положение                                                                                                         | Значение для темы                                                                   |
|---------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Теория формирования личности                      | Л. И. Божович [18]                            | личность формируется через мотивы, отношения и внутреннюю позицию                                                          | проектная вовлечённость невозможна без внутреннего принятия деятельности            |
| Гуманистическая педагогика                        | В. А. Сухомлинский [22]                       | подлинное развитие обеспечивается через личностный смысл, уважение к субъекту и нравственную содержательность деятельности | проект не должен становиться чисто технической формой                               |
| Психология самооценки и саморегуляции             | А. Т. Абдурахманова [4; 5]                    | личностная устойчивость и характер саморегуляции влияют на способ включения в деятельность                                 | вовлечённость опосредована внутренними психологическими механизмами                 |
| Психология предикторов поведения                  | А. Т. Абдурахманова [7]                       | поведение в учебной деятельности определяется не только задачей, но и личностными предпосылками                            | проектная активность не объясняется одной лишь организацией проекта                 |
| Психология внимания и познавательной устойчивости | А. Т. Абдурахманова [6; 12; 13]               | снижение концентрации внимания и когнитивно-эмоциональная перегруженность ослабляют устойчивое участие                     | одна из актуальных проблем проектной вовлечённости связана с фрагментацией внимания |
| Педагогика проектной деятельности                 | А. Т. Абдурахманова [9]                       | проектная деятельность значима как образовательная форма при условии содержательной включённости субъекта                  | позволяет разграничить форму и внутренний эффект                                    |
| Компетентностный анализ вовлечённости             | А. Т. Абдурахманова [10]                      | вовлечённость связана с профессиональными компетенциями студента                                                           | выводит проектную вовлечённость к профессиональному становлению                     |
| Педагогические технологии                         | А. Kenjaboev, О. Ergasheva, J. Kenjabayev [2] | эффективность курса зависит от технологически выстроенной организации обучения                                             | проектная вовлечённость требует не спонтанности, а педагогической технологии        |

| Теоретическая линия                                | Представители                                     | Ключевое положение                                                                                             | Значение для темы                                                         |
|----------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Аксиологическая и нравственно-воспитательная линия | Х. Тухтаев [1; 3; 21; 22], Х. Б. Бердиева [14–17] | ценностная и социокультурная насыщенность образовательного процесса усиливает личностное принятие деятельности | аффективный и ценностный аспекты проектной вовлечённости нельзя исключать |
| Социально-психологическая линия общения            | С. Норбоева, Г. Урокова [19; 20]                  | качество взаимодействия и социальный интеллект влияют на учебное участие                                       | проектная вовлечённость зависит от групповой и коммуникативной среды      |

### 3. Научные подходы и школы

**Таблица 3. Подходы к анализу проектной вовлечённости**

| Подход                    | Что объясняет                                                        | Сильная сторона                                           | Ограничение                                 |
|---------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------|
| Личностно-деятельностный  | включение субъекта в деятельность через смысл, мотив и действие      | объясняет переход от внешней задачи к внутреннему участию | требует учёта среды и регуляции             |
| Компетентностный          | связь вовлечённости с профессиональным становлением                  | позволяет увидеть образовательный результат               | может чрезмерно формализовать явление       |
| Аксиологический           | ценностное принятие проектной деятельности                           | объясняет устойчивость внутренней мотивации               | недостаточен без поведенческого блока       |
| Социально-психологический | влияние группы, коммуникации и взаимодействия                        | показывает роль совместной работы                         | может недооценивать индивидуальные различия |
| Психорегулятивный         | роль внимания, самооценки, защиты и самоконтроля                     | раскрывает внутренние механизмы устойчивости участия      | требует осторожной операционализации        |
| Междисциплинарный         | соединяет педагогику, психологию, социальную психологию и аксиологию | даёт целостную модель                                     | усложняет диагностику                       |

Для анализа проектной вовлечённости наиболее продуктивно сочетание личностно-деятельностного, аксиологического, компетентностного и психорегулятивного подходов. Только в такой комбинации становится

возможным объяснить, почему внешне одинаковая проектная среда вызывает у студентов различную глубину включённости.

#### 4. Классификация проектной вовлечённости

**Таблица 4. Классификация состояний проектной вовлечённости**

| Тип состояния                          | Характеристика                                                                               | Основной риск                      |
|----------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------|
| <b>Формальное участие</b>              | студент присутствует в проекте организационно, но не принимает его как значимую деятельность | имитация активности                |
| <b>Ситуативная вовлечённость</b>       | активность возникает кратковременно под влиянием интереса, оценки или внешнего стимула       | неустойчивость результата          |
| <b>Функциональная вовлечённость</b>    | студент выполняет задачи добросовестно, но без выраженного ценностного принятия              | ограниченность личностного эффекта |
| <b>Интегративная вовлечённость</b>     | когнитивное понимание, эмоциональное принятие и поведенческая активность согласованы         | наиболее продуктивный уровень      |
| <b>Фрагментированная вовлечённость</b> | отдельные компоненты выражены неравномерно, например высокая активность при низкой рефлексии | внутренний дисбаланс участия       |

**Таблица 5. Уровни выраженности проектной вовлечённости**

| Уровень | Признаки                                                                                        | Интерпретация                                        |
|---------|-------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Низкий  | слабое понимание целей, низкая инициатива, зависимость от внешнего контроля                     | проект не принят как личностно значимая деятельность |
| Средний | частичная активность, ограниченная инициатива, интерес к отдельным задачам                      | вовлечённость присутствует, но нестабильна           |
| Высокий | самостоятельность, смысловое принятие, эмоциональная включённость, ответственность за результат | проект стал пространством субъектного участия        |

#### 5. Позиции ведущих авторов

Позиции ведущих авторов по данной проблематике можно объединить в несколько логических линий.

Первая линия связана с личностным основанием вовлечённости. Здесь принципиально важна мысль о том, что поведение в образовательной деятельности определяется не только организацией процесса, но и внутренней позицией личности, характером её самооценки, системой мотивов и способностью к саморегуляции [4; 5; 7; 18].

Вторая линия касается образовательной формы проекта. Проектная деятельность педагогически значима не как самоценная технология, а как форма, способная при определённых условиях активизировать субъекта, приблизить обучение к реальной задаче и включить профессиональные компетенции в действие [2; 9; 10].



Третья линия раскрывает роль ценностно-аффективного основания. Работы, связанные с нравственным, социокультурным и аксиологическим измерением образовательного процесса, позволяют утверждать, что долговременная вовлечённость невозможна без внутреннего принятия целей и смыслов деятельности [1; 3; 14–17; 21; 22].

Четвёртая линия касается коммуникативной среды и социального интеллекта. Совместная проектная работа требует умения понимать другого, договариваться, распределять ответственность и выдерживать межличностное напряжение [19; 20]. Следовательно, проектная вовлечённость не может анализироваться вне групповой динамики.

## 6. Внутренняя структура явления

**Таблица 6. Внутренняя структура проектной вовлечённости**

| Компонент              | Содержание                                                                         | Основная функция                          | Внешнее проявление                                     |
|------------------------|------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------|
| <b>Когнитивный</b>     | понимание целей проекта, структуры задач, критериев результата, собственной роли   | обеспечивает осмысленность участия        | аргументированное включение в работу                   |
| <b>Аффективный</b>     | интерес, эмоциональное принятие, переживание значимости и сопричастности           | поддерживает внутреннюю энергию участия   | устойчивый интерес и эмоциональная включённость        |
| <b>Конативный</b>      | инициатива, настойчивость, саморегуляция, готовность доводить задачу до результата | переводит смысл в действие                | активность, ответственность, доведение работы до конца |
| <b>Рефлексивный</b>    | анализ своих действий, ошибок, вкладов и результатов                               | обеспечивает коррекцию и развитие участия | способность осмыслить опыт проекта                     |
| <b>Коммуникативный</b> | взаимодействие, кооперация, согласование позиций                                   | удерживает коллективный характер проекта  | участие в командной работе                             |

В теоретическом отношении ключевым является не наличие каждого компонента по отдельности, а степень их согласованности. Именно поэтому проектная вовлечённость может быть высокой по одному параметру и слабой по-другому. Например, активное выполнение задач без ценностного принятия проекта не свидетельствует о полноценной вовлечённости.

## 7. Актуальные проблемы проектной вовлечённости на современном этапе

**Таблица 7. Основные проблемные зоны**

| Проблема                                | Содержание                                                                                             | Теоретическое основание |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------|
| Формализация проектного участия         | проект становится обязательной процедурой, а не лично значимой деятельностью                           | [2; 9; 10]              |
| Дефицит внутренней мотивации            | активность поддерживается оценкой, сроками или внешним контролем                                       | [1; 3; 10; 18]          |
| Фрагментация внимания                   | снижение концентрации и распределённость когнитивного ресурса затрудняют длительное участие            | [6; 12; 13]             |
| Неравномерность личностных предикторов  | не все студенты обладают одинаковой саморегуляцией и устойчивостью                                     | [4; 5; 7]               |
| Разрыв между деятельностью и рефлексией | опыт проекта не перерабатывается в личный и профессиональный смысл                                     | [10; 19; 20]            |
| Слабая ценностная насыщенность проектов | проектная задача выполняется без осознания её человеческой, социальной или профессиональной значимости | [14–17; 21; 22]         |

Из этого следует, что проблема проектной вовлечённости сегодня состоит не в отсутствии проектных форм как таковых, а в дефиците их внутреннего психологического наполнения.

## 8. Диаграмма темы

## 9. Спорные вопросы и междисциплинарные связи

**Таблица 8. Спорные вопросы и их методологически корректное разрешение**

| Спорный вопрос                                             | Междисциплинарная плоскость           | Рабочее решение                                                           |
|------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------|
| Вовлечённость — это состояние, свойство или процесс        | психология личности, педагогика       | целесообразно рассматривать её как интегративное динамическое образование |
| Достаточно ли участия в проекте для вывода о вовлечённости | педагогика, психология деятельности   | нет, участие и вовлечённость должны быть разведены                        |
| Можно ли считать проектную форму автоматически развивающей | педагогическая технология, аксиология | нет, эффект опосредован содержанием, смыслом и условиями                  |
| Следует ли включать аффективный компонент в анализ         | психология эмоций, педагогика         | да, без него вовлечённость редуцируется до исполнительности               |

| Спорный вопрос                                           | Междисциплинарная плоскость           | Рабочее решение                          |
|----------------------------------------------------------|---------------------------------------|------------------------------------------|
| Может ли вовлечённость быть измерена только поведенчески | психометрика, методология образования | нет, необходима многокомпонентная оценка |

Междисциплинарность проблемы обусловлена тем, что проектная вовлечённость одновременно относится к психологии мотивации, психологии саморегуляции, социальной психологии взаимодействия, педагогике высшей школы и теории образовательных технологий. Любая попытка анализировать её в пределах одной дисциплины приводит к редукции явления.

#### **10. Практические следствия в пределах доказанного**

Во-первых, проектная вовлечённость должна рассматриваться как самостоятельный объект педагогического проектирования, а не как побочный эффект проектного обучения.

Во-вторых, при организации проектов необходимо различать внешнее участие и внутреннюю включённость. Это требует разработки процедур сопровождения, поддерживающих понимание целей, личностный смысл, инициативу и рефлекссию.

Во-третьих, проектная деятельность должна быть содержательно насыщенной. Если проект лишён ценностной и профессиональной значимости, он быстрее превращается в формальную учебную нагрузку.

В-четвёртых, педагогическая поддержка вовлечённости должна учитывать психологические различия студентов: устойчивость внимания, особенности самооценки, личностные предикторы поведения, уровень рефлексивной зрелости [4–7; 12; 13].

В-пятых, для диагностики проектной вовлечённости недостаточно учитывать только посещаемость, активность на защите или объём выполненной работы. Нужна многокомпонентная оценка, включающая когнитивный, аффективный, конативный и рефлексивный уровни.

#### **Заключение**

Проектная вовлечённость студентов представляет собой одну из ключевых проблем современной высшей школы, поскольку именно в ней пересекаются вопросы мотивации, личностного смысла, педагогической технологии, саморегуляции и профессионального становления. Теоретический анализ показывает, что проектная вовлечённость не может быть сведена к организационному участию в проекте. Она является интегративным психологическим образованием, включающим когнитивный, аффективный, конативный, коммуникативный и рефлексивный компоненты.

На современном этапе основные трудности связаны с формализацией проектных практик, дефицитом внутренней мотивации, фрагментацией внимания, неравномерностью личностных предикторов участия и слабой рефлексивной переработкой проектного опыта. В пределах теоретического анализа обосновано, что продуктивное понимание проектной вовлечённости

возможно только при сочетании личностно-деятельностного, аксиологического, компетентностного и психорегулятивного подходов.

Выводы статьи ограничены рамками теоретического исследования. Они задают концептуальную основу для дальнейшей операционализации критериев и показателей проектной вовлечённости, а также для построения эмпирического исследования без недоказанных причинных выводов.

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## **РЕЖИМЫ РАБОТЫ СИЛОВЫХ ТРАНСФОРМАТОРОВ И ИХ АНАЛИЗ В ЭНЕРГЕТИЧЕСКИХ СИСТЕМАХ**

***Аннотация.** В данной статье рассмотрены основные режимы работы силовых трансформаторов, включая холостой ход, нагрузочный режим, короткое замыкание и аварийные режимы. Проведен анализ энергетических характеристик трансформаторов, потерь мощности и коэффициента полезного действия. Особое внимание уделено вопросам повышения эффективности эксплуатации трансформаторов в современных энергетических системах.*

***Ключевые слова:** трансформатор, холостой ход, короткое замыкание, нагрузка, КПД, потери энергии, электрическая сеть.*

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## **OPERATING MODES OF POWER TRANSFORMERS AND THEIR ANALYSIS IN POWER SYSTEMS**

***Abstract.** This article examines the main operating modes of power transformers, including no-load operation, load conditions, short-circuit режим, and emergency modes. An analysis of the energy characteristics of transformers, power losses, and efficiency is carried out. Particular attention is paid to improving the efficiency of transformer operation in modern power systems.*

***Keywords:** transformer, no-load operation, short circuit, load, efficiency, power losses, electrical network.*

### **Введение**

Силовые трансформаторы являются неотъемлемой частью электрических энергетических систем и играют ключевую роль в передаче и распределении электроэнергии. Их надежная и эффективная работа обеспечивает стабильность энергоснабжения промышленных и бытовых потребителей. В процессе эксплуатации трансформаторы работают в различных режимах, которые существенно влияют на их технические характеристики, энергетические показатели и срок службы. Анализ этих режимов позволяет оптимизировать эксплуатационные параметры и повысить энергетическую эффективность системы в целом.



## **1. Общая характеристика трансформаторов**

Трансформатор представляет собой статическое электромагнитное устройство, предназначенное для преобразования уровня напряжения переменного тока при неизменной частоте.

Основными элементами трансформатора являются:

магнитопровод (сердечник),  
первичная и вторичная обмотки,  
изоляционная система,  
охлаждающая система.

Основные параметры трансформатора:

номинальная мощность,  
напряжение,  
коэффициент трансформации,  
потери мощности.

## **2. Режим холостого хода**

Режим холостого хода возникает при подключении трансформатора к сети при разомкнутой вторичной обмотке.

Основные особенности:

ток холостого хода составляет 2–10% от номинального,  
активная мощность расходуется на потери в стали,  
возникают магнитные потери (гистерезис и вихревые токи).

Потери холостого хода:

потери на гистерезис,  
потери на вихревые токи.

Данный режим используется для определения параметров магнитной цепи трансформатора.

## **3. Нагрузочный режим**

Нагрузочный режим является основным режимом работы трансформатора, при котором вторичная обмотка подключена к нагрузке.

Характеристики:

ток пропорционален нагрузке,  
возникают потери в меди обмоток,  
изменяется напряжение на выходе.

Потери в нагрузочном режиме:

активные потери ( $I^2R$ ),  
дополнительные потери (рассеяние потока).

Коэффициент полезного действия (КПД):

КПД трансформатора определяется как отношение полезной мощности к полной:

$$\eta = \frac{P_2}{P_1} \times 100\%$$

Где:

$P_1$  — входная мощность,

$P_2$  — выходная мощность.

Максимальный КПД достигается при равенстве потерь в меди и стали.

#### **4. Режим короткого замыкания**

Режим короткого замыкания возникает при замыкании вторичной обмотки.

Особенности:

напряжение на первичной стороне снижено,  
ток достигает номинального значения,  
основные потери — медные.

Значение режима:

используется для определения сопротивления обмоток,  
позволяет оценить потери короткого замыкания.

Этот режим является опасным при аварийной эксплуатации.

#### **5. Аварийные режимы работы**

Аварийные режимы включают:

- перегрузку,
- короткое замыкание,
- перегрев,
- нарушение изоляции.

Причины:

- превышение нагрузки,
- повреждение изоляции,
- нестабильность сети.

Последствия:

- снижение срока службы,
- выход трансформатора из строя,
- аварии в энергосистеме.

Для предотвращения аварий используются:

- релейная защита,
- автоматическое отключение,
- системы охлаждения.

#### **6. Потери энергии в трансформаторе**

Потери делятся на:

Постоянные (в стали) — не зависят от нагрузки

Переменные (в меди) — зависят от тока нагрузки

Общие потери:

$$P_{\text{общ}} = P_{\text{ст}} + P_{\text{мед}}$$

Снижение потерь достигается за счет:

- улучшения материалов,
- оптимизации конструкции,
- применения современных технологий.

#### **7. Пути повышения эффективности работы трансформаторов**

Для повышения эффективности применяются:

использование аморфных сталей,  
улучшение системы охлаждения,

оптимизация режимов нагрузки,  
внедрение автоматизированных систем управления.

Особое значение имеет:

контроль напряжения,  
балансировка нагрузки,  
снижение гармонических искажений.

### **Заключение**

В данной работе рассмотрены основные режимы работы трансформаторов и их влияние на энергетические характеристики. Анализ показал, что эффективность работы трансформатора во многом зависит от правильного выбора режима эксплуатации.

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## **АНТИБИОТИКОРЕЗИСТЕНТНОСТЬ КАК ГЛОБАЛЬНАЯ ПРОБЛЕМА СОВРЕМЕННОЙ МЕДИЦИНЫ**

**Аннотация:** Антибиотикорезистентность является одной из наиболее значимых проблем здравоохранения XXI века. Рост устойчивости микроорганизмов к антибактериальным препаратам приводит к снижению эффективности лечения инфекционных заболеваний, увеличению смертности и экономических затрат. В статье рассмотрены причины, механизмы развития антибиотикорезистентности, её клинические последствия и современные подходы к профилактике и контролю.

**Ключевые слова:** антибиотикорезистентность, фармакотерапия, устойчивость, антибиотики, клиническая фармакология.

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## **ANTIBIOTIC RESISTANCE AS A GLOBAL PROBLEM OF MODERN MEDICINE**

**Abstract:** Antimicrobial resistance is one of the most significant global health challenges of the 21st century. The increasing resistance of microorganisms to antibacterial drugs leads to reduced effectiveness of treatment, higher mortality rates, and increased healthcare costs. This article discusses the causes, mechanisms, clinical consequences of antimicrobial resistance, and modern strategies for its prevention and control.

**Keywords:** antimicrobial resistance, pharmacotherapy, antibiotics, drug resistance, clinical pharmacology.

### **Введение**

Антибиотики сыграли ключевую роль в снижении смертности от инфекционных заболеваний. Однако их широкое и зачастую нерациональное применение привело к формированию устойчивости микроорганизмов[1].

Антибиотикорезистентность определяется как способность бактерий выживать при воздействии антибактериальных препаратов, ранее эффективных для их уничтожения[2].

В настоящее время считается, что более 50% антибиотиков во многих странах используются ненадлежащим образом, например, для лечения вирусов, когда они лечат только бактериальные инфекции или используют неправильный (более широкого спектра) антибиотик, тем самым способствуя распространению устойчивости к противомикробным препаратам. Одной из наиболее актуальных проблем является распространение устойчивых грамотрицательных бактерий, включая *Acinetobacter*, *Escherichia coli*, *Ps.aeruginosae* и *Klebsiella pneumoniae*.

Там, где антибиотики для лечения людей можно приобрести без рецепта, возникновение и распространение устойчивости усугубляются. Аналогичным образом, в тех странах, где нет стандартных лечебных рекомендаций, антибиотики часто назначаются врачами избыточно и используются населением сверх меры[3].

Цель исследования. Изучить причины, механизмы развития антибиотикорезистентности и оценить её влияние на эффективность фармакотерапии.

Материалы и методы. Проведён анализ научной литературы, данных международных организаций (ВОЗ, CDC), а также клинических исследований последних лет. Использованы методы системного анализа, сравнения и обобщения данных.

Причины антибиотикорезистентности

К основным причинам относятся:

- нерациональное применение антибиотиков[4];
- самолечение пациентов;
- использование антибиотиков в сельском хозяйстве[5];
- недостаточный контроль инфекций.

Механизмы устойчивости

Основные механизмы включают:

- генетические мутации[6];
- горизонтальный перенос генов;
- инактивацию антибиотиков ферментами;
- изменение мишеней действия препарата.

Клинические последствия

Антибиотикорезистентность приводит к:

- увеличению длительности лечения[7];
- росту летальности;
- увеличению затрат на лечение;
- снижению эффективности стандартной терапии.

Глобальное распространение

По данным международных исследований, ежегодно миллионы случаев инфекций связаны с устойчивыми штаммами бактерий[8]. Прогнозируется дальнейший рост данной проблемы при отсутствии эффективных мер[9].

Роль клинической фармакологии

Клиническая фармакология обеспечивает:

- рациональный выбор терапии;
- контроль дозирования;
- профилактику побочных эффектов[10].

Пути решения проблемы

Основные направления:

- рациональное использование антибиотиков[11];
- разработка новых препаратов;
- усиление фармаконадзора;
- внедрение образовательных программ.

**Результаты и обсуждение.** Проведённый анализ показал, что антибиотикорезистентность обусловлена совокупностью факторов, ключевыми из которых являются неправильное применение антибиотиков и недостаточный контроль их использования.

Современные данные свидетельствуют о необходимости комплексного подхода к решению проблемы, включающего как клинические, так и организационные меры[12].

### **Выводы**

1. Антибиотикорезистентность является глобальной проблемой здравоохранения.
2. Основной причиной является нерациональное применение антибиотиков.
3. Рост устойчивости снижает эффективность лечения.
4. Необходим комплексный подход к решению проблемы.

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## **НЕСТЕРОИДНЫЕ ПРОТИВОВОСПАЛИТЕЛЬНЫЕ ПРЕПАРАТЫ (НПВС): СРАВНИТЕЛЬНАЯ ХАРАКТЕРИСТИКА В КЛИНИЧЕСКОЙ ПРАКТИКЕ**

**Аннотация:** Нестероидные противовоспалительные препараты (НПВС) представляют собой одну из наиболее широко применяемых групп лекарственных средств в современной медицине. Они обладают противовоспалительным, анальгезирующим и жаропонижающим действием. Несмотря на сходный механизм действия, различные представители НПВС имеют различную селективность к изоформам циклооксигеназы, фармакокинетические свойства и профиль безопасности. В статье представлен сравнительный анализ традиционных и селективных НПВС, рассмотрены их клиническая эффективность, побочные эффекты, особенности применения у пациентов с сопутствующими заболеваниями, а также фармакоэкономические аспекты.

**Ключевые слова:** НПВС, селективные ингибиторы ЦОГ-2, анальгезия, противовоспалительное действие, фармакология.

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## **NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS): COMPARATIVE CHARACTERISTICS IN CLINICAL PRACTICE**

**Abstract:** Non-steroidal anti-inflammatory drugs (NSAIDs) are among the most widely used medications in modern clinical practice. They exhibit anti-inflammatory, analgesic, and antipyretic effects. Although sharing a common mechanism, different NSAIDs vary in cyclooxygenase isoform selectivity, pharmacokinetics, and safety profiles. This article presents a comparative analysis of traditional and selective NSAIDs, including clinical efficacy, adverse effects, use in patients with comorbidities, and pharmacoeconomic considerations.

**Keywords:** NSAIDs, COX-2 inhibitors, analgesia, anti-inflammatory effect, pharmacology.

## **Введение**

НПВС являются основной терапевтической группой при лечении воспалительных заболеваний, боли различной этиологии, ревматоидных и дегенеративных заболеваний суставов [1].

Классические НПВС ингибируют обе изоформы циклооксигеназы (ЦОГ-1 и ЦОГ-2), что обеспечивает выраженный противовоспалительный эффект, но может сопровождаться побочными эффектами со стороны ЖКТ[2].

Селективные ингибиторы ЦОГ-2 направлены на минимизацию гастропатий, сохраняя противовоспалительную активность [3].

Актуальность исследования определяется необходимостью выбора препарата с максимальной эффективностью и минимальными рисками побочных эффектов.

**Цель исследования.** Провести сравнительный анализ традиционных и селективных НПВС по эффективности, безопасности и применению в различных клинических ситуациях.

## **Материалы и методы**

Анализ литературы включал:

- современные рекомендации EULAR, ACR и WHO;
- результаты рандомизированных клинических исследований;
- метаанализы и обзоры;
- фармакологические справочники[4].

Применялись методы сравнительной оценки, систематизации и анализа.

Основная часть

Механизм действия НПВС

НПВС ингибируют фермент циклооксигеназу, что приводит к снижению синтеза простагландинов, участвующих в воспалении, боли и терморегуляции[5].

- Традиционные НПВС: ингибируют ЦОГ-1 и ЦОГ-2, оказывая как противовоспалительный, так и гастротоксический эффект.

- Селективные ингибиторы ЦОГ-2: преимущественно блокируют ЦОГ-2, минимизируя повреждение слизистой ЖКТ.

Фармакологические свойства

Традиционные НПВС:

- ибупрофен, диклофенак, индометацин
- быстрый антиалгезирующий эффект
- выраженная противовоспалительная активность

Селективные НПВС:

- целекоксиб, эторикоксиб
- длительное действие
- минимальное влияние на ЖКТ
- подходящие для длительной терапии у пациентов с высоким риском язвенной болезни[6]

Клиническая эффективность

- Боль острого характера: оба типа эффективны; селективные могут быть предпочтительны при длительном применении.

- Хронические ревматические заболевания: снижение воспаления и болевого синдрома у пациентов с артритами.

- Снижение температуры: обе группы эффективны как жаропонижающие средства.

Побочные эффекты

Традиционные НПВС:

- язвенные поражения ЖКТ, кровотечения
- нефротоксичность при длительном применении
- повышение риска сердечно-сосудистых событий при некоторых препаратах[7]

Селективные НПВС:

- меньше побочных эффектов со стороны ЖКТ
- возможное повышение артериального давления
- осторожность при сердечно-сосудистых заболеваниях

Применение у особых категорий пациентов

- Пожилые пациенты: предпочтение селективных НПВС для снижения риска язвенной болезни.

- Пациенты с сердечно-сосудистыми заболеваниями: ограничение длительного применения селективных ЦОГ-2 ингибиторов[8].

- Больные с хронической почечной недостаточностью: осторожность при любом НПВС.

Фармакоэкономический аспект

Традиционные НПВС дешевле, но риск побочных эффектов может приводить к дополнительным затратам. Селективные НПВС дороже, но снижают риск осложнений ЖКТ, что важно при длительной терапии[9].

Современные тенденции

- Разработка НПВС нового поколения с минимальными побочными эффектами.

- Использование комбинированной терапии с ингибиторами протонной помпы для снижения риска гастропатий.

- Акцент на индивидуальный подбор препарата и дозировки.

**Результаты и обсуждение**

1. Сравнительная эффективность: традиционные и селективные НПВС схожи по анальгезирующей и противовоспалительной активности при кратковременном применении.

2. Побочные эффекты: селективные НПВС обладают лучшей переносимостью ЖКТ, но могут повышать риск сердечно-сосудистых осложнений при длительной терапии.

3. Применение в ревматологии: селективные НПВС предпочтительны при длительном применении у пациентов с высоким риском гастропатий, тогда как традиционные — при краткосрочной терапии острого болевого синдрома.

4. Фармакоэкономика: долгосрочная стоимость терапии с селективными НПВС может быть ниже за счёт снижения частоты госпитализаций и осложнений.

5. Индивидуальный подход: выбор препарата должен учитывать возраст пациента, сопутствующие заболевания, длительность терапии и риск побочных эффектов.

#### **Выводы**

1. НПВС — эффективные средства при воспалении, боли и лихорадке.
2. Традиционные НПВС обладают высокой антиалгезирующей активностью, но имеют больше побочных эффектов со стороны ЖКТ.
3. Селективные ингибиторы ЦОГ-2 безопаснее для ЖКТ, но требуют осторожности при сердечно-сосудистых заболеваниях.
4. Выбор препарата должен быть индивидуализирован.
5. Современные рекомендации акцентируют внимание на минимизации побочных эффектов и длительной безопасности терапии.

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## **ЭКОЛОГИЧЕСКИЕ ФАКТОРЫ, ОПРЕДЕЛЯЮЩИЕ СЕЗОННЫЕ ИЗМЕНЕНИЯ ФАУНЫ МЛЕКОПИТАЮЩИХ В УСЛОВИЯХ ЮЖНОГО ПРИАРАЛЬЯ**

***Аннотация:** В статье рассматриваются экологические факторы, определяющие сезонные изменения фауны млекопитающих Южного Приаралья. Установлено, что основное влияние оказывают температура воздуха, водные ресурсы и кормовая база. На основе полевых и климатических данных выявлено снижение активности видов летом и её максимум весной. Обнаружена статистически значимая связь активности с температурой и наличием воды. Антропогенные факторы усиливают сезонные колебания и изменяют местообитания. Результаты могут быть использованы для экологического мониторинга и сохранения биоразнообразия.*

***Ключевые слова:** млекопитающие, динамика, факторы, климат, биоразнообразие, популяция, антропогенное воздействие.*

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## **ENVIRONMENTAL FACTORS DETERMINING SEASONAL CHANGES IN MAMMALIAN FAUNA IN THE SOUTHERN ARAL SEA REGION**

***Abstract:** This article examines the environmental factors that determine seasonal changes in the mammal fauna of the Southern Aral Sea region. It has been established that air temperature, water resources, and food supply have the primary influence. Field and climate data revealed a decrease in species activity in summer and a peak in spring. A statistically significant relationship between activity and temperature and water availability was found. Anthropogenic factors intensify seasonal fluctuations and alter habitats. The results can be used for environmental monitoring and biodiversity conservation.*



**Keywords:** *mammals, dynamics, factors, climate, biodiversity, population, anthropogenic impact.*

## Введение

Южное Приаралье — одна из наиболее трансформированных природных территорий Центральной Азии, сформированная вследствие усыхания Аральского моря и последующих климатических и антропогенных изменений. Регион характеризуется аридным, резко континентальным климатом, дефицитом водных ресурсов и значительными сезонными колебаниями температуры, что существенно влияет на биоразнообразие и фауну млекопитающих. В экстремальных условиях животные адаптируются через изменения активности, распределения, питания и численности. Актуальность исследования обусловлена продолжающейся деградацией экосистем (опустынивание, засоление, сокращение растительности). Несмотря на важную роль млекопитающих в экосистемах, их сезонная динамика изучена недостаточно. Цель работы — выявление экологических факторов, определяющих сезонные изменения фауны млекопитающих Южного Приаралья, и оценка их влияния на поведенческие и популяционные характеристики видов.

## Материалы и методы

Полевые исследования проводились в Южном Приаралье, включая высохшее дно Аральского моря, полупустынные и пустынные ландшафты, а также участки с остаточной растительностью и водоёмами. Применялся комплексный подход, сочетающий традиционные зоологические наблюдения и современные методы мониторинга. Учёт млекопитающих осуществлялся маршрутными обследованиями с фиксацией следов жизнедеятельности и визуальными наблюдениями в утренние и вечерние часы. Для изучения скрытных и ночных видов использовались фотоловушки, а мелкие млекопитающие отлавливались стандартными ловушками с последующим определением видов и выпуском. Климатические параметры анализировались по данным метеостанций с учётом водного режима территории (временные водоёмы, уровень грунтовых вод, засоление почв). Взаимосвязи между экологическими факторами и сезонной динамикой млекопитающих оценивались с применением статистических методов, включая корреляционный и сравнительный анализ.

## Результаты и обсуждение

Проведённые исследования показали, что сезонная динамика фауны млекопитающих Южного Приаралья определяется комплексным воздействием климатических и антропогенных факторов, среди которых ключевую роль играют температура воздуха, доступность воды и состояние кормовой базы. В летний период, характеризующийся экстремально высокими температурами (до 40°C и выше) и минимальным количеством осадков, наблюдается значительное снижение активности большинства видов, особенно мелких млекопитающих. Грызуны, такие как песчанки и

тушканчики, переходят к ночному образу жизни или ограничивают активность, укрываясь в норах, что позволяет им избегать перегрева и потери влаги.

Крупные млекопитающие демонстрируют пространственные перемещения, связанные с поиском воды и кормовых ресурсов. В частности, отмечено смещение популяций копытных к участкам с сохранившимися водоёмами или искусственными источниками воды. Весенний период, напротив, характеризуется повышением биологической активности, обусловленной умеренными температурами и появлением растительности. В это время наблюдается рост численности многих видов, усиление репродуктивной активности и расширение ареалов обитания.

Осенний сезон сопровождается постепенным снижением температуры и сокращением кормовой базы, что приводит к накоплению жировых запасов у животных и подготовке к зимнему периоду. Зимой, несмотря на относительно мягкие климатические условия региона, ограниченность кормовых ресурсов и изменение структуры растительности оказывают влияние на выживаемость и распределение видов. Анализ данных показал статистически значимую зависимость между температурными показателями и уровнем активности млекопитающих ( $r = 0,70-0,75$ ), а также между наличием водных ресурсов и пространственным распределением видов ( $r = 0,65-0,70$ ).

Антропогенные факторы, включая выпас скота, развитие сельского хозяйства и транспортную инфраструктуру, оказывают дополнительное воздействие на фауну, усиливая фрагментацию местообитаний и вызывая локальные изменения численности популяций. В ряде случаев отмечено вытеснение чувствительных видов и доминирование более устойчивых к стрессовым условиям форм.

Полученные результаты свидетельствуют о том, что сезонные изменения фауны млекопитающих Южного Приаралья являются результатом сложного взаимодействия природных и антропогенных факторов. Ключевыми экологическими драйверами выступают температурный режим, водный фактор и состояние растительного покрова, которые в совокупности определяют доступность ресурсов и условия обитания животных. Адаптивные стратегии млекопитающих, включая изменение суточной активности, миграции, использование укрытий и физиологические механизмы регуляции, позволяют им выживать в экстремальных условиях аридного климата.

Сравнение полученных данных с результатами исследований в других аридных регионах показывает сходство адаптационных механизмов, однако в Южном Приаралье они усиливаются за счёт последствий экологической катастрофы, связанной с усыханием Аральского моря. Это проявляется в более выраженной сезонной нестабильности экосистем и высокой чувствительности фауны к изменениям окружающей среды. Особое значение приобретает влияние антропогенных факторов, которые не только изменяют

структуру местообитаний, но и усиливают воздействие природных стрессоров.

Практическое значение работы заключается в возможности использования полученных результатов для прогнозирования изменений фауны в условиях дальнейших климатических трансформаций, а также для разработки мер по сохранению биоразнообразия региона. Это включает создание охраняемых природных территорий, регулирование хозяйственной деятельности и восстановление деградированных экосистем.

#### Заключение

Таким образом, сезонные изменения фауны млекопитающих в Южном Приаралье обусловлены комплексным воздействием климатических факторов, прежде всего температуры и водного режима, а также антропогенной трансформацией ландшафтов. Установлено, что адаптационные реакции животных направлены на оптимизацию использования ограниченных ресурсов и минимизацию воздействия экстремальных условий среды. Полученные данные имеют важное значение для экологического мониторинга, прогнозирования динамики популяций и разработки эффективных природоохранных мероприятий в регионе.

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## **КОНЦЕПТУАЛЬНЫЕ ОСНОВЫ РАЗВИТИЯ ЧЕЛОВЕЧЕСКОГО КАПИТАЛА В УСЛОВИЯХ ИННОВАЦИОННОЙ ЭКОНОМИКИ**

***Аннотация.** В статье систематизированы приоритетные направления развития человеческого капитала в условиях инновационной экономики Узбекистана. На основе системного, сравнительного и статистического анализа обобщены современные теоретические подходы к человеческому капиталу и оценены структурные изменения, происходящие в сферах образования, цифровизации и научно-исследовательской деятельности. **Ключевые слова:** человеческий капитал, инновационная экономика, цифровизация, высшее образование, научно-исследовательская деятельность, рынок труда, непрерывное обучение.*

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## **CONCEPTUAL BASIS FOR THE DEVELOPMENT OF HUMAN CAPITAL IN THE CONTEXT OF AN INNOVATIVE ECONOMY**

***Abstract.** This article systematizes priority areas for human capital development in Uzbekistan's innovative economy. Using a systemic, comparative, and statistical analysis, it summarizes contemporary theoretical approaches to human capital and assesses the structural changes occurring in education, digitalization, and research.*

***Keywords:** human capital, innovative economy, digitalization, higher education, research, labor market, lifelong learning.*

**Введение** В инновационной экономике человеческий капитал становится не только фактором производства, но и главным источником технологического обновления, организационных изменений и роста национальной конкурентоспособности. Классические подходы Т. Шульца и Г.Беккера трактуют инвестиции в образование, здоровье и профессиональную подготовку как основу повышения производительности труда и доходов [1; 2]. В современных условиях данная логика дополняется требованиями цифровой трансформации: экономике нужны специалисты, способные

быстро осваивать новые технологии, работать с данными, генерировать и внедрять инновации, а также постоянно обновлять собственные компетенции. Для Узбекистана развитие человеческого капитала приобретает стратегическое значение в контексте структурной модернизации экономики, расширения сектора услуг, формирования цифровой инфраструктуры и повышения экспортного потенциала. Переход от преимущественно ресурсной и трудоемкой модели роста к модели, основанной на знаниях, требует качественно иной архитектуры образования, науки и подготовки кадров. В этих условиях особое значение имеют не только количественные параметры охвата образованием, но и качество обучения, практико-ориентированность программ, развитие исследовательской культуры и институциональная среда инноваций. Цель статьи состоит в выявлении приоритетных направлений развития человеческого капитала в инновационной экономике Узбекистана и в обосновании мер, способных обеспечить более тесную связь между образованием, научными исследованиями, цифровизацией и потребностями рынка труда. Для достижения указанной цели в работе сочетаются теоретический обзор и анализ официальных статистических данных.

### **Обзор литературы и методология исследования**

В научной литературе человеческий капитал рассматривается как совокупность знаний, навыков, здоровья, опыта, ценностных установок и поведенческих характеристик, влияющих на производительность индивида и результаты экономической системы [1; 2]. П. Друкер подчеркивал, что в экономике знаний определяющее значение приобретает не физический труд, а способность создавать, перерабатывать и применять новую информацию [3]. Современные международные организации связывают качество человеческого капитала с развитием навыков XXI века, непрерывным обучением, гибкостью компетенций и цифровой грамотностью [4; 5].

Методология исследования основана на сочетании системного, сравнительного, статистического и логико-структурного анализа. Эмпирическую базу составили официальные данные Национального комитета Республики Узбекистан по статистике по высшему образованию и научно-инновационной деятельности, а также международные показатели Всемирного банка, характеризующие состояние человеческого капитала, цифровой включенности и здоровья населения [5–9]. В работе использованы методы динамического анализа, сопоставления показателей, структурной интерпретации и экспертного обобщения.

Предлагаемый подход позволяет оценить не только текущую количественную динамику, но и качество институциональных изменений. При этом статья носит аналитико-обзорный характер и не ставит задачу построения эконометрической модели; ее основная функция — выявить ключевые узкие места и определить наиболее значимые направления государственной и корпоративной политики в сфере человеческого капитала.



### Анализ текущих тенденций развития человеческого капитала

Анализ официальной статистики показывает, что за последнее десятилетие в Узбекистане произошли существенные количественные сдвиги в развитии человеческого капитала. Наиболее показательным индикатором является расширение охвата высшим образованием населения в возрасте 18–23 лет: если в 2014 году он составлял 6,8 %, то к началу 2024/2025 учебного года достиг 47,7 %, то есть вырос на 40,9 процентного пункта и более чем в 7 раз [6]. Данный результат отражает активное расширение сети высших учебных заведений, рост приема и более широкое вовлечение молодежи в формальное обучение.



Рисунок 1. Динамика охвата высшим образованием населения в возрасте 18–23 лет в Узбекистане, %

Источник: составлено автором на основе данных Национального комитета Республики Узбекистан по статистике [6].

Положительная динамика подтверждается и абсолютными показателями. В 2024/2025 учебном году число студентов в организациях высшего образования достигло 1 432,8 тыс. человек, а прием составил 381,7 тыс. человек. Существенно усилилась гендерная сбалансированность: доля девушек среди студентов достигла 50,6 %, что указывает на постепенное выравнивание доступа к высшему образованию [7]. При этом рост численности студентов создает новый вызов: количественное расширение системы должно сопровождаться сопоставимым ростом качества преподавания, исследовательской подготовки и соответствия учебных программ запросам работодателей.



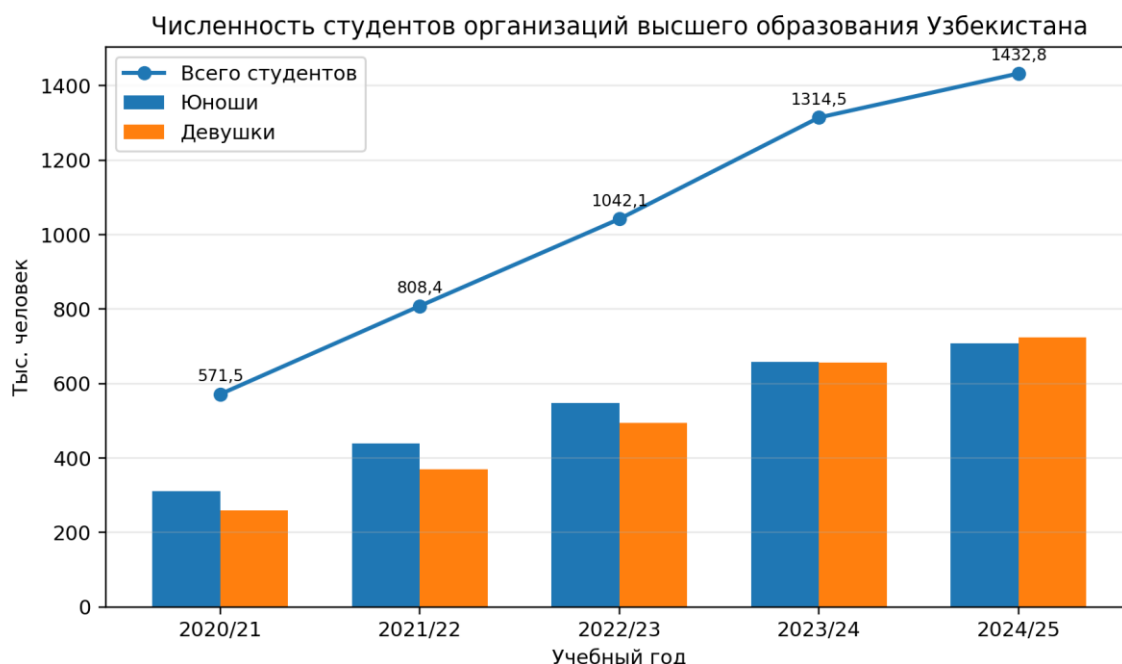


*Рисунок 2. Численность студентов организаций высшего образования Узбекистана, тыс. человек*

*Источник: составлено автором на основе данных Национального комитета Республики Узбекистан по статистике [7].*

Важным измерением человеческого капитала является научно-инновационная активность. По данным официальной статистики, в 2024 году в Узбекистане действовали 264 организации, выполнявшие научные исследования и разработки; численность работников, занятых НИОКР, составила 37 164 человека, а объем затрат на научные исследования и разработки достиг 1 574,1 млрд сумов [8]. Вместе с тем сохраняется территориальная концентрация исследовательского потенциала: на город Ташкент приходилось 40,5 % всех работников НИОКР. Это означает, что дальнейшее развитие человеческого капитала должно сопровождаться расширением региональной исследовательской базы и снижением дисбалансов между столицей и областями.

По международным данным Всемирного банка, индекс человеческого капитала Узбекистана составляет 0,6, что означает реализацию лишь части потенциальной производительности будущих работников при текущих параметрах образования и здоровья [5; 9].

**Таблица 1. Ключевые показатели, характеризующие человеческий капитал и инновационную среду Узбекистана**

| Показатель                                       | Значение | Год            | Интерпретация для инновационной экономики                                                            |
|--------------------------------------------------|----------|----------------|------------------------------------------------------------------------------------------------------|
| Индекс человеческого капитала (World Bank HSI)   | 0,6      | 2020           | Указывает на необходимость дальнейшего повышения качества образования и здоровья населения.          |
| Пользователи Интернета, % населения              | 89       | посл. доступн. | Высокий уровень цифровой включенности создает базу для развития цифровых навыков и онлайн-обучения.  |
| Охват высшим образованием населения 18–23 лет, % | 47,7     | 2024           | Свидетельствует о быстром расширении доступа к высшему образованию.                                  |
| Численность студентов вузов, тыс. человек        | 1 432,8  | 2024/2025      | Расширяет предложение квалифицированной рабочей силы, но усиливает требования к качеству подготовки. |
| Доля девушек среди студентов, %                  | 50,6     | 2024/2025      | Отражает рост гендерной сбалансированности в накоплении человеческого капитала.                      |
| Организации, выполняющие НИОКР, ед.              | 264      | 2024           | Формируют институциональную основу инновационного производства знаний.                               |
| Работники, занятые НИОКР, человек                | 37 164   | 2024           | Характеризуют масштаб научно-исследовательского кадрового потенциала.                                |
| Затраты на НИОКР, млрд сумов                     | 1 574,1  | 2024           | Показывают рост ресурсной базы науки, но требуют более высокой коммерциализации результатов.         |

**Источник:** составлено автором по данным Всемирного банка и Национального комитета Республики Узбекистан по статистике [5–9].

Одновременно наблюдается заметный рост цифровой включенности: доля пользователей Интернета в стране достигла 89 % населения по последним доступным данным Всемирного банка [9]. В совокупности это подтверждает, что институциональная основа для инновационного роста в стране укрепляется, однако дальнейший прогресс зависит от качества навыков, способности образовательных организаций формировать практические компетенции и эффективности каналов передачи знаний в экономику.

Представленные данные позволяют сделать два принципиальных вывода. Во-первых, в стране сформировалась устойчивая тенденция к наращиванию образовательного охвата и цифровой включенности населения.

Во-вторых, для перехода от количественного роста к качественно новой модели инновационного развития требуются меры по углублению исследовательской подготовки, развитию инженерных и управленческих компетенций, формированию предпринимательских навыков и усилению региональной доступности высококачественного образования.

**Приоритетные направления развития человеческого капитала:**

Первым приоритетом выступает переход от экстенсивного расширения системы образования к модели, основанной на качестве и результативности. Это предполагает регулярное обновление образовательных программ, более тесную увязку содержания обучения с перспективными секторами экономики, развитие модульных программ и механизмов независимой оценки компетенций. В инновационной экономике диплом теряет значение как самодостаточный сигнал, если не подкреплён реальными навыками анализа, коммуникации, проектной работы и использования цифровых инструментов. Второй приоритет связан с развитием системы непрерывного обучения. Быстрое устаревание знаний требует формирования институциональной модели *lifelong learning*, включающей курсы переподготовки, корпоративные образовательные программы, микроквалификации, онлайн-платформы и программы повышения квалификации для работников разных возрастных групп. Особое значение имеют цифровые и STEM-компетенции, а также умение работать в междисциплинарной среде.

Третьим направлением является углубление интеграции «университет — бизнес — государство». Для инновационной экономики критически важно, чтобы образовательные организации участвовали не только в подготовке кадров, но и в создании новых знаний, технологических решений и стартап-проектов. Это требует расширения исследовательских лабораторий, совместных кафедр, программ стажировок, прикладных магистратур, проектного обучения и инструментов коммерциализации результатов исследований. Четвертый приоритет — развитие социальной и территориальной инклюзивности человеческого капитала. Качественные образовательные, цифровые и научные возможности должны быть доступны не только в столице, но и в регионах. Региональная асимметрия доступа к современным лабораториям, интернет-инфраструктуре, языковой подготовке и практическим стажировкам снижает общенациональную отдачу от инвестиций в человеческий капитал.

Пятый приоритет состоит в внедрении результативной системы мониторинга. Государству и образовательным организациям необходима не только фиксация числа студентов и выпускников, но и измерение качества трудоустройства, уровня заработной платы, производительности, инновационной активности выпускников, доли коммерциализируемых исследований и уровня цифровых навыков. Именно такой подход позволяет оценивать реальную эффективность инвестиций в человеческий капитал.

*Таблица 2. Приоритетные направления политики развития человеческого капитала в инновационной экономике*

| Направление           | Основные инструменты                                                                       | Ожидаемый эффект                                                                 | Ключевой уровень реализации         |
|-----------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------|
| Качество образования  | Обновление учебных планов; независимая оценка компетенций; практико-ориентированные модули | Снижение разрыва между подготовкой выпускников и спросом экономики               | Вузы, регуляторы                    |
| Непрерывное обучение  | Программы переподготовки; микроквалификации; корпоративное обучение; EdTech                | Более быстрая адаптация работников к технологическим изменениям                  | Гос-во, бизнес, провайдеры обучения |
| Наука и инновации     | Лаборатории; гранты; исследовательские проекты; механизмы коммерциализации                 | Рост научной продуктивности и инновационной активности                           | Вузы, НИИ, бизнес                   |
| Цифровые навыки       | STEM-подготовка; цифровая грамотность; анализ данных; ИИ-инструменты                       | Формирование кадров для цифровой и платформенной экономики                       | Школы, вузы, центры подготовки      |
| Региональная инклюзия | Развитие интернет-инфраструктуры; удаленных форм обучения; стажировок                      | Снижение территориальных дисбалансов и расширение доступа к качественным услугам | Регионы, министерства               |
| Система мониторинга   | Трекинг трудоустройства выпускников; KPI по НИОКР; оценка цифровых навыков                 | Повышение отдачи от бюджетных и частных инвестиций                               | Гос-во, университеты                |

**Источник:** авторская разработка.

Таким образом, человеческий капитал в инновационной экономике следует рассматривать как многокомпонентную систему, объединяющую образование, здоровье, исследовательские способности, цифровую включенность, адаптивность и инновационную мотивацию. Для Узбекистана приоритет должен смещаться в сторону повышения качественной отдачи от уже достигнутого количественного роста. Это означает необходимость перехода от логики «расширения контингента» к логике «формирования компетентностной, исследовательской и предпринимательской среды», способной генерировать долгосрочный экономический эффект.

### **Заключение**

Проведенный анализ показывает, что Узбекистан создал заметный задел для развития человеческого капитала в инновационной экономике. Существенный рост охвата высшим образованием, увеличение численности студентов, расширение цифровой включенности населения и укрепление

научно-исследовательской инфраструктуры формируют базу для перехода к модели роста, основанной на знаниях. Однако количественные результаты сами по себе не гарантируют устойчивого инновационного эффекта. Ключевое значение приобретают качество образовательных результатов, региональная сбалансированность возможностей, глубина взаимодействия между университетами и бизнесом, а также способность экономики коммерциализировать новые знания.

Приоритетные направления дальнейшего развития должны включать: повышение качества и гибкости образовательных программ; развитие непрерывного обучения и цифровых навыков; поддержку науки и механизмов коммерциализации НИОКР; укрепление инклюзивной социальной инфраструктуры; внедрение системы оценки результативности инвестиций в человеческий капитал. Реализация данных направлений позволит усилить конкурентоспособность национальной экономики, повысить производительность труда и создать устойчивые предпосылки для долгосрочного инновационного роста.

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## **ОЦЕНКА ЭНЕРГЕТИЧЕСКОГО, ЭКОНОМИЧЕСКОГО И КЛИМАТИЧЕСКОГО ЭФФЕКТА ПРОЕКТОВ ПЕРЕРАБОТКИ ОТХОДОВ В ЭНЕРГИЮ В УЗБЕКИСТАНЕ**

***Аннотация:** в статье рассматриваются предпосылки и ограничения развития проектов по переработке отходов в энергию в Узбекистане. На основе официальных проектных параметров, нормативных актов и научных публикаций показано, что формирующийся сектор переработки отходов способен дать заметный энергетический эффект, сократить полигонную нагрузку и создать дополнительные инвестиционные стимулы. Вместе с тем итоговый климатический и экономический результат зависит от морфологического состава отходов, устойчивости их низшей теплоты сгорания, капиталоемкости объектов и места переработки в иерархии обращения с отходами. Сделан вывод о целесообразности развития переработки отходов в энергию как элемента интегрированной системы, а не как замены раздельному сбору и переработке.*

***Ключевые слова:** твёрдые бытовые отходы, переработка отходов в энергию, энергетическая утилизация, климатический эффект, электроэнергия, Узбекистан, устойчивое развитие.*

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## **ASSESSMENT OF THE ENERGY, ECONOMIC AND CLIMATE EFFECT OF WASTE-TO-ENERGY PROJECTS IN UZBEKISTAN**

***Abstract:** The paper examines the prerequisites and constraints for waste-to-energy development in Uzbekistan. Using official project parameters, regulatory documents and academic sources, it shows that the emerging WtE sector can generate a tangible energy effect, reduce landfill pressure and create additional investment incentives. At the same time, the final climate and economic outcome depends on waste composition, the stability of lower heating value, capital intensity*



*and the position of WtE within the waste hierarchy. The study concludes that WtE should be developed as part of an integrated waste management system rather than as a substitute for separate collection and recycling.*

**Keywords:** *municipal solid waste, waste-to-energy, energy recovery, climate effect, electricity generation, Uzbekistan, sustainable development.*

В условиях роста объёмов отходов и повышения требований к декарбонизации энергетики проекты переработки отходов в энергию приобретают для Узбекистана двойное значение: как инструмент сокращения захоронения и как дополнительный источник электроэнергии. По официальным материалам, в стране образуется около 35 млн м<sup>3</sup> твёрдых бытовых отходов в год, а к 2030 году в обновлённом Национальном Вкладе поставлены ориентиры по охвату 95% населения системой сбора ТБО и использованию 35% отходов для выработки энергии [1, 2]. Такая постановка вопроса переводит проблемы преобразования твердых бытовых отходов в энергию из разряда коммунальной практики в сферу энергетической и климатической политики.

Нормативная база Узбекистана в целом допускает такую траекторию. Стратегия обращения с твёрдыми бытовыми отходами на 2019-2028 годы закрепляет иерархию, в которой приоритет отводится предотвращению образования отходов, повторному использованию и переработке [1]. Закон Республики Узбекистан «Об отходах» рассматривает термическую обработку и сжигание как формы обезвреживания, но одновременно запрещает сжигание без специальных технических устройств и подчёркивает недопустимость захоронения отходов, для которых существуют технологии утилизации [3]. Следовательно, переработку отходов в энергию правомерно рассматривать не как альтернативу переработке, а как решение для остаточной, слабоутилизируемой фракции.

Практический поворот к переработке отходов связан с проектами 2025 года. В Ташкентской, Андижанской, Наманганской, Ферганской, Кашкадарьинской и Самаркандской областях заявлена совокупная мощность более 10 тыс. т ТБО в сутки. Для этих объектов предусмотрены договоры гарантированного выкупа электроэнергии и гарантированной поставки отходов сроком на 30 лет, что снижает сбытовой и сырьевой риск и делает сектор более предсказуемым для инвестора. Для Ташкентской области заявлены 2500 т/сут и 390 млн кВт·ч в год, для Андижанской, Кашкадарьинской и Самаркандской областей по 1500 т/сут и 240 млн кВт·ч в год, для Наманганской и Ферганской областей по 1500 т/сут и 227,5 млн кВт·ч в год [4-6].

Для первичной проверки энергетической состоятельности проектов можно использовать формулу удельной выработки электроэнергии. В методическом плане оценка эффективности сложных систем должна опираться на сопоставление затрат и результативности [7]. Она позволяет сопоставить заявленные проектные параметры с международным диапазоном

эффективности объектов, перерабатывающих отходы в энергию, который, по данным IPCC, обычно составляет 300-600 кВт·ч на 1 т ТБО [8].

$$E_{уд} = \frac{E_{год}}{Q_{сут} \times 365}$$

где  $E_{уд}$  – удельная выработка электроэнергии, кВт·ч/т;  $E_{год}$  – годовая выработка электроэнергии, кВт·ч;  $Q_{сут}$  – суточная мощность по приёму отходов, т/сут.

Результаты расчёта удобно представить в виде сопоставления проектных параметров, ожидаемой выработки электроэнергии и инвестиционной нагрузки по основным проектам по переработке отходов в Узбекистане.

Таблица 1.

**Сравнение проектных параметров и ожидаемого энергетического эффекта от переработки отходов в Узбекистане**

| Проект                                  | Мощность, т/сут | Выработка, млн кВт·ч/год | Удельная выработка, кВт·ч/т | Инвестиции, млн долл. США |
|-----------------------------------------|-----------------|--------------------------|-----------------------------|---------------------------|
| Ташкентская область                     | 2500            | 390,0                    | 427,4                       | 240                       |
| Андижанская область                     | 1500            | 240,0                    | 438,4                       | 110-140                   |
| Наманганская и Ферганская области       | 1500            | 227,5                    | 415,5                       | 141,5                     |
| Кашкадарьинская и Самаркандская области | 1500            | 240,0                    | 438,4                       | 150                       |

*Источник: составлено автором*

Таблица показывает, что заявленные узбекские проекты укладываются в интервал, который в международной методической литературе считается реалистичным для мусоросжигательных объектов. Средневзвешенная удельная выработка по этим параметрам составляет около 429,5 кВт·ч на 1 т ТБО, то есть находится в середине диапазона IPCC [8]. Это означает, что сами проектные показатели не выглядят завышенными. Одновременно видно, что экономический результат будет зависеть не столько от паспортной мощности, сколько от фактической загрузки, состава отходов и устойчивости их калорийности.

Ключевым ограничителем энергетического эффекта остаётся качество топливной базы. Для Урта-Чирчикского района Ташкентской области зафиксирована низшая теплота сгорания смешанных ТБО на уровне 2479,34 ккал/кг, то есть около 10,4 МДж/кг [9]. Это выше минимального порога 7 МДж/кг, который необходим для устойчивой работы мусоросжигателя без дополнительного топлива [10]. Однако международный опыт показывает, что при высокой влажности и изменчивости состава низшая теплота сгорания может снижаться до 6,133 МДж/кг, а после предварительной обработки

возрастать до 11,8 МДж/кг [10]. Отсюда следует, что в Узбекистане переработка отходов требует не только строительства печей и турбогенерации, но и развитой системы подготовки топлива: удаления инертных и влажных фракций, стабилизации состава и контроля сезонных колебаний.

Экономический эффект от переработки отходов в энергию для Узбекистана проявляется по нескольким каналам:

1. Речь идёт о замещении части традиционной генерации и сокращении полигонной нагрузки.

2. Крупные проекты формируют спрос на оборудование, строительство, обслуживание и занятость. В частности, для андижанского завода указано около 100 рабочих мест.

3. 30-летние обязательства по выкупу электроэнергии и поставке отходов снижают неопределённость денежного потока.

В то же время высокая капиталоемкость очевидна уже по проектным сметам: от 110 до 240 млн долл. США на объект [4-6]. Это означает, что финансовая устойчивость переработки будет зависеть от сочетания тарифа на электроэнергию, платы за приём отходов и фактической загрузки мощностей.

Климатический эффект от переработки отходов в энергию неоднозначен, но в узбекском контексте потенциально значим. По материалам IPCC, полный выброс при сжигании 1 т ТБО составляет 0,7-1,2 т CO<sub>2</sub>, однако климатически релевантная, то есть фоссильная, доля оценивается примерно в 0,415 т CO<sub>2</sub> на 1 т ТБО [8]. При этом при коэффициенте полезного использования энергии не ниже примерно 25% и замещении ископаемой генерации переработкой отходов в энергию может быть климатически нейтрален или предпочтителен по сравнению с традиционными тепловыми станциями. Для Узбекистана это означает, что климатический результат зависит не от самого факта сжигания, а от технологической конфигурации станции и от того, насколько переработка сокращает полигонные выбросы и реально вытесняет углеродоёмкую генерацию.

С учётом изложенного место переработки отходов в энергию в системе обращения с отходами Узбекистана должно быть строго функциональным. Его задача состоит в утилизации остаточного потока после отбора пригодных для переработки фракций, а не в конкуренции с рециклингом. Именно такое понимание согласуется и с действующим Законом «Об отходах», и со Стратегией 2019-2028, и с целевыми ориентирами национально определяемого вклада [1-3]. Наиболее рациональная модель для страны включает отдельный сбор, сортировку, извлечение вторичных ресурсов, биологическую обработку органической части там, где это возможно, и энергетическую утилизацию остатка с приемлемой калорийностью.

В заключении следует отметить, что проекты по переработке в Узбекистане обладают реальным энергетическим и инфраструктурным потенциалом. Их заявленные показатели по удельной выработке

электроэнергии в целом соответствуют приемлемому диапазону, а институциональная модель с долгосрочными гарантиями выкупа и поставки отходов создаёт основу для привлечения инвестиций. Вместе с тем эффективность переработки отходов в энергию не является автоматической. Она определяется качеством топливной базы, уровнем предобработки отходов, капитальными затратами и достижимым коэффициентом полезного действия. Поэтому для Узбекистана оптимален сценарий, при котором переработка развивается как часть интегрированной иерархии обращения с отходами, поддерживает климатические цели страны, но не подменяет переработку и предотвращение образования отходов.

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## **РОЛЬ ЭМОЦИОНАЛЬНО-ЭКСПРЕССИВНОЙ ЛЕКСИКИ В СОЗДАНИИ ХУДОЖЕСТВЕННЫХ ОБРАЗОВ В ПОВЕСТИ Н. АБГАРЯН «МАНЮНЯ»**

**Аннотация:** В данной статье рассматривается роль эмоционально-экспрессивной лексики в создании художественных образов в повести Н. Абгарян «Манюня». Исследование выполнено в рамках лингвостилистического анализа художественного текста. Особое внимание уделяется языковым средствам, передающим эмоциональное состояние персонажей, их внутренние переживания, психоэмоциональные особенности и индивидуальные черты характера.

В статье анализируются такие элементы, как междометия, оценочная лексика, разговорные и просторечные выражения, а также экспрессивные синтаксические конструкции, активно используемые автором для создания ярких и запоминающихся образов. На основе конкретных примеров из текста показано, что эмоционально-экспрессивная лексика выполняет не только коммуникативную, но и важную эстетическую функцию, усиливая выразительность художественного произведения и обеспечивая его эмоциональное воздействие на читателя.

Особое место в исследовании занимает анализ детской речи, характерной для персонажей повести, а также юмористических и иронических элементов, которые способствуют раскрытию образов и формированию особой художественной атмосферы произведения. Делается вывод о том, что использование эмоционально-экспрессивной лексики является одним из ключевых средств создания художественной образности в творчестве Н. Абгарян.

**Ключевые слова:** эмоционально-экспрессивная лексика, художественный образ, Н. Абгарян, «Манюня», лингвостилистический анализ, разговорная речь, междометия, оценочная лексика, экспрессивные средства, персонаж, художественный текст, эмоциональность, образность, эстетическая функция

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## THE ROLE OF EMOTIONAL-EXPRESSIVE VOCABULARY IN THE CREATION OF ARTISTIC IMAGES IN N. ABGARYAN'S NOVELLA "MANYUNYA"

**Abstract:** *This article examines the role of emotional and expressive vocabulary in the creation of artistic images in N. Abgaryan's novella "Manyunya." The study is conducted within the framework of linguo-stylistic analysis of a literary text. Particular attention is paid to linguistic means that convey the emotional states of characters, their inner experiences, psychological features, and individual traits.*

*The paper analyzes such elements as interjections, evaluative vocabulary, colloquial and informal expressions, as well as expressive syntactic constructions actively used by the author to create vivid and memorable characters. Based on textual examples, it is demonstrated that emotional and expressive vocabulary performs not only a communicative function but also an important aesthetic function, enhancing the expressiveness of the literary work and intensifying its emotional impact on the reader.*

*Special emphasis is placed on the analysis of children's speech characteristic of the characters in the novella, as well as humorous and ironic elements that contribute to character development and the formation of a unique artistic atmosphere. The study concludes that the use of emotional and expressive vocabulary is one of the key means of creating artistic imagery in N. Abgaryan's work.*

**Keywords:** *emotional-expressive vocabulary, artistic image, N. Abgaryan, Manyunya, linguo-stylistic analysis, colloquial speech, interjections, evaluative vocabulary, expressive means, character, literary text, emotionality, imagery, aesthetic function*

Язык художественной литературы отличается особой выразительностью и образностью, что обусловлено его направленностью на создание эстетического воздействия на читателя. В этом контексте важную роль играет эмоционально-экспрессивная лексика, которая позволяет не только передавать информацию, но и выражать чувства, переживания, оценку и отношение автора к изображаемой действительности. Именно через такие языковые средства формируется художественный образ, раскрывается внутренний мир персонажей и усиливается эмоциональное воздействие произведения.<sup>26</sup>

В современной литературе, особенно в произведениях, посвящённых детству, роль эмоционально-экспрессивной лексики значительно возрастает. Это связано с тем, что детская речь отличается высокой степенью эмоциональности, непосредственности и спонтанности. В этом отношении особый интерес представляет творчество Наринэ Абгарян, в частности её

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<sup>26</sup> Лакофф Дж., Джонсон М. *Метафоры, которыми мы живём*. — М.: Прогресс, 2004

повесть «Манюня», в которой с большой теплотой и юмором изображён мир детства.

Повесть «Манюня» представляет собой яркий пример использования разговорной и эмоционально насыщенной речи для создания живых и запоминающихся образов. Автор активно использует междометия, оценочную лексику, разговорные выражения и экспрессивные конструкции. Например, такие реплики, как: «Ой, мама, что же теперь будет!», «Ну всё, нам конец!», «Это было ужасно смешно!» позволяют передать эмоциональное состояние персонажей, их страх, радость или удивление. Эти языковые единицы не только усиливают выразительность текста, но и способствуют более глубокому раскрытию характеров героев.

Проблема эмоционально-экспрессивной лексики широко освещена в трудах известных лингвистов. Так, Виктор Виноградов подчёркивал, что язык художественной литературы направлен прежде всего на создание образа, а экспрессивные средства являются важнейшим инструментом художественной выразительности.<sup>27</sup> В свою очередь, Ирина Арнольд в рамках стилистики современного русского языка подробно анализирует функции эмоционально окрашенной лексики и её роль в формировании эстетического эффекта текста

Особенностью повести «Манюня» является широкое использование разговорной речи, что делает текст максимально приближенным к реальному общению. Речь персонажей насыщена экспрессивными элементами, которые передают не только информацию, но и эмоциональное отношение говорящего. Например, в речи бабушки часто встречаются резкие, но комически окрашенные выражения, которые создают яркий и запоминающийся образ. Подобные языковые средства позволяют автору индивидуализировать речь персонажей и сделать их образы более реалистичными.

Отдельного внимания заслуживает детская речь, представленная в произведении. Она характеризуется обилием междометий, повторов, усилительных конструкций и эмоционально окрашенных слов. Реплики типа «Я же тебе говорила!», «Это было просто ужасно смешно!» отражают непосредственность и эмоциональность восприятия мира детьми. Благодаря этому создаётся эффект подлинности и живости изображаемых событий.

С точки зрения лингвистики, эмоционально-экспрессивная лексика выполняет как коммуникативную, так и эстетическую функцию. С одной стороны, она передаёт субъективное отношение говорящего к предмету речи, с другой — усиливает художественную выразительность текста и способствует созданию образности. Именно поэтому её роль в художественном произведении трудно переоценить.<sup>28</sup>

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<sup>27</sup> Виноградов В.В. *О языке художественной литературы*. — М.: Наука, 1971.

<sup>28</sup> Абгарян Н. *Манюня*. — М.: АСТ, 2010.

Актуальность данного исследования обусловлена тем, что в современной лингвистике всё больше внимания уделяется изучению языковых средств художественной выразительности, однако анализ эмоционально-экспрессивной лексики в творчестве Н. Абгарян остаётся недостаточно разработанным. Повесть «Манюня» представляет собой богатый материал для такого анализа, поскольку в ней широко представлены различные виды экспрессивной лексики.

Целью настоящей работы является выявление роли эмоционально-экспрессивной лексики в создании художественных образов в повести «Манюня», а также анализ её функциональных и стилистических особенностей. В ходе исследования предполагается рассмотреть основные виды экспрессивных языковых средств, определить их функции и показать их значение в формировании художественного образа.

Таким образом, изучение эмоционально-экспрессивной лексики в повести Н. Абгарян «Манюня» позволяет глубже понять механизмы создания художественной образности и выявить особенности авторского стиля.

Эмоционально-экспрессивная лексика является одним из ключевых средств создания художественного образа в литературном произведении. В повести Н. Абгарян «Манюня» она выполняет не только вспомогательную, но и основную функцию, формируя эмоциональный фон текста, раскрывая внутренний мир персонажей и усиливая выразительность повествования.

Прежде всего, необходимо отметить, что эмоционально-экспрессивная лексика в данном произведении тесно связана с разговорной речью. Автор сознательно использует элементы живой, повседневной коммуникации, что придаёт тексту естественность и достоверность. В частности, междометия играют важную роль в передаче эмоциональных состояний персонажей. Например, в репликах героев часто встречаются такие выражения, как: «Ой, мама!», «Ай-ай-ай!», «Ну всё!» — они позволяют мгновенно передать страх, удивление или отчаяние. Подобные языковые единицы выступают как маркеры эмоциональной реакции и усиливают экспрессивность высказывания.

Согласно теоретическим положениям Ирина Арнольд, эмоционально окрашенная лексика выполняет функцию субъективной оценки и способствует созданию эстетического эффекта текста.<sup>29</sup> В повести «Манюня» эта функция реализуется через широкое использование оценочных слов и выражений. Например, такие конструкции, как «ужасно смешно», «страшно интересно», «безумно обидно» демонстрируют не только факт, но и отношение персонажа к происходящему. Усилительные наречия («ужасно», «страшно», «безумно») играют важную роль в формировании экспрессивности высказывания, делая его более эмоционально насыщенным.

Кроме того, значительную роль в создании художественных образов играет детская речь, которая в повести представлена особенно ярко. Детская

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<sup>29</sup> Арнольд И.В. *Стилистика современного русского языка*. — М., 2002

речь характеризуется спонтанностью, непосредственностью и высокой степенью эмоциональности. В тексте часто встречаются повторы, усилительные конструкции и эмоционально окрашенные высказывания: «Я же тебе говорила!», «Это было просто ужасно смешно!». Такие реплики передают живость детского восприятия мира и способствуют созданию реалистичных и убедительных образов.

Особое внимание следует уделить юмору и иронии как важным компонентам эмоционально-экспрессивной лексики. В повести «Манюня» комический эффект достигается за счёт сочетания экспрессивной лексики с неожиданными ситуациями и гиперболизацией. Например, в описаниях бытовых ситуаций часто используются преувеличения, которые усиливают комический эффект: персонажи могут описывать обычное событие как «катастрофу» или «конец света». Подобные приёмы не только вызывают улыбку у читателя, но и способствуют более глубокому раскрытию характера героев.

Важным элементом является также речь взрослых персонажей, особенно бабушки, которая отличается высокой степенью экспрессивности. В её высказываниях часто присутствуют резкие, но эмоционально окрашенные выражения, которые придают образу яркость и индивидуальность. Например, её реплики могут сочетать в себе строгость и юмор, что делает её образ многогранным и запоминающимся. Таким образом, экспрессивная лексика выступает средством индивидуализации речи персонажей.

С точки зрения теории, Виктор Виноградов отмечал, что язык художественной литературы характеризуется особой выразительностью, направленной на создание образа.<sup>30</sup> В этом контексте эмоционально-экспрессивная лексика становится одним из основных инструментов художественного воздействия. В повести «Манюня» это проявляется в том, что практически каждый персонаж обладает своим уникальным речевым стилем, сформированным за счёт использования определённых экспрессивных средств.

Следует также отметить роль синтаксических средств в усилении экспрессивности. К ним относятся восклицательные предложения, неполные конструкции, повторы. Например: «Ну всё! Нам конец!», «Я не могу! Это невозможно!» — подобные структуры передают динамику речи и эмоциональное напряжение. Они создают эффект живого диалога и усиливают вовлечённость читателя в происходящее.

Кроме того, эмоционально-экспрессивная лексика способствует созданию особой атмосферы произведения. Повесть «Манюня» наполнена теплотой, ностальгией и юмором, и именно язык играет ключевую роль в передаче этих ощущений. Через эмоционально окрашенные слова и выражения автор создаёт ощущение близости и доверия между текстом и читателем.

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<sup>30</sup> Виноградов В.В. *О языке художественной литературы*. — М., 1971.

Важно подчеркнуть, что экспрессивная лексика в произведении не является случайной. Она системно организована и подчинена общей художественной задаче — созданию ярких, живых и запоминающихся образов. Каждый элемент языка выполняет определённую функцию и способствует раскрытию авторского замысла.

Таким образом, анализ повести Н. Абгарян «Манюня» показывает, что эмоционально-экспрессивная лексика является одним из основных средств создания художественного образа. Она обеспечивает выразительность текста, раскрывает внутренний мир персонажей, формирует их индивидуальность и усиливает эмоциональное воздействие произведения на читателя.

Проведённый анализ повести Н. Абгарян «Манюня» показал, что эмоционально-экспрессивная лексика играет важную роль в создании художественных образов и формировании общей выразительности текста. Она не только передаёт эмоциональные состояния персонажей, но и способствует раскрытию их внутреннего мира, индивидуальных особенностей и характера.

В произведении активно используются различные виды экспрессивных средств: междометия, оценочная лексика, разговорные выражения, усилительные конструкции, а также экспрессивные синтаксические формы. Эти элементы позволяют передать широкий спектр эмоций и делают речь персонажей живой, естественной и достоверной. Особенно ярко это проявляется в детской речи, которая отличается непосредственностью, искренностью и эмоциональной насыщенностью.

Значительную роль в создании образов играет и речь взрослых персонажей, отличающаяся индивидуальностью и выразительностью. Использование эмоционально окрашенных выражений, юмора и иронии способствует формированию запоминающихся и многогранных образов. Комический эффект, достигаемый за счёт экспрессивной лексики, усиливает художественное воздействие произведения на читателя.

Таким образом, эмоционально-экспрессивная лексика выполняет как коммуникативную, так и эстетическую функцию, обеспечивая выразительность текста и способствуя созданию художественной образности. Её использование в повести «Манюня» является системным и целенаправленным, что позволяет автору создавать яркие, реалистичные и эмоционально насыщенные образы.

В целом можно заключить, что эмоционально-экспрессивная лексика является одним из ключевых средств художественной выразительности и важным элементом авторского стиля Н. Абгарян.

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## **ҚОРАҚАЛПОҒИСТОН ШАРОИТИДА СОЯ НАВЛАРИНИ БАҲОРГИ МУДДАТДА ЭКИБ ЕТИШТИРИШ**

**Аннотация.** Мақолада соя навларининг маҳаллий шароитларга мослашувчанлигини ҳисобга олган ҳолда, минтақаларнинг экологик зоналари бўйича тўғри жойлаштириб етиштириш масаласи кўриб чиқилган. Тадқиқотда вегетация даври 111 кундан 115 кунгача бўлган, ерта пишир ва ҳосилдор “Тўмарис Ман-60” ва “Ойжамол” навлари қўлланилган.

**Калит сўзлар:** континентал климат, метеорологиялик фактор, шўрланиш, ерларнинг мелиоратив ҳолати, соя, нав, намуна, эрта пишир, ўсиш, ривожланиш, ҳосилдорлик

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## **SPRING PLANTING OF SOYBEAN VARIETIES IN KARAKALPOKISTAN**

**Abstract.** The article discusses the issue of the correct placement of varieties according to the ecological zones of the regions, taking into account the adaptability of the variety to local conditions. As result of the study, the early-ripening and high-yielding varieties "Toomaris Man-60" and "Oyjamol» were identified, where the growing season ranged from 111 to 115 days. For production, the varieties that can produce high and stable yields in a given are of the greatest value.

**Keywords:** continental climate, meteorological factor, salinity, land reclamation, shading, variety, sample, precocity, growth, development, productivity.

**Кириш.** Аҳоли сонининг доимий равишда ортиб бориши, ер юзида глобал иқлимнинг ўзгариши ва саноатнинг ривожланиши ҳисобига қишлоқ хўжалиги маҳсулотларига бўлган талаб ҳам ортиб бормоқда.

Ҳозирги кунда дунё деҳқончилигида соя етиштириш бўйича етакчилик қилувчи мамлакатларда, ҳар бир ҳудуднинг тупроқ - иқлим шароитларидан келиб чиқиб асосий ва такрорий экин сифатида мақбул экин муддатларида парваришланиб, минерал ўғитлар билан озиклантиришни тўғри йўлга қўйилиши ҳисобига, юқори ва сифатли дон ҳосили олишга эришилмоқда.

Соядан олинадиган ҳосилдорликни янада ошириб бориш учун, уни парваришлаш агротехнологияларини такомиллаштириб бориш, жумладан,

уни мақбул экиш муддати, кўчат қалинлиги ва ўғитлаш меъёрларини ҳар бир худуднинг тупроқ-иқлим шароитларидан келиб чиққан ҳолда тўғри белгилаш, муҳим вазифалардан ҳисобланади.

Ҳарқандай нав ўз имкониятларини фақат уларнинг талабларига жавоб берадиган шароитларга жойлаштирилганда кўрсатиши мумкин [1].

Нав, етиштириш зонасининг тупроқ ва иқлим шароитларига яхши мослашган, юқори ҳосилдор ва яхши дон сифатига ега бўлиши керак [2].

Соя навларининг биометрик кўрсаткичларига экиш муддати ва меъёрлари кучли таъсир қилади, экиш даврининг кечикиши билан ҳосилдорлик кўрсаткичлари сезиларли даражада камаяди [3].

Кун давомида ҳарорат ва намликнинг ўзгариши тугунларнинг азот тўплаш фаоллигига кучли таъсир қилади [4].

Ҳар қандай нави экиб етиштиришда, агротехника қоидаларига тўғри амал қилинса, у ҳеш қачон ҳосилдорлик имкониятларини йўқотмайди [5].

**Тадқиқот услублари.** Экиш, ушбу зона учун мақбул вақтда 60 см қатор оралиғида, 60х5-1 тизимида, ҳар бир нав 50 м<sup>2</sup> пайкалларга экилди. Уруғларнинг йирик-майдалигидан келиб чиққан ҳолда гектарига 80 кг (гектарига ўртача 330-400 минг туп кўчат) ҳисобидан экилди.

Тажриба майдонида тупроқни тузсизлантириш учун гектарига 1500-1800 м<sup>3</sup> меъёрда икки марта шўр ювиш амалга оширилди. Ерни ҳайдаш олдидан фосфорли-калийли ўғитларнинг 50 %-и шудгор остига солинди. Апрель ойининг учинчи ўн кунлигида 22-25 см чуқурликда шудгорлаш амалга оширилди.

**Натижалар ва мунозара.** Баҳорги м удатда экилган соя навларининг ривожланиш даврларини давомийлиги, азотли ўғитлар меъёрларини ошириб борилиши билан, узайиб борди. Соя навларининг майса ҳосил қилиш даври бир хил бўлганлиги билан, ўсимликнинг шоналаш давридан бошлаб фарқланишлар кузатила бошлади.

Шоналаш фазаси “Тўмарис Ман-60” навида, “Ойжамол” навиға нисбатан 2 кун кечикиб бошланди. Навларнинг дуккак ҳосил қилиш вақти бўйича “Ойжамол” нави “Тўмарис Ман-60” навидан 3-4 кун эрта эканлиги кузатилди. Соя навларининг пишиш даврига тўлиқ ўтиши, август ойининг иккинчи ярмига тўғри келди.

Гуллаш-дуккак ҳосил қилиш даврида ўсимликнинг бўйи “Тўмарис Ман-60” навида 41,0-51,6 см ни, битта ўсимликдаги ҳосил шоҳлари сони 2,2-3,3 дона ни, дуккаклар сони 15,2-29,3 донани ташкил этган бўлса, “Ойжамол” навида ўсимликнинг бўйи 38,0-50,0 см ни, битта ўсимликдаги ҳосил шоҳлари сони 2,0-3,3 дона ни, дуккаклар сони 14,3-27,3 донани ташкил этди.

Соя навларини гуллаш-дуккак ҳосил қилиш даврида унинг ўсиши ва ривожланиши бўйича энг юқори кўрсаткичлар, минерал ўғитларнинг N<sub>120</sub> P<sub>90</sub> K<sub>60</sub> кг/га меъёри қўлланилганда кузатилиб, “Тўмарис Ман-60” навида ўсимликнинг бўйи 50,0 см ни, битта ўсимликдаги ҳосил шоҳлари сони 3,3 дона ни, дуккаклар сони 29,3 донани ни ташкил этган бўлса, “Ойжамол навида

ўсимликнинг бўйи 50,0 см ни, битта ўсимликдаги ҳосил шоҳлари сони 3,3 дона ни, дуккаклар сони 27,3 донани ташкил этди.

Соянинг “Тўмарис Ман-60” ва “Ойжамол” навларини парваришlashда қўлланиладиган минерал ўғитлар меъёрлари, ўсимликнинг вегетатив ва генератив органлари таркибидаги озика моддалар миқдорларига таъсир кўрсатиши кузатилиб, минерал ўғитларнинг  $P_{90}$   $K_{60}$  кг/га меъёри қўлланилганда, азотли ўғитлар меъёрларининг гектарига 30 килограмдан 150 килограмгача ошириб борилиши, ўсимлик қисмларидаги NPK миқдорларини ҳам ортиб боришини таъминлади.

Соя навларидан олинган дон ҳосили бўйича энг юқори кўрсаткичлар минерал ўғитларнинг  $N_{120}$   $P_{90}$   $K_{60}$  кг/га меъёрлари қўлланилган вариантларда кузатилиб, “Тўмарис Ман-60” навида 26,1-27,7 ва “Ойжамол” навида 25,3-26,6 ц/га ни ташкил этди.

Маълумки, экин туридан қатъий назар уларни парваришlashда қўлланиладиган агротехнологик тадбирлар, ўсимликнинг ўсиши, ривожланиши ва ҳосилдорлигига таъсир кўрсатибгина қолмасдан, балки улардан олинадиган ҳосилнинг сифат кўрсаткичларига ҳам таъсир қилади.

Соя навларидан олинган доннинг сифат кўрсаткичлари таҳлил қилинганда, унинг таркибидаги оксил миқдори бўйича энг юқори кўрсаткичлар, минерал ўғитларнинг  $N_{120}$   $P_{90}$   $K_{60}$  кг/га меъёрлари қўлланилганда кузатилиб, “Тўмарис Ман-60” навида 42,5 % ни ташкил этди. Соя ўсимлигига ўғит берилмаганда, оксил миқдори 38,3 % ни, минерал ўғитларнинг  $P_{90}$   $K_{60}$  кг/га меъёри қўлланилган вариантда эса 39,2 % ни ташкил этганлиги кузатилди.

Соянинг “Ойжамол” навининг дони таркибидаги оксил миқдори бўйича ҳам энг юқори кўрсаткичлар минерал ўғитнинг  $N_{120}$   $P_{90}$   $K_{60}$  кг/га меъёри қўлланилганда кузатилиб, 41,8 % ни ташкил этди ва ўғитламаган вариантга нисбатан 3,7-4,4 % га юқори бўлганлиги аниқланди.

Соя навлари донининг таркибидаги мой миқдори таҳлил қилинганда, оксил миқдори ошган сари мой миқдорини камайиб борганлиги аниқланди. Соянинг “Тўмарис Ман-60” навида, доннинг таркибидаги мой миқдори бўйича энг юқори кўрсаткичлар минерал ўғитларнинг  $N_{60}$   $P_{90}$   $K_{60}$  кг/га меъёрлари қўлланилганда кузатилиб, 24,5 % ни ташкил этди ва ўғитланмаганга нисбатан 2,2 % га юқори бўлди.

Вегетация охирида олинган маълумотларга кўра, тупроқдаги гумус миқдори ҳайдов (0-30 см) қатламида соя навларини парваришlashда минерал ўғитлар қўлланилмаганда, 1,013-1,014 фоизни ташкил этган бўлса, минерал ўғитларнинг  $P_{90}$   $K_{60}$  кг/га меъёрида қўлланган вариантларда 1,016-1,017 фоизни ташкил этди. Минерал ўғитларнинг  $N_{30}$   $P_{90}$   $K_{60}$  кг/га меъёри қўлланилганда гумус миқдори 1,021 фоизни ташкил этиб, дастлабки кўрсаткичларга нисбатан 0,001 фоизга ортишини таъминлаган бўлса, минерал ўғитларнинг  $N_{120}$   $P_{90}$   $K_{60}$  кг/га меъёри қўлланилганда 0,011-0,013 фоизга, минерал ўғитларнинг  $N_{150}$   $P_{90}$   $K_{60}$  кг/га меъёри қўлланилганда эса 0,014-0,015 фоизга, ортганлиги аниқланди.

**Хулоса.** Ҳар қандай қишлоқ хўжалик экини амал даври давомида тупроқдан сезиларли равишда озика элементларини олиб чиқиб кетади. Ўсимликни ҳосили йиғиштириб ёки ўриб олингандан кейин маълум миқдордаги озика элементлари ўсимликнинг анғиз (қолдиқ поя) ва илдиз қолдиқлари орқали органик модда сифатида тупроққа қайтади.

Соя навларини баҳорги муддатларда парвариш қилиш жараёнида қўлланиладиган минерал ўғитлар меъёрлари, тупроқнинг агрокимёвий хоссаларига таъсир кўрсатиб, минерал ўғитларнинг  $N_{120} P_{90} K_{60}$  ва  $N_{150} P_{90} K_{60}$  кг/га меъёрларда қўлланилиши, гумус миқдорини 0,011-0,015 фоизга, умумий азот миқдорини 0,011-0,014 фоизга, умумий фосфор миқдорини эса 0,008-0,015 фоизга ортишини таъминлади.

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## **ТЕХНОЛОГИЯ РАЗВИТИЯ СОЦИОКУЛЬТУРНОЙ КОМПЕТЕНТНОСТИ У БУДУЩИХ УЧИТЕЛЕЙ НАЧАЛЬНЫХ КЛАССОВ НА ОСНОВЕ АКСИОЛОГИЧЕСКОГО ПОДХОДА**

***Аннотация:** В статье рассматривается технология развития социокультурной компетентности у будущих учителей начальных классов на основе аксиологического подхода. Актуальность темы определяется возрастанием требований к личностной, культурной и ценностной готовности педагога начального образования в условиях усложнения образовательной среды и усиления воспитательной функции школы. Цель статьи состоит в теоретическом обосновании структуры социокультурной компетентности будущего учителя начальных классов, уточнении её аксиологического основания и раскрытии технологических механизмов её развития в системе профессиональной подготовки. Исследование носит теоретический характер и основано на анализе психолого-педагогических источников, сопоставлении научных подходов, систематизации позиций ведущих авторов и логико-структурном моделировании. Показано, что социокультурная компетентность будущего учителя начальных классов представляет собой интегративное образование, включающее ценностно-смысловой, когнитивный, коммуникативный, рефлексивный и поведенческий компоненты. Обосновано, что аксиологический подход задаёт не внешний идеологический фон подготовки, а принцип отбора содержания, организации взаимодействия и оценки готовности будущего педагога к профессиональной деятельности в культурно неоднородной и нормативно насыщенной образовательной среде. Выделены основные элементы технологии развития данной компетентности. К ним отнесены ценностная интеграция содержания дисциплин, рефлексивный анализ педагогических ситуаций, диалогические и кооперативные формы обучения, включение семейно- и социокультурно ориентированных практик, а также формирование устойчивой педагогической саморегуляции. Практические следствия сформулированы в пределах доказанного и не выходят за рамки теоретического анализа.*

***Ключевые слова:** социокультурная компетентность, будущий учитель начальных классов, аксиологический подход, педагогическая технология, ценности, профессиональная подготовка, культурная среда, педагогическое взаимодействие.*



**TECHNOLOGY FOR THE DEVELOPMENT OF  
SOCIOCULTURAL COMPETENCE IN FUTURE PRIMARY SCHOOL  
TEACHERS BASED ON THE AXIOLOGICAL APPROACH**

**Abstract:** *The article examines the technology for the development of sociocultural competence in future primary school teachers based on the axiological approach. The relevance of the topic is determined by the increasing demands on the personal, cultural, and value-based readiness of the primary school teacher in the context of the growing complexity of the educational environment and the strengthening of the school's educational function. The purpose of the article is to provide a theoretical substantiation of the structure of the sociocultural competence of the future primary school teacher, to clarify its axiological foundation, and to reveal the technological mechanisms of its development within the system of professional training. The study is theoretical in nature and is based on the analysis of psychological and pedagogical sources, the comparison of scientific approaches, the systematization of the positions of leading authors, and logical-structural modeling. It is shown that the sociocultural competence of the future primary school teacher is an integrative formation that includes value-semantic, cognitive, communicative, reflective, and behavioral components. It is substantiated that the axiological approach does not serve as an external ideological background of training, but as a principle for selecting content, organizing interaction, and assessing the future teacher's readiness for professional activity in a culturally heterogeneous and normatively saturated educational environment. The main elements of the technology for developing this competence are identified. These include the value-based integration of disciplinary content, reflective analysis of pedagogical situations, dialogical and cooperative forms of learning, the inclusion of family- and socioculturally oriented practices, as well as the formation of stable pedagogical self-regulation. The practical implications are formulated within the limits of what has been demonstrated and do not go beyond the framework of theoretical analysis.*

**Keywords:** *sociocultural competence, future primary school teacher, axiological approach, pedagogical technology, values, professional training, cultural environment, pedagogical interaction*

Конец формы

**Введение**

Современная подготовка будущего учителя начальных классов не может ограничиваться усвоением предметного содержания и методики преподавания. Начальная школа является пространством первичной культурной социализации ребёнка, а потому педагог здесь выступает не только транслятором знаний, но и носителем ценностной нормы, образцом



коммуникации, посредником между семьёй, школой и обществом. Вследствие этого социокультурная компетентность будущего учителя приобретает статус одного из базовых результатов профессиональной подготовки [14–17].

В научной литературе данная проблема раскрывается в нескольких связанных плоскостях. Во-первых, через духовно-нравственное воспитание и роль национальных ценностей в образовательном процессе [1; 3; 24; 25]. Во-вторых, через развитие социокультурной компетентности у будущих педагогов и факторов её становления [15–17]. В-третьих, через психологические основания профессионального поведения, включая самооценку, защитные механизмы, личностные предикторы поведения, внимание, эмоционально-познавательную регуляцию [4–8; 12; 13]. В-четвёртых, через проблематику педагогического взаимодействия и социального интеллекта [19; 22]. Однако при наличии тематически близких исследований сохраняется необходимость в концептуализации именно технологии развития социокультурной компетентности на основе аксиологического подхода как внутренне целостной системы.

Цель статьи состоит в теоретическом обосновании технологии развития социокультурной компетентности у будущих учителей начальных классов на основе аксиологического подхода.

#### **Задачи статьи**

1. уточнить исходные определения
2. выделить релевантные психологические и педагогические теории
3. систематизировать научные подходы и школы
4. раскрыть внутреннюю структуру социокультурной компетентности
5. определить спорные вопросы и междисциплинарные связи
6. сформулировать практические следствия в пределах доказанного.

#### **Материалы и методы**

Статья имеет теоретико-аналитический характер. Используются методы понятийного анализа, сравнительно-сопоставительного рассмотрения научных позиций, логико-структурного моделирования, а также метод научного обобщения источников [1–25]. Работа не содержит эмпирической верификации эффективности предложенной технологии. Все выводы ограничены уровнем теоретического анализа и не интерпретируются как экспериментально установленные эффекты.

# 1. Исходные определения

**Таблица 1. Исходные определения, принятые в статье**

| Понятие                                                           | Рабочее определение                                                                                                                                                                                     | Аналитическая функция             |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Социокультурная компетентность будущего учителя начальных классов | интегративная способность понимать, принимать и профессионально реализовывать культурно и ценностно обусловленные нормы педагогического взаимодействия в системе «ребёнок — семья — школа — сообщество» | задаёт предмет анализа            |
| Аксиологический подход                                            | методологическая позиция, согласно которой содержание, организация и результаты подготовки рассматриваются через систему ценностей и их педагогическую интериоризацию                                   | задаёт принцип интерпретации      |
| Технология развития                                               | воспроизводимая система целей, этапов, средств, форм и процедур педагогической организации, обеспечивающих направленное становление заданной компетентности                                             | задаёт процессуальный уровень     |
| Ценностно-смысловой компонент                                     | система педагогически значимых ориентиров, регулирующих отношение будущего учителя к ребёнку, культуре, семье, профессии и социальной ответственности                                                   | раскрывает мировоззренческое ядро |
| Рефлексивный компонент                                            | способность к анализу собственных педагогических действий, культурных установок и коммуникативных последствий                                                                                           | задаёт механизм самокоррекции     |

Такое определение позволяет избежать двух методологических ошибок. Первая состоит в сведении социокультурной компетентности к общему культурному уровню личности. Вторая — в её редукции к набору внешних коммуникативных навыков. В научно корректной постановке речь идёт об интегративном образовании, включающем знание, ценность, рефлексию и поведенческую реализацию.

## 2. Психологические и педагогические теории, значимые для темы

Проблема развития социокультурной компетентности будущего учителя начальных классов раскрывается на пересечении педагогики воспитания, психологии личности, теории компетентностной подготовки, социальной психологии общения и культурологически ориентированной педагогики.

**Таблица 2. Теоретические основания анализа**

| Теоретическая линия                                      | Представители                                 | Ключевое положение                                                                                            | Значение для темы                                                            |
|----------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Теория формирования личности                             | Л. И. Божович [18]                            | личность формируется через систему мотивов, отношений и внутренней позиции                                    | социокультурная компетентность требует внутреннего ценностного основания     |
| Гуманистическая педагогика                               | В. А. Сухомлинский [23]                       | воспитание строится через уважение к ребёнку, нравственный пример и культуру отношений                        | компетентность учителя проявляется в качестве педагогического взаимодействия |
| Психология саморегуляции и личностного поведения         | А. Т. Абдурахманова [4–8; 12; 13]             | самооценка, защитные реакции, личностные предикторы и внимание влияют на поведение в образовательной ситуации | социокультурная компетентность невозможна без личностной регуляции           |
| Духовно-нравственное воспитание через обучение           | Х. Т. Тухтаев [1; 3; 24; 25]                  | ценностное содержание должно быть встроено в образовательный процесс                                          | аксиологический подход требует интеграции ценностей в учебную подготовку     |
| Развитие социокультурной компетентности будущего учителя | Х. Б. Бердиева [15–17]                        | социокультурная компетентность формируется через взаимодействие семьи, культуры и профессиональной подготовки | определяет предметное ядро статьи                                            |
| Социальный интеллект и педагогическое взаимодействие     | С. Норбоева, Г. Урокова [19; 22]              | понимание другого и адекватная социальная интерпретация выступают условием профессиональной коммуникации      | раскрывает коммуникативно-интерпретативный уровень компетентности            |
| Педагогические технологии как фактор эффективности       | A. Kenjaboev, O. Ergasheva, J. Kenjabayev [2] | результативность подготовки зависит от организации технологического процесса                                  | обосновывает переход от декларации к технологизации                          |

Из приведённого сопоставления следует, что аксиологический подход не отменяет психологической, коммуникативной и технологической логики подготовки. Напротив, он задаёт ценностный критерий их отбора и соединения.

### 3. Научные подходы и школы

**Таблица 3. Подходы к исследованию социокультурной компетентности будущего учителя**

| Подход                   | Что объясняет                                         | Сильная сторона                                          | Ограничение                                               |
|--------------------------|-------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|
| Аксиологический          | роль ценностей в профессиональном становлении         | позволяет раскрыть смысловое основание подготовки        | требует операционализации                                 |
| Компетентностный         | интегративный результат профессионального образования | переводит ценности в язык образовательных результатов    | может формализовать личностную сферу                      |
| Личностно-деятельностный | развитие деятельности и взаимодействия                | объясняет переход от знания к действию                   | требует точной организации практики                       |
| Социокультурный          | связь личности с культурой, семьей, сообществом       | раскрывает контекст подготовки учителя начальных классов | возможен описательный характер без технологического блока |
| Коммуникативный          | роль общения, диалога, интерпретации другого          | показывает, где компетентность реально проявляется       | недостаточен без ценностного ядра                         |
| Междисциплинарный        | связь педагогики, психологии, этики, культурологии    | обеспечивает целостный анализ                            | усложняет диагностику                                     |

В рамках статьи принимается интегративная позиция, где аксиологический подход выступает системообразующим, а компетентностный, личностно-деятельностный, социокультурный и коммуникативный подходы выполняют уточняющую и операционализирующую функцию.

### 4. Классификация и внутренняя структура явления

Социокультурную компетентность будущего учителя начальных классов целесообразно описывать как многокомпонентную систему.

**Таблица 4. Внутренняя структура социокультурной компетентности**

| Компонент           | Содержание                                                                                | Основная функция                    | Внешнее проявление                                                        |
|---------------------|-------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| Ценностно-смысловой | уважение к личности ребёнка, семье, культуре, языку, традиции, социальной ответственности | задаёт нормативно-смысловую основу  | педагогические решения не противоречат гуманистической и культурной норме |
| Когнитивный         | знание культурных кодов, норм взаимодействия, особенностей начального образования и семьи | обеспечивает понимание контекста    | содержательная аргументация действий                                      |
| Коммуникативный     | диалогичность, такт, способность к сотрудничеству и учёту позиции другого                 | обеспечивает взаимодействие         | корректная коммуникация с детьми, родителями, коллегами                   |
| Рефлексивный        | самоанализ, самокоррекция, оценка последствий собственных действий                        | обеспечивает внутреннюю регуляцию   | способность корректировать педагогическое поведение                       |
| Поведенческий       | реализация норм в конкретных педагогических действиях                                     | переводит компетентность в практику | культурно соразмерное и профессионально ответственное поведение           |

**Таблица 5. Классификация уровней проявления социокультурной компетентности**

| Уровень                         | Характеристика                                                              | Ограничение                                     |
|---------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------|
| <b>Формально-нормативный</b>    | знание общих требований без устойчивого личностного присвоения              | высокая зависимость от внешнего контроля        |
| <b>Интерпретативный</b>         | понимание культурного и коммуникативного контекста педагогической ситуации  | возможен разрыв между пониманием и действием    |
| <b>Рефлексивно-практический</b> | устойчивое соединение ценности, анализа ситуации и педагогического поступка | требует длительной подготовки и поддержки среды |

## 5. Позиции ведущих авторов

Позиции ведущих авторов можно сгруппировать в три аналитические линии.

Первая линия связана с нравственно-ценностным основанием педагогической подготовки. Здесь принципиальное значение имеют работы, в которых воспитание и профессиональное становление рассматриваются

через призму личности, внутренней позиции и ценностной ориентации [18; 23].

Вторая линия ориентирована на раскрытие социокультурного измерения профессиональной подготовки учителя начальных классов. В исследованиях Х. Б. Бердиевой социокультурная компетентность связана с семьёй, культурной средой, системой обучения и профессионально значимыми качествами будущего учителя [14–17].

Третья линия объединяет исследования, показывающие, что устойчивое профессиональное поведение не выводится напрямую из знания нормы. Оно требует личностной регуляции, коммуникативной зрелости, развитой самооценки, способности к самоконтролю и культурно опосредованному взаимодействию [4–8; 19; 22].

#### **6. Технология развития социокультурной компетентности на основе аксиологического подхода**

Если структура отвечает на вопрос, **что именно** развивается, то технология отвечает на вопрос, **через что и в какой логике** это развитие может быть обеспечено.

Под технологией развития социокультурной компетентности в данной статье понимается функционально организованная система педагогических целей, этапов, средств, форм и процедур, посредством которых ценности профессионального взаимодействия переводятся в устойчивые способы понимания, коммуникации, рефлексии и поведения будущего учителя начальных классов.

**Таблица 6. Технологические механизмы развития**

| Механизм                                        | Содержательная роль                                                                    | Педагогический результат                               |
|-------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------|
| Ценностная интеграция содержания дисциплин      | включение аксиологических вопросов в профессиональные и психолого-педагогические курсы | формирование смыслового основания подготовки           |
| Анализ педагогических ситуаций                  | разбор культурно и коммуникативно сложных случаев                                      | развитие интерпретативной и рефлексивной способности   |
| Диалогические и кооперативные формы обучения    | работа в обсуждении, сотрудничестве, взаимной аргументации                             | развитие коммуникативной и социальной чувствительности |
| Семейно-социокультурно ориентированные практики | моделирование взаимодействия с семьёй, сообществом, культурной средой                  | расширение контекстного понимания профессии            |
| Рефлексивное сопровождение                      | самоанализ, письменные рефлексивные задания, самооценка                                | формирование внутренней регуляции                      |



| Механизм                          | Содержательная роль                                       | Педагогический результат                               |
|-----------------------------------|-----------------------------------------------------------|--------------------------------------------------------|
| Нормативно-деонтологическая рамка | связь ценностей профессиональной ответственностью учителя | с предотвращением разрыва между установкой и действием |

## 7. Диаграмма темы

### Диаграмма 1. Концептуальная схема технологии развития социокультурной компетентности у будущих учителей начальных классов на основе аксиологического подхода

Концептуальная модель технологии развития социокультурной компетентности будущих учителей начальных классов на основе аксиологического подхода



## 8. Спорные вопросы и междисциплинарные связи

**Таблица 7. Спорные вопросы и способы их научно экономического разрешения**

| Спорный вопрос                                                                             | Междисциплинарная плоскость               | Рабочее решение                                                                                     |
|--------------------------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Социокультурная компетентность — это знание культуры или способ профессионального действия | педагогика, культурология, психология     | компетентность трактуется как интегративное образование, а не только как знание                     |
| Можно ли формировать ценности технологически                                               | педагогика, философия образования, этика  | технологизируется не ценность как таковая, а педагогически организованный процесс её интериоризации |
| Достаточно ли коммуникативных навыков для социокультурной компетентности                   | социальная психология, педагогика общения | навыки необходимы, но недостаточны без ценностного и рефлексивного компонентов                      |
| Может ли диагностика прямо измерить социокультурную зрелость                               | психометрика, педагогическая методология  | корректнее оценивать компоненты и проявления, а не абстрактный конструкт целиком                    |
| Национальные ценности и универсальные нормы соотносятся как альтернатива или единство      | культурология, этика, педагогика          | продуктивна модель их сопряжения, а не противопоставления                                           |

Междисциплинарность проблемы носит не декоративный характер. Педагогика здесь задаёт рамку формирования, психология — механизмы личностной и коммуникативной регуляции, культурология — содержательный контекст, этика — нормативное основание, а теория профессионального образования — логику технологизации подготовки.

## 9. Практические следствия в пределах доказанного

В пределах теоретического анализа обоснованными являются следующие положения.

Во-первых, развитие социокультурной компетентности будущего учителя начальных классов требует включения ценностной проблематики в основное содержание профессиональной подготовки, а не её изоляции в специальных воспитательных мероприятиях.

Во-вторых, аксиологический подход продуктивен тогда, когда он соединён с технологической логикой организации подготовки. Без этого ценностный компонент остаётся декларативным.

Во-третьих, социокультурная компетентность не формируется через информирование о нормах. Она требует включения студентов в анализ педагогических ситуаций, сотрудничество, рефлекссию и практики взаимодействия с семьёй и культурной средой.

В-четвёртых, диагностировать следует не «культурность» как абстрактное качество, а отдельные компоненты компетентности: ценностную аргументацию, коммуникативную корректность, рефлексивную зрелость, устойчивость поведенческих решений.

В-пятых, образовательная среда самого вуза должна быть внутренне согласована с провозглашаемыми ценностями. В противном случае технология теряет воспроизводимость.

### **Заключение**

Социокультурная компетентность будущего учителя начальных классов должна рассматриваться как интегративный результат профессиональной подготовки, включающий ценностно-смысловой, когнитивный, коммуникативный, рефлексивный и поведенческий компоненты. Аксиологический подход в данной логике выступает не внешней идеологической надстройкой, а методологическим принципом отбора содержания, организации взаимодействия и интерпретации результатов подготовки.

Теоретический анализ показал, что технология развития социокультурной компетентности наиболее последовательно раскрывается через сочетание ценностной интеграции содержания дисциплин, диалогических и кооперативных форм обучения, анализа педагогических ситуаций, рефлексивного сопровождения, семейно- и социокультурно ориентированных практик, а также нормативно-деонтологической регуляции. Выводы статьи ограничены рамками теоретического исследования. Они задают концептуальную и структурную основу для дальнейшей операционализации критериев, показателей и процедур эмпирической проверки.

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## **ПРОБЛЕМЫ ГИПЕРАКТИВНОСТИ ДЕТЕЙ МЛАДШЕГО ШКОЛЬНОГО ВОЗРАСТА**

**Аннотация:** актуальность исследуемой темы обусловлена устойчивым ростом числа детей, проявляющих признаки гиперактивности и синдрома дефицита внимания, что влечет за собой трудности адаптации в школе, снижение успеваемости, дестабилизацию поведения и сложности в межличностных отношениях. Проблема коррекции гиперактивности в младшем школьном возрасте имеет не только педагогическое, но и общественное значение, так как своевременная помощь позволяет предупредить развитие асоциальных форм поведения в будущем.

**Ключевые слова:** гиперактивность, синдром дефицита внимания, психофизиологические и личностные особенности.

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## **PROBLEMS OF HYPERACTIVITY IN CHILDREN OF PRIMARY SCHOOL AGE**

**Abstract:** The relevance of the study is due to the steady increase in the number of children who exhibit signs of hyperactivity and attention deficit disorder, which leads to difficulties in adapting to school, decreased academic performance, destabilized behavior, and challenges in interpersonal relationships. The issue of hyperactivity correction in early school age is not only of pedagogical importance, but also has a significant social impact, as timely intervention can prevent the development of antisocial behavior in the future.

**Keywords:** hyperactivity, attention deficit disorder, psychophysiological and personal characteristics.

Проблема гиперактивности у детей занимает центральное место в современной детской психологии и педагогике. Термин «гиперактивность» традиционно используется для обозначения повышенной двигательной и поведенческой активности, эмоциональной импульсивности и снижения способности к длительной концентрации внимания [2]. В научной литературе



чаще всего употребляется понятие «синдром дефицита внимания с гиперактивностью» (СДВГ, ADHD – Attention Deficit Hyperactivity Disorder).

Исторически исследования СДВГ ведут начало с работ Г. Стилл (1902), описавшего детей с «моральной дефектностью», которую он связывал с церебральной дисфункцией. Позднее в середине XX века термин претерпел изменения – от «минимальной мозговой дисфункции» к «гиперкинетическому расстройству» (МКБ-9), а в DSM-5 утвердилось понятие ADHD с разделением на три типа: невнимательный, гиперактивно-импульсивный и смешанный.

Современные российские исследователи рассматривают гиперактивность не только как неврологический дефицит, но и как психологическое явление, связанное с особенностями внутренней саморегуляции, эмоционального контроля и социального опыта ребенка [1]. Важно разграничивать гиперактивность и повышенную подвижность, типичную для детей младшего школьного возраста. В первом случае поведение ребенка деструктивно и мешает обучению, во втором – является возрастной нормой.

Основные критерии диагностики СДВГ согласно DSM-5 включают стойкий дефицит внимания, импульсивность, гиперактивность и сниженную способность к регуляции поведения. Согласно МКБ-11, гиперкинетическое расстройство относится к нейроразвивающим и характеризуется началом в детском возрасте и длительным течением. Российские авторы (Л. С. Цветкова, Т. В. Ахутиной, Н. Н. Семенович) подчеркивают, что основой гиперактивности служит функциональная незрелость лобных структур мозга и недостаточная сформированность высших психических функций.

По данным исследований Danielson и соавт. (2024), распространенность ADHD среди детей в мире составляет около 7 %, а у младших школьников – до 10 % [9]. Отечественные авторы подтверждают тенденцию к росту числа таких детей, особенно в условиях повышенной информационной нагрузки и стрессогенных факторов школьной среды [2].

Гиперактивные дети характеризуются повышенной психической и двигательной возбудимостью, трудностью длительного удержания внимания и снижением уровня самоконтроля [5]. На нейрофизиологическом уровне отмечается снижение активации префронтальной области мозга, отвечающей за регуляцию целей и планирование поведения. По данным нейропсихологических исследований (Л. С. Цветкова, Т. В. Ахутиной), гиперактивные дети демонстрируют низкий уровень произвольности и дефицит контроля внимания.

Особенности эмоционально-волевой сферы заключаются в повышенной тревожности, импульсивных реакциях и неспособности предвидеть последствия своих поступков [3]. Дети часто испытывают затруднения в построении социальных контактов: их поведение может восприниматься агрессивным или неадекватным, что усугубляет положение в коллективе. Ахметова З. А. указывает, что подобные дети нередко становятся



объектами стигматизации со стороны сверстников и педагогов, что приводит к формированию вторичных эмоциональных расстройств [2].

С точки зрения когнитивного развития, гиперактивные младшие школьники часто демонстрируют нестабильность познавательной деятельности: они быстро вовлекаются в новое занятие, но так же быстро теряют интерес. Демьянчук Р. В. отмечает, что у детей с СДВГ существует особое восприятие времени: оно фрагментарно, и ребенок не способен четко осознать последовательность действий, что приводит к дезорганизации поведения [5].

Таким образом, гиперактивность следует рассматривать в контексте комплекса нейропсихологических и личностных особенностей, которые в совокупности создают трудности обучения и социализации.

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## **ИСПОЛЬЗОВАНИЕ СОВРЕМЕННЫХ ПЕДАГОГИЧЕСКИХ ТЕХНОЛОГИЙ НА УРОКАХ МАТЕМАТИКИ**

**Аннотация:** в статье рассматриваются современные педагогические технологии, применяемые на уроках математики в условиях реализации федерального государственного образовательного стандарта. Раскрывается сущность и классификация технологий (проблемное обучение, проектная деятельность, информационно-коммуникационные технологии, технология уровневой дифференциации, здоровьесберегающие технологии). Анализируется влияние каждой технологии на формирование познавательных универсальных учебных действий и повышение качества математического образования. Представлены практические примеры использования технологий в учебном процессе.

**Ключевые слова:** современные педагогические технологии, уроки математики, проблемное обучение, проектная деятельность, ИКТ, уровневая дифференциация, здоровьесбережение.

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## **THE USE OF MODERN PEDAGOGICAL TECHNOLOGIES IN MATHEMATICS LESSONS**

**Abstract.** The article examines modern pedagogical technologies used in mathematics lessons in the context of the implementation of the federal state educational standard. The essence and classification of technologies (problem-based learning, project activities, information and communication technologies, level differentiation technology, health-saving technologies) are revealed. The influence of each technology on the formation of cognitive universal educational

*actions and the improvement of the quality of mathematical education is analyzed. Practical examples of the use of technologies in the educational process are presented.*

**Keywords:** *modern pedagogical technologies, mathematics lessons, problem-based learning, project activities, ICT, level differentiation, health saving.*

Современная система образования находится в стадии активной модернизации. Внедрение Федерального государственного образовательного стандарта (ФГОС) основного общего образования предъявляет новые требования к результатам обучения, среди которых ключевое место занимают не только предметные, но и метапредметные и личностные результаты. В связи с этим перед учителем математики встает задача поиска и применения таких методов и приемов обучения, которые позволят не только передать учащимся систему математических знаний, но и развить их познавательную активность, самостоятельность, критическое мышление и способность к самообучению. Наиболее эффективным инструментом решения этой задачи является использование современных педагогических технологий.

Педагогическая технология (от греч. *techne* – искусство, мастерство и *logos* – учение) – это научно обоснованный способ организации учебного процесса, гарантирующий достижение поставленных целей обучения. В отличие от традиционной методики, которая ориентирована преимущественно на передачу знаний, современные технологии нацелены на развитие личности учащегося, формирование у него универсальных учебных действий и компетенций.

В практике преподавания математики наиболее широкое распространение получили следующие современные педагогические технологии: проблемное обучение, проектная деятельность, информационно-коммуникационные технологии (ИКТ), технология уровневой дифференциации, здоровьесберегающие технологии. Рассмотрим каждую из них подробнее.

Проблемное обучение – это технология, при которой учитель не дает готовых знаний, а организует учебный процесс таким образом, что учащиеся самостоятельно «открывают» новые математические факты, закономерности и способы действия. Основой данной технологии является создание проблемной ситуации – интеллектуального затруднения, которое возникает, когда ученик не может объяснить новый факт с помощью имеющихся знаний.

На уроках математики проблемное обучение может быть реализовано через систему проблемных вопросов и задач. Например, при изучении темы «Сумма углов треугольника» в 7 классе учитель предлагает учащимся построить произвольный треугольник, измерить транспортиром его углы и сложить полученные значения. Учащиеся получают разные результаты (от  $178^\circ$  до  $182^\circ$ ), что создает проблемную ситуацию: «Почему результаты разные? Какое же значение является истинным?». В процессе обсуждения учащиеся приходят к выводу, что погрешность связана с неточностью

измерений, и формулируют гипотезу: сумма углов треугольника равна  $180^\circ$ , которая затем доказывается.

Проблемное обучение способствует развитию познавательной активности, логического мышления и исследовательских навыков. Однако его применение требует от учителя тщательной подготовки и умения управлять познавательной деятельностью учащихся.

Проектная деятельность – это технология, предполагающая самостоятельную разработку и реализацию учащимися учебного проекта, имеющего практическую значимость. В отличие от проблемного обучения, где акцент делается на познавательной деятельности внутри урока, проект предполагает более длительную, часто внеурочную работу, результатом которой является конкретный продукт.

На уроках математики возможны следующие типы проектов: исследовательские («Числа Фибоначчи в природе», «Золотое сечение в архитектуре родного города»); практико-ориентированные («Математика в профессии моих родителей», «Расчет бюджета семьи», «Планирование ремонта комнаты»); информационные («История развития математических символов», «Великие математики древности»); творческие («Математическая сказка», «Геометрический орнамент»).

Применение проектной технологии формирует у учащихся умение самостоятельно ставить цели, планировать деятельность, работать с информацией, представлять и защищать результаты. Важно, чтобы тема проекта была интересна учащимся и имела личностную значимость.

Информационно-коммуникационные технологии (ИКТ) занимают особое место в современном образовании. Использование компьютера, интерактивной доски, образовательных платформ и цифровых ресурсов на уроках математики открывает широкие возможности для визуализации учебного материала, организации индивидуальной и групповой работы, оперативного контроля и самоконтроля.

Наиболее распространенные формы применения ИКТ на уроках математики включают: мультимедийные презентации (объяснение нового материала, обобщение и систематизация знаний); интерактивные модели (построение графиков функций в динамической среде GeoGebra, моделирование геометрических построений); обучающие программы и тренажеры (отработка вычислительных навыков, решение уравнений и задач); онлайн-тестирование (подготовка к ОГЭ и ЕГЭ, текущий контроль знаний); использование образовательных платформ (Учи.ру, ЯКласс, Решу ОГЭ/ЕГЭ).

Особого внимания заслуживают динамические геометрические среды (GeoGebra, Desmos), которые позволяют в реальном времени изменять параметры математических объектов и наблюдать за соответствующими изменениями. Например, при изучении квадратичной функции  $y = ax^2 + bx + c$  учащиеся могут с помощью ползунков изменять коэффициенты  $a$ ,  $b$ ,  $c$  и видеть, как при этом меняется положение и форма параболы. Такая

наглядность способствует более глубокому пониманию материала и формированию функционального мышления.

Технология уровневой дифференциации предполагает организацию учебного процесса с учетом индивидуальных особенностей, способностей и темпа усвоения материала каждого учащегося. В условиях классно-урочной системы, когда в одном классе обучаются дети с разным уровнем математической подготовки, дифференциация становится необходимым условием эффективного обучения.

Уровневая дифференциация может реализовываться на разных этапах урока. При опросе: слабым учащимся предлагаются репродуктивные вопросы, сильным – проблемные и творческие. При объяснении нового материала: для разных групп используются разные способы изложения (наглядный, аналитический, практический). При закреплении: задания делятся на три уровня сложности – базовый (обязательный для всех), повышенный (по выбору), творческий (для желающих). При контроле: используются разноуровневые контрольные работы, где каждый ученик выбирает задания, соответствующие его уровню.

Важным элементом уровневой дифференциации является индивидуальная образовательная траектория. Учащийся может самостоятельно выбирать темп изучения темы, форму отчетности, уровень сложности заданий. Это формирует ответственность за собственное обучение и повышает учебную мотивацию.

Здоровьесберегающие технологии – это система мер, направленных на сохранение и укрепление здоровья учащихся в процессе обучения. Урок математики, требующий высокой концентрации внимания и интенсивной умственной деятельности, создает значительную нагрузку на организм школьника. Поэтому применение здоровьесберегающих технологий на уроках математики приобретает особую актуальность.

К элементам здоровьесберегающих технологий относятся: рациональная организация урока (чередование видов деятельности, смена поз, физкультминутки); соблюдение санитарно-гигиенических норм (освещение, температура, проветривание); учет индивидуальных психофизиологических особенностей учащихся; создание психологически комфортной атмосферы (отсутствие стресса, ситуация успеха, доброжелательное общение); использование наглядности и ИКТ в соответствии с временными нормативами.

На уроках математики особенно эффективны такие формы здоровьесбережения, как математические физкультминутки («Встаньте, если ответ положительный, присядьте – если отрицательный», «Покажите руками угол: острый, прямой, тупой, развернутый»), гимнастика для глаз (после работы с доской или компьютером), релаксационные паузы (под спокойную музыку). Включение этих элементов не только сохраняет здоровье, но и повышает работоспособность учащихся.

Комплексное применение описанных технологий на уроках математики дает устойчивый положительный результат. Как показывает практика, использование проблемного обучения повышает познавательную активность и развивает логическое мышление. Проектная деятельность формирует самостоятельность и навыки работы с информацией. ИКТ обеспечивают наглядность и возможность индивидуализации обучения. Уровневая дифференциация позволяет каждому ученику работать в зоне своего ближайшего развития. Здоровьесберегающие технологии поддерживают работоспособность и снижают утомляемость.

Таким образом, использование современных педагогических технологий на уроках математики является необходимым условием реализации требований ФГОС и повышения качества математического образования. Учитель математики сегодня должен не просто знать эти технологии, но и уметь творчески применять их с учетом особенностей класса, темы урока и собственного педагогического стиля. Только в этом случае процесс обучения математике становится не только результативным, но и увлекательным для учащихся. Дальнейшие направления работы в этой области связаны с интеграцией различных технологий (например, проблемно-проектного обучения), разработкой новых цифровых инструментов и созданием системы оценки эффективности применяемых технологий.

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## ИМИТАЦИОННАЯ МОДЕЛЬ РАЗВИТИЯ ФЕРМЕРСКИХ ХОЗЯЙСТВ

***Аннотация.** В данной статье рассматривается возможности использования метода имитационного моделирования как воспроизведения механизма развития фермерских хозяйств с учётом результатов анализа существенных взаимосвязей между её элементами. Отмечается важность имитационного моделирования для разработки проектов принимаемых решений при обосновании потребности в производстве продукции растениеводства и животноводства, расчёте структуры и объема производимой продукции сельского хозяйства, детальном описании научно обоснованной схемы и площади севооборота, подражании процессов достижения баланса системы показателей и после чего произвести расчёты результативных финансово – экономических показателей. Для этого в данной модели предусмотрена процедура согласования путём сравнения показателей управления на основе маневрирования их значениями в интервалах изменения. Приводятся основные шаги и элементы имитационного моделирования, скрывается смысл основных ключевых аспектов популярности этого метода, таким как конкретность используемых данных, адекватное отражение процессов вычисления, точная (ясная) экономическая интерпретация модельных результатов, широкое возможности привлечения экспертов, появляется возможности поддержки принятия решений. Заслуживает внимание итеративный характер проведения комплекс расчётов, что позволяет с одной стороны получить альтернативные многовариантные результаты расчётов, с другой стороны определить направления достижения адекватности имитационной модели развития фермерских хозяйств. А также в статье отмечается, что на основе структуры посевных площадей и норм расхода на 1 га и на 1 голову скота, а также по нормам трудоёмкости определяется потребность в материальных и трудовых ресурсах. Важное место в статье отводится на разработки алгоритмов расчёта результативных финансовых и экономических показателей, которые взаимосвязаны и взаимообусловлены с алгоритмами, приведенных в предыдущих этапах данной имитационной модели, что достигается за счёт чёткого определения и использования данных о потребности в ресурсах, выбора рациональных каналов реализации продукции. Все они вместе способствует повышению эффективности использования ресурсов и реализации продукции по каналам распределения, что в значительной мере достигается за счёт появления возможности выбирать из множества возможных значений параметров управления,*

варианта, удовлетворяющего специалистов и руководителей фермерских хозяйств.

**Ключевые слова.** *Имитация, модель, фермерское хозяйство, итерация, метод, алгоритм, воспроизведение, алгоритм, севооборот, прогнозирование.*

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## **SIMULATION MODEL OF FARM DEVELOPMENT**

**Abstract.** *This article examines the potential of using simulation modeling to simulate the mechanism of farm development, taking into account the results of an analysis of the essential interrelations between its elements. The importance of simulation modeling for developing project decisions is noted, particularly when justifying the need for crop and livestock production, calculating the structure and volume of agricultural output, and providing a detailed description of crop rotation patterns and areas. After achieving a balanced outcome in the previous stages of project decisions, the calculation of effective financial and economic indicators is performed. This model includes a structured approval procedure based on comparing indicators and manipulating their values within possible limits. The article presents the key steps and elements of simulation modeling, highlighting the key aspects of this method's popularity, such as the specificity of the data used, adequate reflection of calculation processes, accurate (clear) economic interpretation of model results, broad opportunities for engaging experts, and the emergence of opportunities for decision support. The iterative nature of the calculation complex is noteworthy, allowing for multivariate results and identifying areas for achieving the adequacy of the farm development simulation model. The article also notes that labor requirements and other factors are determined based on the structure of crop areas and consumption rates per hectare and per head of cattle, as well as labor intensity standards. Finally, algorithms for calculating effective financial and economic indicators are presented. These indicators are interconnected with those of the previous stages of this simulation model, due to a clear definition of resource requirements and the selection of rational channels for product distribution. All of these factors, taken together, contribute to a reduction in resource and product losses, thereby increasing the efficiency of farm management. Keywords Simulation, model, farming, iteration, interpretation, method, algorithm, crop rotation, forecasting.*

**Введение.** Актуальность и новизна темы. Необходимость управле - ния развитием фермерского хозяйства в условиях перехода к рыночным отношениям, тесной взаимосвязи производственных, экономических и финансовых показателей, ограниченности ресурсов и другие факторы

производства обуславливает использования современных методов прогнозирования, базирующиеся на имитационному моделированию. Вместе с тем данный метод позволяет провести всесторонний анализ производственной и экономической деятельности фермерских хозяйств и определить различные сценарии перспективного их развития и оценить последствия принимаемых хозяйственных решений. Данные исследования, посвященные имитационному моделированию развития фермерских хозяйств в отличие от существующих работ при определении структуры и объёма производства продукции учитываются потребности в производстве на них, размер севооборотного поля и схемы чередования севооборотных культур, представление возможности сравнительной оценки значения экономических и финансовых показателей и на основе неформальной процедуры достижения согласованности параметров модели.

Основная цель исследования в том, чтобы воспроизвести поведение фермерских хозяйств на основе всестороннего анализа и учёта тесных взаимосвязей финансовых и экономических, производственных и технологических процессов и описать схемы проведения различных сценариев производства и реализации продукции сельского хозяйства. Поставленная цель предусматривает решение следующих задач:

произвести анализ существующих научных работ к имитационному моделированию развития фермерских хозяйств;

исследовать и определить систему основных финансовых, экономических показателей и агротехнических условий производства;

разработать имитационной модели.

Объектом имитационного моделирования является экономические процессы развития фермерских хозяйств в новых условиях хозяйствования. Предметом исследования является имитационная модель, которая воспроизводит сложные экономические процессы функционирования фермерских хоз -яйств.

**Обзор литературы.** В диссертационные работы И. В. Ткаченко [1] отмечается важность проведения реформы в сельском хозяйстве РФ и результатом которой стал создание фермерских хозяйств, которые имеют существенное значение в обеспечении населения страны продовольствием. В ходе исследования автор рассматривает процессы бизнес – планирования производства продукции сельского хозяйства в фермерских хозяйствах. Предложенная автором оптимизационная модель задачи позволяет, в конечном итоге определить оптимальное перспективное направления развития фермерских хозяйств. Кроме того, автор предложила имитационную модель, учитывающая влияние случайных факторов, которые сопряжено с большими экономическими рисками. В данной диссертационной работе существенное место отводится на разработку методики, описывающая процесса имитации динамики трудовых ресурсов, имеющих случайный характер потерь рабочего времени и образование цен на продукции сельского хозяйства. В рамке диссертационного исследования автором предложена

автоматизированная система поддержки принятия решений, которая позволяет имитировать производственный процесс на любой стадии производства сельскохозяйственную продукцию.

В научной статье А.А.Пускова и другие [2] показаны, что эконометрические методы более адекватно описывают реальные процессы прогнозирования параметров развития фермерских хозяйств. В данной статье построены различные модели прогнозирования, результаты реализации которых подсказывает необходимость совершенствования технологии производства сельскохозяйственной продукции. По мнению авторов, результаты исследования могут быть использованы как при определении стратегий развития сельскохозяйственного производства, так и в качестве методического указания для эконометристов при построении эконометрических моделей. Далее, также авторы статье на основе построенной эконометрических моделей делают оценки за счет увеличения урожайности культур и расхода кормов на одну единиц на сколько увеличивается доход от отраслей соответственно растениеводства и животноводства.

В диссертационной работе В.Н.Собина [3] приводится теоретические основы и место крестьянского (фермерского) хозяйства при формировании разных форм собственности на средства производства. А также, исследуется зарубежный опыт формирования фермерских хозяйств и оцениваются варианты использования их опыта в РФ. На основе фактических данных Удмуртской Республики произведен анализ и оценка эффективности ведения сельского хозяйства в условиях различных форм собственности. На основе всестороннего анализа современного состояния фермерского хозяйства и с целью рационального использования ограниченных ресурсов предложены пути определения их потенциальной возможности для определения вносимой доли вклада их при развитии регионального сельского хозяйства. Далее, авторами предложены основные направления совершенствования системы государственной поддержки фермерских хозяйств на региональном уровне. В целом, в данной монографии авторами определены перспективные направления развития фермерских хозяйств с учетом реальных производственных условий региона.

В монографии Т.И.Шароватовой [4] анализируется процесс формирования частного сектора, в частности место в этом секторе в условиях рыночных отношений фермерских хозяйств. Раскрываются теоретические основы функционирования и основные показатели, характеризующие развития фермерских хозяйств. Анализируются современное состояние и выявляются факторы, влияющие на результаты производства в фермерских хозяйствах. Кроме того уточняется их место и роль в системе сельского хозяйства Ростовской области. Далее, выясняется межотраслевые связи сельского хозяйства на всех стадиях производства конечной продукции. В данной монографии также рассматриваются вопросы государственного регулирования экономических процессов развития фермерских хозяйств с

учетом данных, вытекающих из принципа рыночных отношений. Выработаны различные подходы по формированию механизма реализации продукции сельского хозяйства по каналам распределения.

В предложенной статье [5] приведены результаты экономика – математического моделирования производственных процессов, происходящих многоступенчатых цепях фермерских хозяйств в различных их типах. Авторы вскрывают структуру разработанного комплекса моделей развития производства в фермерских хозяйствах. В научной статье предлагается математическая модель оценки хозяйственной деятельности разного типа фермерских хозяйств. Авторы в заключении отметили, что разработанные ими модели могут использованным быть при планировании и организации производства в фермерских хозяйствах. В научной статье А.А. Хозиева и Н.М. Дроница [6] предложена модели механизма принятия решений в фермерских хозяйствах Республики Татарстан. Это исследование проведено на основе интервью фермеров Татарстана и как результат разработана модель принятия им решений. Данная модель состоит из трёх блоков, начиная изучения независимых внешних факторов и кончая результирующие показатели развития сельского хозяйства. Большое внимание в статье уделяется установление связи между факторами и сформированных авторами трёх блоков задач управления фермерским хозяйством и определить степень влияния каждого фактора на принимаемые решения.

Методология исследования. В данной статье использован метод дискретного имитационного моделирования с целью анализа функционирования и прогноза - рования развития фермерских хозяйств в новых условиях хозяйствования и описана схема оценки влияния изменения значений имитирующих индикаторов на результаты модельных расчётов.

Анализ и обсуждение результатов исследования. Данная имитационная модель включает в себе следующих входных параметров: нормативная потребность в производстве продукции фермерского хозяйства; наличие сельскохозяйственных угодий по типам; размер площади и схема севооборота; нормативы затрат кормов на 1 га посева и на 1 голову скота; наличие поголовье скота в разрезе стада и другие. Основными выходными параметрами модели выступают: структура посевных площадей сельскохозяйственных культур; величина посевной площади севооборотных культур; объем производства продукции сельского хозяйства; стоимость товарной продукции в текущих ценах (баланс производимой и реализуемой продукции по каналам распределения) ; потребность фермерских хозяйств в материальных ресурсах и другие.

Важным фактором улучшения механизма управления фермерских хозяйств является включение в структуре модели взаимосвязанных и взаимодействующих показателей с учетом выполнения многократных расчётов. Это наиболее рационально осуществляется построением и реализацией алгоритмов и моделей имитационного типа. С целью реализации



этих задач был изучен опыт управления и практика разработки показателей производства и распределения сельскохозяйственной продукции на уровне фермерских хозяйств.

В процессе имитационных экспериментов лицо принимающее решение (ЛПР) может варьировать значениями следующих входных параметров модели (имитируемые индикаторы): уровень урожайности культур и продуктивности животных; уровень специализации; доли распределения сельскохозяйственной продукции по каналам использования; структуру рациона скота; сортовую структуру собираемого хлопка–сырца; сортовую структуру выхода хлопкового волокна; материалоемкость единицы продукции и другие.

Анализ и оценка результатов модельных расчетов позволяет ЛПР изменять конкретные имитационные параметры и выбирать наилучшие их значения. Схема итеративного расчета и сбалансирования объема производства и распределения сельскохозяйственной продукции по каналам использования с расчетом соответствующих результативных показателей представлена на рис.1.



Рис.1. Схема работы имитационной модели

Первый блок включает в себе задач прогнозирования показателей и расчета коэффициентов для проведения имитационных экспериментов. Второй блок включает в себя трех групп имитационной модели задач расчета потребности в производстве сельскохозяйственной продукции, структуры посевных площадей сельскохозяйственных культур; структуры и объёма производства продукции сельского хозяйства; Третий блок имитационной модели состоит из алгоритмов расчёта результативных показателей и предусматривает процесс согласования параметров отдельных блоков путем изменения диапазона их значений и проведения итеративных расчетов.

В предлагаемой имитационной модели результаты решения задач первого блока используются по трем главным направлениям исходя из информационно–логической схеме взаимосвязи технических и экономических показателей управления фермерским хозяйством. Работа имитационной модели развития фермерских хозяйств состоит из следующих этапов:



1)ЛПР определяет начальные значения входных параметров модели: договор контрактации с заготовителями; динамику фактической урожайности сельскохозяйственных культур, продуктивности скота и птиц; доля распределения продукции для внутривладельческих нужд; наличие в хозяйстве видов и категорий земель ;принятую в хозяйстве структуру затраты кормов; принятую в зоне хлопководства (расположения рассматриваемого хозяйства) схемы севооборота ;стоимость продукции в сопоставимых и текущих ценах ;количество скота и птиц в стаде ;динамику реализации хлопка и хлопковой продукции по промышленным сортам; динамику значений основных факторов, влияющих на урожайность сельскохозяйственных культур ;структура выхода волокна ;2)производится расчёт по модели определения объема производимой продукции сельского хозяйства;3)ЛПР анализирует результаты расчётов по модели.

Предположим, что при решении задачи определения объёма производимой продукции ограничивающие условия модели по использованию ресурсов не выполняются. В этом случае ЛПР:

1)Производит взаимную увязку расчётной потребности в ресурсах с их наличием в хозяйстве (если увязка не получится, то ЛПР переходит к выполнению пункта 2, иначе 5);

2) изыскивает возможности повышения урожайности культур до максимально достигнутого уровня (если при этом результат будет удовлетворительным, то он переходит к выполнению пункта 5, в противном случае 3);

3)пересматривает структуру распределения продукции, затем оценивает результаты решения (если получен приемлемый ответ, то переходит к выполнению пункта 5, иначе 4 );

4) сравнивает потенциальной возможности фермерских хозяйств по производству продукции с потребностью в них. Если потребность в целом необеспечивается то он исключает из модели сельскохозяйственные культуры с минимальными значениями приоритета и после получения приемлемых результатов переходит к выполнению пункта 5;

5) производить расчёт по распределению продукции и рассчитывает результативные экономические показатели развития фермерских хозяйств. Ниже приводятся алгоритмы вспомогательных расчетов для проведения имитационных экспериментов:

1) площадь севооборотных культур

$D = D_x + D_l + D_k$ , здесь : $D$  –количество севооборотов;  $D_x, D_l, D_k$ – доля , соответственно хлопчатника, люцерны и кукурузы в схеме севооборота;  $P_s$  – размер площади севооборотных культур по  $s$  – й схеме;  $P_p$  – средний размер севооборотного поля; $P_x, P_l, P_k$ - размер площади, соответственно хлопчатника, люцерны и кукурузы .Алгоритм их расчёта выглядит так: $P_x = P_p \cdot D_x, P_l = P_p \cdot D_l, P_k = P_p \cdot D_k$  , где,  $P_p = \frac{P_s}{D}$  .

Алгоритмы расчёта потребности животноводческой отрасли фермерских хозяйств приведены в статье [7].

2) по определению потребности в затраты труда в растениеводстве (чел.-ч.)

$$T_j = \sum_{\tau=1}^4 T_j^{\tau}, T_j^4 = U_j \cdot 3T_i (i = j), T = \sum_{i=1}^4 T_j$$

здесь,  $T_{1j}$ ,  $T_{2j}$ ,  $T_{3j}$ ,  $T_{4j}$  –затраты труда на 1 га  $j$  – й культуры, соответственно за до посевной период, посевной, за период вегетации и за период уборки урожая при  $U_j$ ;  $U_j$  – уровень урожайности  $j$  – й культуры;  $3T_j$  – затраты труда на 1 ц продукции за период уборки урожая.

3) стоимость используемых минеральных удобрений

$$CM_j = C_N N_j + C_P P_j + C_K K_j, CM = \sum_{j=1}^n CM_j$$

где,  $CM_j$  – стоимость минеральных удобрений, вносимых на 1 га  $j$  – й культуры;  $CM$  – стоимость минеральных удобрений по всей культуры;  $C_N$ ,  $C_P$ ,  $C_K$  – стоимость единицы объема, соответственно азота, фосфора, калия;  $N_j$ ,  $P_j$ ,  $K_j$  – норма внесения на 1 га  $j$  – й культуры, соответственно азота, фосфора и калия.

3) приведенные затраты

$$ПЗ_j = \sum_{\tau=1}^4 ПЗ_j^{\tau}, ПЗ_1 = ПЗ_j / U_j$$

$ПЗ_{j=1}^4$  – текущие годовые затраты на 1 га  $j$  – й культуры, соответственно за до посевной период ( $\tau = 1$ ), посевной ( $\tau = 2$ ), за период вегетации ( $\tau = 3$ ) и период уборки урожая ( $\tau = 4$ ).

4) На первом этапе прогнозирования себестоимости продукции сельского хозяйства строится регрессионная модель, затем на основе полученной модели и заданных значений факторов производится прогноз их значений на перспективный период:

$$C_i^{t+(\tau+\gamma)} = f(X_{in}^{t+(\tau+\gamma)})$$

$\gamma$  – номер года прогнозируемого периода;

$t$  – номер начального года прогнозируемого периода;

$\tau$  – номера годов прогнозируемого периода;

$n$  – номер факторов, влияющих на результативный показатель  $n = \overline{1, N}$ ;

$i$  – номер вида продукции.

Прогнозирование себестоимости сельскохозяйственной продукции производится на основе де композиционного подхода, предусматривающего определение значений отдельных статей затрат с последующей их агрегацией. Данный подход позволяет учитывать специфической особенности формирования каждой статье себестоимости, способствует повысить адекватность прогноза за счет более точного учёта индивидуальных драйверов затрат и предоставить возможность всестороннего анализа динамики издержек.

5) чистая прибыль

$$Ч_p = H_n + D_b - N_p - N_d, \text{ где: } N_p = \frac{S_p * H_n}{100}, N_d = \frac{S_d * D_b}{100}$$

$Ч_p$  – чистый прибыль;  $H_n$  – прибыль облагаемая налогом;  $D_b$  – доходы по ценным бумагам от долевого участия в других хозяйствующих субъектах;

$N_p$  – налог на прибыль;  $N_d$  – налог на доходы;  $S_p$  – ставка налога на прибыль;  $S_d$  – ставка налога на доход.

б) рентабельность продукции, расчёт этого показателя в данном случае представляет собой отношение чистой прибыли к себестоимости:

$$R_{pr} = \frac{Ч_p}{C_p} 100 \%$$

где:  $R_{pr}$  = рентабельность продукции;  $Ч_p$  – чистый прибыль;  $C_p$  – себестоимость производимой продукции и оказываемой услуги.

В практике прогнозирования структуры посева сельскохозяйственных культур нередко возникает задача необходимости согласования показателей, в частности, с одной стороны объема производимой продукции с объемом потребности в них по ассортиментом, с другой стороны итогов посевных культур не должно превышать наличие сельскохозяйственных угодий в фермерском хозяйстве.

Сложность разработки и увязки с наличными ресурсами объясняется взаимообусловленностью этих показателей и трудностью сравнения их результатов на каждом шаге расчета. Данная процедура требует в итеративном режиме осуществлять расчеты с целью отыскания среди альтернативных решений экономически эффективного варианта развития производства. Это как раз тот этап прогнозирования, который предполагает применение метода имитационного моделирования.

При этом с точки зрения эффективного использования сельскохозяйственных угодий приоритетное значение отводится на прогнозирование структуры и объема производства продукции засухоустойчивых культур на богарных землях. Затем объем производимой продукции отнимается от объема потребности в их производстве. Разница в объемах производства и потребности в них фермерского хозяйства по ассортиментам служит входом для расчета структуры сельскохозяйственных культур на орошаемых землях. Данная процедура выполнения указанных расчетов производится по следующим алгоритмам

$$Q_i^B = U_j^B * S_j^B \quad (i=j) \quad , \quad \hat{S}^B = \sum_{j=1}^m S_j^B \quad , \quad S^B = \hat{S}^B .$$

$$Q_i^r = P_i - Q_i^B \quad , \quad \hat{S}_j^r = \frac{Q_i^r}{u_j} \quad , \quad \hat{S}^r = \sum_{j=1}^m \hat{S}_j^r \quad , \quad S^r = \hat{S}^r .$$

где:  $I, j$  – номер, соответственно сельскохозяйственной продукции и культур;  $m$  – верхняя граница  $j$  – го индекса (конечный индекс);  $Q_i^B, Q_i^r$  – объем производимой  $i$  – й продукции соответственно на богарных и орошаемых пашнях;  $U_j^B, S_j^B$  – урожайность и посевная площадь  $j$  – й культуры, соответственно на богарных землях;  $U_j^r, S_j^r$  – урожайность и посевная площадь  $j$  – й культуры, соответственно на орошаемой пашни;  $\hat{S}_j^B, \hat{S}_j^r$  – расчётное значение посевной площади  $j$  – й культуры, соответственно на богарной и орошаемой пашни. Взаимоотношение показателей в схематичном виде приводится ниже (рис.2).



При разработки модели следует учитывать специфические особенности сельскохозяйственных угодий, площадь которого долгое время не изменяется. К тому же, для организации научно обоснованной системы ведения земледелия важно правильно учитывать требование чередования севооборотных культур. По нормам трудоёмкости на 1 га и на 1 голову скота, внесения на 1 га минеральных удобрений по видам, затраты кормов на единицы объема производства продукции животноводства или на 1 голову скота определяется потребность в них. Если корма для животноводства составляет дефицит во фермерском хозяйстве, то тогда определяется объем их покупки. После выполнения всех расчетов производится проверка на выполнение условий, если все условия выполняются то тогда переходим к расчету результативных финансово–экономических показателей, в противном случае возвращаемся предыдущим этапам расчета показателей развития фермерского хозяйства.

**Заключения (выводы и дальнейшие перспективы исследования).** В результате проведённого исследования методов совершенствования механизма управления сельским хозяйством была разработана имитационная модель развития фермерских хозяйств, основанная на проведение сценарного расчёта и анализа результатов вычислительных экспериментов. В статье исходя из этапности и информационной взаимообусловленности решения комплекса задач они классифицированы и размещены на три блока. В первом блоке размещен задач обоснование объема потребности в производстве продукции собственного производства, урожайности сельскохозяйственных культур. Во втором блоке включена модель определения посевных площадей сельскохозяйственных культур с учётом схемы севооборота. В третьем блоке на основе алгоритмов производится расчет результативные показатели развития фермерских хозяйств. Практическая значимость данной модели заключается в том, что её можно использовать в программном виде органами управления фермерскими хозяйствами для определения перспективных решений. В заключение можно отметить, что предложенная в статье имитационная модель может быть надежным инструментом для анализа и

прогнозирования развития фермерских хозяйств и является начальной частью для определения стратегии хлопковых кластеров.

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## **ЎҚУВ ҚЎЛЛАНМА ЁЗИШДА ЙЎЛ ҚЎЙИЛАДИГАН ХАТОЛИКЛАР**

**Аннотация:** Ушбу илмий мақолада ўқув қўлланма яратиш жараёнида учрайдиган асосий хатоликлар кенг таҳлил қилинади. Мақолада мазмуний, услубий, дидактик ва техник камчиликлар илмий нуқтаи назардан ёритилиб, уларни бартараф этиш бўйича амалий тавсиялар келтирилган. Тадқиқот натижалари таълим сифатини оширишга хизмат қилади.

**Калим сузлар:** ўқув қўлланма, услубий камчилик, терминлардан ҳаддан зиёд фойдаланиш, дизайн ва техник жиҳатлар, мультимедиа элементлари, интерактив топшириқлар ва инфографикалардан фойдаланиш.

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## **ERRORS IN WRITING STUDY TEXTBOOKS**

**Abstract:** This research article presents a comprehensive analysis of the main errors that arise during the creation of a study guide. From a scientific perspective, the article identifies substantive, methodological, didactic, and technical shortcomings and provides practical recommendations for their elimination. The results of the study contribute to improving the quality of education.

**Keywords:** study guide, methodological shortcomings, excessive use of terminology, design and technical aspects, multimedia elements, use of interactive tasks and infographics.

### **Кириш**

Замонавий таълим тизимида ўқув қўлланмалар муҳим аҳамият касб этади. Улар таълим жараёнини самарали ташкил этишда, ўқувчилар ва талабаларнинг билим ҳамда кўникмаларини шакллантиришда асосий манба



сифатида хизмат қилади. Шу билан бирга, ўқув қўлланманинг сифати унинг мазмуни, тузилиши ва услубий жиҳатларига бевосита боғлиқдир.

Амалиёт шуни кўрсатмоқдаки, кўплаб ўқув қўлланмаларни тайёрлаш жараёнида турли хил хатоликларга йўл қўйилади. Бу эса таълим самарадорлигининг пасайишига сабаб бўлади. Шу нуктаи назардан, мазкур масалани илмий жиҳатдан таҳлил қилиш долзарб аҳамиятга эга.

Ўқув қўлланманинг мазмуний жиҳати унинг асосий қийматини белгилайди. Мазмуннинг нотўғри ёки етарли даражада ёритилмаганлиги ўқувчида нотўғри билим шаклланишига олиб келиши мумкин. Айниқса, эскирган маълумотлардан фойдаланиш, илмий янгиликларни инобатга олмаслик ва мантиқий изчилликнинг бузилиши жиддий камчиликлар ҳисобланади.

Бундай ҳолатларда ўқувчи мавзулар ўртасидаги боғлиқликни англаб ета олмайди ва билимлар тизимли равишда шаклланмайди. Шунинг учун ўқув қўлланма тайёрлашда замонавий ва ишончли манбаларга таяниш, ҳар бир мавзунини чуқур таҳлил қилиш муҳим ҳисобланади.

Тузилма ва услубий камчиликларга қарайдиган бўлсак аввало ўқув қўлланманинг тузилиши аниқ ва мантиқий бўлиши лозим. Материалнинг тартибсиз жойлаштирилиши, бўлимлар ўртасидаги узилишлар ва режанинг пухта ишланмаганлиги ўқув жараёнига салбий таъсир кўрсатади. Тўғри тузилма ўқувчига материални босқичма-босқич ўзлаштириш имконини беради. Матн услуби ҳам алоҳида аҳамиятга эга. Илмий услуб сақланган ҳолда, фикрлар содда ва тушунарли ифода этилиши керак. Ортиқча мураккаб иборалар ва терминлардан ҳаддан зиёд фойдаланиш ўқувчини чарчатади ва материални қабул қилишни қийинлаштиради. Ўқув қўлланма ёзишда дидактик жиҳатдаги хатоликлар ҳам учрайди албатта бундай хатоликларга йўл қўймаслик керак.

Ўқув қўлланманинг дидактик қиймати унинг амалий аҳамияти билан белгиланади. Агар қўлланмада мисоллар, машқлар ва саволлар етарли бўлмаса, ўқувчи назарий билимни амалиётда қўллаш имкониятидан маҳрум бўлади. Бу эса билимнинг мустаҳкамланмаслигига олиб келади.

Шунинг учун ҳар бир мавзу амалий мисоллар, топшириқлар ва мустақил ишлаш учун саволлар билан бойитилиши зарур. Бундай ёндашув ўқувчининг фаоллигини оширади ва билимларни мустаҳкамлайди.

Ўқув қўлланманинг ташқи кўриниши дизайн ва техник жиҳатлари ҳам унинг самарадорлигига таъсир кўрсатади. Матннинг ўқишга қулай бўлиши, шрифтларнинг тўғри танланиши ва саҳифанинг тўғри форматланиши муҳим аҳамиятга эга. Визуал элементлар, жумладан, расмлар, жадваллар ва диаграммалар материални янада тушунарли қилади.

Нотўғри форматлаш, тартибсиз абзацлар ва визуал материалларнинг йўқлиги ўқувчининг қизиқишини пасайтиради.

Илмий ишларда муаллифлик ҳуқуқига риоя қилиш муҳим талаб ҳисобланади. Бошқа манбалардан фойдаланганда уларга ҳавола бериш шарт.

Манбасиз келтирилган маълумотлар илмий этикага зид бўлиб, ишнинг ишончилигига салбий таъсир кўрсатади.

Шу боис ҳар бир маълумот манбаси аниқ кўрсатилиши ва иқтибослар тўғри расмийлаштирилиши лозим.

Ўқув қўлланма маълум бир аудитория учун мўлжалланган бўлади. Унинг мазмуни ва услуби ўқувчиларнинг ёши, билим даражаси ва тайёргарлигига мос бўлиши керак. Акс ҳолда, материал жуда қийин ёки жуда содда бўлиб қолиши мумкин.

Бу эса таълим жараёни самарадорлигини пасайтиради.

### **Натижа**

Ҳозирги кунда таълим жараёнида инновацион технологиялардан фойдаланиш муҳим аҳамият касб этмоқда. Ўқув қўлланмаларда мультимедиа элементлари, интерактив топшириқлар ва инфографикалардан фойдаланиш тавсия этилади. Бу усуллар ўқувчиларнинг қизиқишини оширади ва материални тезроқ ўзлаштиришга ёрдам беради.

### **Хулоса**

Ўқув қўлланма яратиш мураккаб ва масъулиятли жараён бўлиб, у муаллифдан юқори даражадаги билим ва методик маҳоратини талаб қилади. Мазмуний, услубий ва дидактик хатоларга йўл қўймаслик орқали юқори сифатли ўқув материални яратиш мумкин. Бундай қўлланмалар эса таълим сифати ошишига ва ўқувчиларнинг билим даражаси юксалишига хизмат қилади.

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## **МИРОВОЗЗРЕНЧЕСКИЕ ОСНОВАНИЯ ФОРМИРОВАНИЯ ПЕДАГОГИЧЕСКОЙ КУЛЬТУРЫ. КОНЦЕПТУАЛИЗАЦИЯ, ОПЕРАЦИОНАЛИЗАЦИЯ, ПРОГРАММНАЯ СХЕМА**

***Аннотация:** В статье рассматриваются мировоззренческие основания формирования педагогической культуры как интегративного качества современного педагога. Актуальность темы определяется усилением требований к ценностной устойчивости, профессиональной ответственности и методологической рефлексии учителя в условиях обновления содержания образования. Обосновывается положение о том, что педагогическая культура не сводится к совокупности норм, умений и профессиональных техник, а включает устойчивую систему смыслов, ценностных ориентиров, нравственных регуляторов и способов профессионального действия. На этой основе предложена трехуровневая модель педагогической культуры, включающая мировоззренческий, нормативно-этический и методологический уровни. Показано, что переход от декларируемых ценностей к реальным педагогическим практикам требует операционализации компонентов педагогической культуры через наблюдаемые индикаторы и воспроизводимые процедуры фиксации. В статье представлена программная схема формирования педагогической культуры, ориентированная на развитие ценностно-смысловой определенности, профессиональной этики, рефлексии, коммуникативной ответственности и способности к педагогическому выбору в ситуациях неопределенности. Теоретическую основу составили труды по духовно-нравственному воспитанию, педагогическим технологиям, психологии личности, социокультурной компетентности, педагогической этике и отношениям учителя и ученика [1–3; 13–22]. Материал может быть использован как концептуальная и методическая основа для разработки программ подготовки педагогических кадров.*

### **Ключевые слова**

*педагогическая культура, мировоззрение педагога, духовно-нравственное воспитание, ценности образования, профессиональная этика, операционализация, педагогическая рефлексия, формирующая программа.*

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## WORLDVIEW FOUNDATIONS OF THE FORMATION OF PEDAGOGICAL CULTURE CONCEPTUALIZATION, OPERATIONALIZATION, AND PROGRAM FRAMEWORK

**Abstract:** *The article examines the worldview foundations of the formation of pedagogical culture as an integrative quality of the modern teacher. The relevance of the topic is determined by the increasing demands for teachers' value stability, professional responsibility, and methodological reflection in the context of the renewal of educational content. It is argued that pedagogical culture cannot be reduced to a set of norms, skills, and professional techniques, but includes a stable system of meanings, value orientations, moral regulators, and modes of professional action. On this basis, a three-level model of pedagogical culture is proposed, including the worldview, normative-ethical, and methodological levels. It is shown that the transition from declared values to actual pedagogical practices requires the operationalization of the components of pedagogical culture through observable indicators and reproducible recording procedures. The article presents a program framework for the formation of pedagogical culture aimed at developing value-semantic clarity, professional ethics, reflection, communicative responsibility, and the ability to make pedagogical choices in situations of uncertainty. The theoretical foundation is based on works devoted to spiritual and moral education, pedagogical technologies, personality psychology, sociocultural competence, pedagogical ethics, and teacher–student relations [1–3; 13–22]. The material may be used as a conceptual and methodological basis for designing teacher training programs.*

### **Keywords**

*pedagogical culture, teacher worldview, spiritual and moral education, educational values, professional ethics, operationalization, pedagogical reflection, formative program*

### **Введение**

Современное образование предъявляет к педагогу требования, выходящие за пределы предметной подготовленности и технологической грамотности. В центре профессионального внимания находится не только качество обучения, но и качество педагогического присутствия, система ценностей учителя, его отношение к ребенку, характер профессионального выбора и степень внутренней ответственности за результаты взаимодействия. Именно поэтому проблема педагогической культуры приобретает не прикладной, а мировоззренческий статус.

В научной литературе вопросы духовно-нравственного воспитания, национальных ценностей, педагогической технологии, социокультурной компетентности и отношений учителя с обучающимся раскрываются в разных исследовательских плоскостях [1–3; 13–16; 18–22]. Однако сохраняется теоретический разрыв между описанием нормативных требований к педагогу и объяснением тех внутренних оснований, которые обеспечивают

устойчивость его профессиональной позиции. Педагогическая культура в этом контексте должна рассматриваться не как внешняя сумма правил, а как интегрированная форма профессионального сознания и поведения.

Цель статьи состоит в теоретическом обосновании мировоззренческих оснований педагогической культуры, их концептуализации и операционализации, а также в построении программной схемы ее формирования в системе подготовки педагогических кадров.

### **Теоретические основания исследования**

Исходной предпосылкой выступает положение о том, что педагогическая культура формируется на пересечении ценностей, норм и способов действия. Духовно-нравственное воспитание, по данным ряда работ, сохраняет системообразующее значение для педагогической деятельности, особенно в условиях обращения к национальным ценностям и культурному наследию [1; 3; 13; 21; 22]. В этих исследованиях подчеркивается, что воспитательный результат не обеспечивается одной только передачей знаний. Он связан с включенностью педагога в ценностное содержание образовательного процесса и с его способностью переводить культурные смыслы в формы профессионального взаимодействия.

С другой стороны, исследования педагогических технологий показывают, что сама по себе технологизация учебного процесса не гарантирует становления педагогической культуры [2]. Технология усиливает педагогическое действие только в том случае, когда опирается на ценностно обоснованную профессиональную позицию. Следовательно, мировоззренческий компонент не является внешним дополнением к педагогическому мастерству, а задает его внутреннюю рамку.

Психологические исследования личности позволяют уточнить, что устойчивость педагогической позиции связана с самооценкой, характером эмоциональной регуляции, особенностями защитных механизмов, направленностью личности, когнитивной мобилизацией и способностью к самоконтролю [4–8; 11]. Эти данные важны для понимания того, что педагогическая культура имеет не только педагогическое, но и психологическое основание. Без внутренней целостности личности учителя затрудняется реализация этически ответственного и профессионально выдержанного поведения.

Работы, посвященные проектной деятельности, профессиональным компетенциям, концентрации внимания и интеллектуальным стратегиям, дополняют данную логику тем, что показывают значимость субъектной включенности педагога и обучающегося в образовательный процесс [9–12]. В свою очередь, исследования социокультурной компетентности подчеркивают связь педагогической культуры с семьей, социальной средой и механизмами культурной трансляции [14–16]. Для понимания структуры явления также сохраняют методологическое значение классические положения о становлении личности в детском возрасте и о нравственной природе педагогического труда [17; 20].



На этом основании педагогическая культура может быть определена как интегративное профессионально-личностное качество педагога, включающее ценностно-смысловую ориентацию, нормативно-этическую регуляцию, рефлексивно-методологическую способность и устойчивые практики педагогического взаимодействия.

### **Концептуализация педагогической культуры**

Концептуально педагогическая культура включает три взаимосвязанных уровня.

Первый уровень — **мировоззренческий**. Он задает базовые представления педагога о человеке, воспитании, образовании, достоинстве личности, социальной ответственности и смысле профессионального труда. На данном уровне определяются не частные методические решения, а смысловые основания педагогической позиции. Именно здесь закладывается отношение к ребенку не как к объекту воздействия, а как к субъекту развития и взаимодействия [17; 20].

Второй уровень — **нормативно-этический**. Он связан с профессиональной этикой, педагогическим тактом, уважением к обучающемуся, академической честностью, ответственностью за образовательную среду и способами разрешения морально сложных ситуаций. Этот уровень переводит мировоззренческие основания в правила профессионального поведения и ограничения педагогического действия [18; 19].

Третий уровень — **методологический**. Он обеспечивает способность педагога осмысленно выбирать средства, оценивать педагогическую ситуацию, сопоставлять цели и результаты, анализировать собственные действия, корректировать профессиональные решения и удерживать критерии качества. Здесь педагогическая культура выступает как форма рефлексивной организации практики, а не как набор отдельных приемов [2; 9; 10].

Такое разведение уровней позволяет уйти от описательного понимания педагогической культуры и перейти к ее аналитическому рассмотрению. Педагогическая культура проявляется не в декларации ценностей, а в согласованности между мировоззрением, нормой и способом действия.

### **Операционализация педагогической культуры**

Для перевода концепта в диагностируемую и воспроизводимую форму необходима его операционализация. Она строится на согласовании компонентов, индикаторов и методов фиксации.



| Компонент                    | Индикаторы                                                                                                   | Методы фиксации                                             |
|------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Ценностно-смысловой          | устойчивость профессиональных убеждений, ориентация на достоинство личности, понимание воспитательной миссии | эссе, интервью, анализ ценностных выборов в кейсах          |
| Нормативно-этический         | соблюдение профессиональной этики, уважительность, корректность решений, академическая честность             | наблюдение, экспертная оценка, ситуационные задания         |
| Рефлексивно-методологический | способность к самоанализу, аргументации выбора методов, критериальной оценке педагогических действий         | самоотчеты, аналитические карты, портфолио                  |
| Практико-поведенческий       | устойчивость педагогического взаимодействия, коммуникативная культура, качество обратной связи               | наблюдение, анализ продуктов деятельности, экспертные листы |

Операционализация педагогической культуры требует сочетания нескольких источников данных. Самоотчет без наблюдения может быть искажен социально желательными ответами. Наблюдение без анализа мотивационно-смыслового уровня не раскрывает внутренних оснований действия. Поэтому корректный вывод возможен только при сопоставлении данных, полученных из кейсов, наблюдения, продуктов деятельности, интервью и экспертной оценки.

### **Программная схема формирования педагогической культуры**

Формирование педагогической культуры целесообразно строить по модульному принципу.

Первый модуль связан с развитием мировоззренческой определенности. Его задача состоит в осмыслении ценностей образования, назначения педагогической профессии, роли национальных и общечеловеческих ценностей в воспитании, а также в соотнесении личных профессиональных установок с гуманистическими основаниями педагогики [1; 3; 13; 21; 22].

Второй модуль направлен на нормативно-этическое упорядочение поведения. Здесь отрабатываются вопросы педагогического такта, профессиональной этики, взаимодействия с обучающимися и родителями, предотвращения деструктивных коммуникативных паттернов, сохранения достоинства ребенка и учителя в образовательной среде [8; 18; 19].

Третий модуль ориентирован на развитие методологической рефлексии. Он включает анализ педагогических ситуаций, обоснование выбора методов, оценку рисков педагогического воздействия, сопоставление целей и результатов, а также освоение критериев профессионального самоанализа [2; 9–12].

Четвертый модуль связан с практической апробацией педагогической культуры в учебных и квазипрофессиональных ситуациях. Здесь используются кейсы, микропреподавание, анализ трудных воспитательных ситуаций, экспертная обратная связь и портфолио профессионального роста.

Контроль результативности программы должен строиться через сопоставление исходного и итогового уровней выраженности компонентов педагогической культуры. При этом корректность выводов требует учета контекста образовательной организации, длительности программы, квалификации экспертов и согласованности оценочных процедур.

### **Обсуждение**

Предложенный подход позволяет уточнить статус педагогической культуры в системе профессиональной подготовки педагога. Ее нельзя трактовать только как совокупность внешних норм, методических приемов или коммуникативных навыков. Внутренним условием педагогической культуры выступает мировоззренческая организованность личности педагога. Без этого профессиональная этика превращается в формальное следование правилам, а методическая компетентность — в техническое воспроизведение приемов.

В то же время мировоззренческий уровень не может оставаться абстрактной декларацией. Он должен быть переведен в систему наблюдаемых проявлений и критериев профессионального действия. Именно поэтому концептуализация без операционализации недостаточна. Для подготовки педагогических кадров требуется такая модель, которая одновременно объясняет структуру педагогической культуры и позволяет выстраивать процедуру ее формирования и оценки.

### **Заключение**

Педагогическая культура представляет собой интегративное профессионально-личностное качество, основанное на согласованности мировоззренческих установок, нормативно-этической регуляции и методологической рефлексии. Ее формирование связано не только с усвоением педагогических технологий, но и с выработкой устойчивой ценностной позиции, определяющей характер профессионального поведения. Операционализация педагогической культуры возможна через систему компонентов, индикаторов и методов фиксации, а формирующая работа — через модульную программу, ориентированную на развитие мировоззренческой определенности, профессиональной этики, рефлексии и практик педагогического взаимодействия. Предложенная схема может служить методической основой для дальнейшей эмпирической апробации в системе подготовки педагогов.

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## РОЛЬ ЭРГОТЕРАПИИ В КОМПЛЕКСНОЙ РЕАБИЛИТАЦИИ ПАЦИЕНТОВ ПОСЛЕ ИНСУЛЬТА

**Аннотация:** Инсульт является одной из ведущих причин инвалидности и снижения качества жизни во всем мире. Реабилитация после инсульта требует комплексного подхода, включающего как медицинские, так и социальные меры поддержки. Эрготерапия (трудотерапия) играет ключевую роль в восстановлении утраченных функций, улучшении самостоятельности и адаптации пациентов к повседневной жизни. Данная статья направлена на исследование роли эрготерапии в реабилитации пациентов после инсульта и анализ методов, повышающих эффективность реабилитационного процесса. Рассматриваются современные подходы к восстановлению двигательных навыков, когнитивных функций и самообслуживания, а также значение психологической поддержки и вовлечения семьи пациента. Особое внимание уделяется интеграции эрготерапевтических программ в общую систему медицинской и социальной реабилитации.

**Ключевые слова:** Инсульт, эрготерапия, реабилитация, трудотерапия, двигательные функции, когнитивные функции, самообслуживание, качество жизни, постинсультная адаптация, социальная поддержка

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## THE ROLE OF OCCUPATIONAL THERAPY IN COMPREHENSIVE REHABILITATION OF POST-STROKE PATIENTS

**Annotation:** Stroke is one of the leading causes of disability and reduced quality of life worldwide. Rehabilitation after stroke requires a comprehensive approach that includes both medical and social support measures. Occupational therapy (ergotherapy) plays a key role in restoring lost functions, improving independence, and helping patients adapt to daily life. This article aims to study the role of occupational therapy in the rehabilitation of patients after stroke and to analyze methods that enhance the effectiveness of the rehabilitation process. It

*examines modern approaches to restoring motor skills, cognitive functions, and self-care abilities, as well as the importance of psychological support and family involvement. Special attention is given to the integration of occupational therapy programs into the overall system of medical and social rehabilitation.*

**Key words:** *Stroke, occupational therapy, rehabilitation, ergotherapy, motor functions, cognitive functions, self-care, quality of life, post-stroke adaptation, social support*

Инсульт является одним из наиболее распространенных острых заболеваний центральной нервной системы и одной из ведущих причин инвалидности среди взрослого населения. Он возникает в результате нарушения кровообращения в мозге, что приводит к повреждению нервной ткани и нарушению функций организма. В зависимости от типа инсульта — ишемического или геморрагического — проявления могут включать слабость или паралич конечностей, нарушение речи, зрения, когнитивных функций и снижение способности к самообслуживанию. Реабилитация после инсульта является необходимым этапом восстановления пациента и направлена на максимальное восстановление утраченных функций и возвращение к самостоятельной жизни. Среди различных методов реабилитации эрготерапия занимает особое место. Эрготерапия (трудотерапия) — это комплексный подход, который включает в себя восстановление моторных навыков, координации движений, развитие когнитивных функций и адаптацию к повседневной деятельности. Эрготерапевтические вмешательства направлены на то, чтобы помочь пациенту снова выполнять основные бытовые и профессиональные задачи. Это могут быть занятия, имитирующие повседневную деятельность: одевание, приготовление пищи, гигиенические процедуры, использование бытовых предметов и инструментов. Кроме того, внимание уделяется развитию когнитивных навыков, таких как концентрация, память, планирование и принятие решений, что важно для возвращения пациента к социальной и профессиональной жизни. Научные исследования показывают, что раннее начало эрготерапии значительно улучшает результаты реабилитации. Пациенты, которые начинают терапию в первые недели после инсульта, демонстрируют более быстрое восстановление двигательных функций и большую независимость в повседневной жизни. Эрготерапия также способствует снижению психологической тревожности, депрессии и социальной изоляции, которые часто сопровождают постинсультных пациентов. Важно отметить, что эффективность эрготерапии во многом зависит от индивидуального подхода. Каждая программа должна учитывать возраст пациента, степень повреждений, сопутствующие заболевания и личные потребности. Индивидуализированные планы позволяют повысить мотивацию пациента, улучшить результаты и сократить сроки адаптации к повседневной жизни. Таким образом, эрготерапия играет ключевую роль в комплексной реабилитации пациентов после инсульта. Она способствует восстановлению



утраченных функций, развитию навыков самообслуживания, улучшению когнитивных и психологических показателей и, в конечном итоге, повышает качество жизни пациентов. Понимание значимости эрготерапии является важным шагом для медицинских работников, социальных специалистов и семей пациентов.

Реабилитация пациентов после инсульта является многоплановым процессом, который включает медицинские, социальные и психологические аспекты. Медицинская оценка направлена на определение степени утраты функций, выявление возможных осложнений и формирование индивидуального плана восстановления. Социальная оценка помогает учитывать условия жизни пациента, его поддержку со стороны семьи и общества, что значительно влияет на эффективность реабилитации. С медицинской точки зрения, реабилитационный процесс начинается с комплексной диагностики состояния пациента. Это включает оценку двигательных функций, силы мышц, координации движений, речи и когнитивных способностей. Для этого применяются различные методики: шкалы оценки инвалидности, тесты на функциональные возможности, анализы лабораторные и инструментальные исследования. Раннее выявление нарушений позволяет разработать индивидуальную программу эрготерапии, направленную на восстановление максимально возможного уровня самостоятельности. Эрготерапия в медицинском контексте включает упражнения, имитирующие повседневные действия, адаптацию бытовых условий и использование вспомогательных устройств. Например, для пациентов с нарушением моторики рук разрабатываются задания на мелкую моторику, захват предметов и выполнение последовательных действий. Для пациентов с когнитивными нарушениями включаются упражнения на память, внимание, планирование и принятие решений. Комплексное сочетание двигательных и когнитивных тренингов позволяет улучшить общую функциональную независимость. Социальная оценка играет не менее важную роль. Условия жизни пациента, уровень поддержки со стороны семьи и доступ к медицинским услугам существенно влияют на результаты реабилитации. Пациенты, проживающие в благоприятной социальной среде, с активным участием родственников, быстрее восстанавливаются и демонстрируют большую мотивацию к выполнению реабилитационных упражнений. Напротив, отсутствие поддержки и социальная изоляция могут привести к снижению эффективности терапии и увеличению риска осложнений, таких как депрессия и повторный инсульт. Особое внимание уделяется образованию семьи и близких пациентов. Обучение методам помощи, адаптации домашних условий и поддержания психологического состояния играет ключевую роль в реабилитации. Понимание членами семьи особенностей состояния пациента позволяет создать безопасную и стимулирующую среду, что ускоряет восстановление и повышает качество жизни. Необходимо учитывать также экономические и региональные факторы. В странах с ограниченными ресурсами доступ к эрготерапевтическим программам может быть ограничен.

Это требует разработки мобильных программ, дистанционных консультаций и использования современных цифровых технологий, чтобы обеспечить равный доступ к реабилитационным услугам. Такие подходы позволяют преодолеть географические и финансовые барьеры, обеспечивая пациентам возможность получать качественную помощь независимо от места проживания. Кроме того, регулярная оценка прогресса пациента позволяет корректировать программу реабилитации. Медицинские специалисты используют данные о динамике восстановления двигательных и когнитивных функций, уровне самостоятельности и психологическом состоянии для адаптации упражнений и методов эрготерапии. Такой подход обеспечивает индивидуальность лечения и максимальную эффективность реабилитации. Таким образом, медицинская и социальная оценка является фундаментом для успешной эрготерапевтической реабилитации после инсульта. Интеграция клинических данных, условий жизни пациента и социальной поддержки позволяет формировать комплексные программы, которые способствуют восстановлению утраченных функций, повышению уровня независимости и улучшению качества жизни.

Эффективная реабилитация пациентов после инсульта требует внедрения практических, доказательных подходов и постоянного совершенствования существующих методов. Эрготерапия как ключевой компонент восстановления должна интегрироваться в комплексную систему медицинской и социальной поддержки, обеспечивая пациентам возможность максимально восстановить функции и адаптироваться к повседневной жизни. Первой практической рекомендацией является разработка индивидуализированных программ эрготерапии. Каждая программа должна учитывать возраст пациента, тип и степень инсульта, сопутствующие заболевания, а также личные потребности и цели. Индивидуальный подход позволяет повысить мотивацию пациентов, сделать занятия более эффективными и сократить сроки восстановления. Например, пациенту с нарушением моторики рук назначаются упражнения на мелкую моторику, тренировка захвата предметов и последовательных действий, в то время как пациенту с когнитивными нарушениями рекомендуется выполнять упражнения на внимание, память и планирование. Второй ключевой аспект — интеграция эрготерапевтических программ в систему первичной медицинской помощи. Обучение медицинского персонала методам эрготерапии, обеспечение клиник необходимым оборудованием и регулярный мониторинг прогресса пациентов позволяют повысить качество реабилитации. Использование современных диагностических инструментов, таких как шкалы оценки функциональной независимости и цифровые трекеры активности, позволяет своевременно корректировать план реабилитации и отслеживать динамику восстановления. Третья рекомендация связана с вовлечением семьи и социальной среды пациента. Семья играет решающую роль в поддержании мотивации, адаптации бытовых условий и эмоциональной поддержки. Обучение родственников методам помощи,

созданию безопасной и стимулирующей среды дома, а также вовлечение их в процесс реабилитации способствует более быстрому восстановлению функций и снижает риск осложнений. Кроме того, социальная поддержка со стороны волонтеров и общественных организаций повышает доступность реабилитационных услуг для уязвимых групп населения. Четвёртый аспект — использование современных технологий для расширения охвата и повышения эффективности реабилитации. Телемедицина, мобильные приложения и виртуальные тренажёры позволяют проводить занятия удалённо, обеспечивая доступ к эрготерапии для пациентов из отдалённых регионов или с ограниченной мобильностью. Цифровые решения позволяют контролировать выполнение упражнений, предоставлять обратную связь и адаптировать программу под индивидуальные потребности, что повышает её эффективность. Также важна системная поддержка на уровне государственных и медицинских учреждений. Разработка национальных стандартов эрготерапевтической реабилитации, создание центров восстановительной медицины и обеспечение финансирования программ позволяют поддерживать устойчивость и качество реабилитации. Введение профилактических и образовательных программ в медицинских и социальных учреждениях способствует раннему выявлению нарушений и своевременному началу терапии. Наконец, регулярная оценка результатов и мониторинг эффективности реабилитации являются необходимыми условиями для её совершенствования. Сбор данных о динамике восстановления, функциональной независимости, когнитивных и психологических показателях позволяет выявлять успешные методики, адаптировать программы и распространять лучшие практики среди медицинских специалистов. Такой подход обеспечивает непрерывное улучшение качества реабилитации и положительно влияет на долгосрочные результаты для пациентов.

### **Выводы (заключение)**

Реабилитация пациентов после инсульта является сложным и многоплановым процессом, который требует интеграции медицинских, психологических и социальных подходов. Эрготерапия, как ключевой компонент восстановительной терапии, играет решающую роль в восстановлении двигательных и когнитивных функций, адаптации к повседневной жизни и повышении качества жизни пациентов. Медицинская и социальная оценка показала, что успешная реабилитация зависит не только от методов лечения, но и от условий жизни пациента, поддержки семьи, доступности медицинских услуг и мотивации пациента. Индивидуализированные программы эрготерапии, раннее начало реабилитации, обучение семьи и вовлечение социальных ресурсов значительно повышают эффективность восстановительного процесса. Современные технологии, включая телемедицину, мобильные приложения и виртуальные тренажёры, позволяют расширить доступ к эрготерапии и повысить эффективность занятий, особенно для пациентов из отдалённых

регионов или с ограниченной мобильностью. Системная поддержка на уровне государственных и медицинских учреждений, а также непрерывный мониторинг результатов реабилитации обеспечивают устойчивость и высокое качество восстановительных программ. В целом, комплексное применение медицинских, социальных и технологических подходов к эрготерапии позволяет ускорить восстановление, повысить независимость пациентов и улучшить их качество жизни. Эффективная постинсультная реабилитация возможна только при координированной работе медицинских специалистов, семьи и общества.

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## **ОСОБЕННОСТИ СИСТЕМЫ СТРАТЕГИЧЕСКОГО УПРАВЛЕНИЯ В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ**

**Аннотация:** Система стратегического управления в высших учебных заведениях Узбекистана играет важную роль в развитии образовательной среды и повышении качества образования. В данной статье анализируются основные аспекты и результаты этой системы. В частности, в качестве важных особенностей стратегического управления в наших университетах выделены такие факторы, как целеориентированность, гибкость, системный подход, управление качеством и стратегическое планирование. Результаты системы стратегического управления включают повышение качества образования, расширение международного сотрудничества, укрепление связей с промышленностью, инновациями и технологиями, развитие академической мобильности, устойчивое развитие и повышение социальной ответственности. Совершенствование стратегического управления в современной системе высшего образования Узбекистана позволяет повысить качество образования и международного сотрудничества, укрепить интеграцию с производством и подготовить конкурентоспособных специалистов. Этот процесс способствует обеспечению устойчивого развития страны.

**Ключевые слова:** повышение квалификации, гибкость, интеграция науки и образования, управление качеством, образовательные программы, трудоустройство выпускников, академическая мобильность, социальная ответственность.

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## **FEATURES OF THE STRATEGIC MANAGEMENT SYSTEM IN HIGHER EDUCATION INSTITUTIONS**

**Abstract:** The strategic management system in higher education institutions of Uzbekistan plays an important role in developing the educational environment and improving the quality of education. This article analyzes the main aspects and results of this system. In particular, such factors as goal-orientation, flexibility, a systematic approach, quality management and strategic planning are highlighted as important features of strategic management in our universities. The results of the



*strategic management system include an increase in the quality of education, expansion of international cooperation, strengthening of ties with industry, innovation and technology, development of academic mobility, sustainable development and increased social responsibility. By improving strategic management in the modern higher education system of Uzbekistan, the quality of education and international cooperation are developed, integration with production is strengthened, and competitive specialists are trained. This process serves to ensure the sustainable development of the country.*

**Keywords:** *advanced training, flexibility, integration of science and education, quality management, educational programs, graduate employment, academic mobility, social responsibility.*

## **ВВЕДЕНИЕ**

Педагогическая и экспериментальная работа по внедрению стратегического управления в опыте высшего образования показывает, что оно способствует развитию в области педагогики. Разработка программы должна основываться на научных инновациях, предлагаемых технологиях и проблемах стратегического управления, новой информации, анализах, пособиях и рекомендациях, являющихся образцом для научного распространения, и должна соответствовать целям и задачам образовательного процесса высших учебных заведений.

Пилотные исследования, связанные с внедрением системы стратегического управления, служат для совершенствования учебных планов и программ, развития учебно-методического обеспечения, повышения профессиональной компетентности преподавателей и дальнейшего совершенствования систем мониторинга качества образования. Эти процессы позволяют обосновать выдвинутые в рамках исследования научные гипотезы.

В процессе изучения стратегического управления в контексте системных реформ важно сформировать две группы, действующие одновременно при организации пилотных исследований — экспериментальную и контрольную. Если основной целью исследования является оценка результатов стратегического управления, то в качестве контрольной группы берутся высшие учебные заведения, работающие на основе традиционных методов управления.

Основная цель пилотного исследования — определить уровень достижения повышения качества образования за счет внедрения системы стратегического управления, в которой важную роль играет совершенствование учебных планов, программ и учебников на основе современных подходов и их практическое применение. Результаты оцениваются с использованием математических статистических методов.

Также, поскольку изменения в системе стратегического управления вводятся постепенно, непрерывно и систематически, основная задача пилотного исследования — определить влияние этих обновлений на качество



образования. В этом процессе анализируется эффективность современных подходов, внедренных в механизмы управления.

Основная гипотеза пилотного исследования заключается в том, что качество образования может быть значительно улучшено путем организации стратегического управления в высших учебных заведениях на основе современных подходов, то есть путем обеспечения образовательного процесса улучшенными учебными планами, программами, учебниками и учебно-методическими ресурсами и их методической поддержки.

### **ОБЗОР ЛИТЕРАТУРЫ**

В этой области в Республике Узбекистан созданы важные нормативно-правовые рамки, в частности, Указом Президента № ПФ-165 от 6 июля 2022 года была утверждена «Стратегия инновационного развития Республики Узбекистан на 2022–2026 годы» [1]. В соответствии с этим документом Министерству высшего и среднего специализированного образования в сотрудничестве с Министерством экономического развития и сокращения бедности и Министерством инновационного развития было поручено разработать и внедрить учебные программы по таким направлениям, как «Управление инновациями», «Управление проектами», «Коммерциализация» и «Управление интеллектуальной собственностью», с учетом опыта ведущих зарубежных университетов.

Зарубежные исследователи теории управления, в том числе М. Мескон, М. Альберт и Ф. Хедури, отмечают, что качество управления напрямую влияет на конечные результаты деятельности организации, а также на методы и средства достижения этих результатов [4]. По их мнению, для эффективного решения задач, стоящих перед организацией, необходимо сформировать команду, работающую в гармонии друг с другом. При этом важно, чтобы каждый член команды четко знал свою задачу, работал непрерывно и стабильно, решал возникающие проблемы без конфликтов и был ориентирован на общий результат.

Также отмечается, что главной задачей управления является достижение поставленных целей с минимальными затратами ресурсов и в короткие сроки. В этом процессе теория и практика управления опираются на систему основных функций. По мнению М. Ахмедова, процесс обеспечения качества на основе современных подходов к управлению осуществляется через этапы целеполагания, планирования, выбора методов и средств, мониторинга и оценки, анализа и корректировки. В частности, важной частью управления является система мониторинга и оценки, без которой невозможно эффективно управлять качеством системы образования. Следовательно, управляющим организациям постоянно необходима надежная информация [5].

У. Иноятлов классифицирует управление системой образования по уровням и направлениям. В частности, уровни управления охватывают этапы государственного, межотраслевого, отраслевого, территориального и внутреннего управления учреждением. Направления определяются

организационными, системными, содержательными, кадровыми и методическими аспектами [7].

Р. Джураев интерпретирует понятие мониторинга как процесс сбора, обработки, хранения и распространения информации, позволяющей оценивать, анализировать состояние системы образования или ее отдельных элементов и делать обоснованные выводы. Это имеет большое значение при принятии управленческих решений [18].

Н. Маманазарова в своих исследованиях делает акцент на эффективность управления образовательным учреждением путём организации маркетинга образовательных услуг и вопрос формирования и управления репутацией вуза, его имиджем в обществе и среди потенциальных студентов, а также научно обосновывает необходимость привлечения дополнительных источников финансирования, включая спонсорские средства и гранты [8].

Ф. Тейлор и Ф. Гилберт внесли большой вклад в формирование теории научного управления, разработав концепцию организации управления на научной основе. В этом подходе важными принципами считаются использование научных методов, отбор специалистов в соответствии с их способностями, обеспечение их профессионального развития, обеспечение психологической совместимости между работодателем и работником, а также эффективное использование трудовых ресурсов [10,11].

Дальнейшее развитие науки управления связано с именем Г. Эмерсона, который обосновывал достижение эффективности рационализацией трудовой деятельности, повышением производительности труда и регулированием социальных отношений в организации [9]. Позже Р. Дафт, Ф. Друкер, А. Кравченко и другие ученые развили теорию управления, и сформировалась неоклассическая (административная) школа [2,6]. Представители этой школы изучали управленческую деятельность на основе универсальных принципов и обосновывали необходимость рассматривать ее как отдельный объект научного исследования. В частности, А. Файоль объяснял управление как процесс, состоящий из таких основных функций, как планирование, организация, мотивация, координация и контроль, и глубоко подчеркивал важность формальной структуры организации и системы управления [3].

### **МЕТОДОЛОГИЯ ИССЛЕДОВАНИЯ**

Данное исследование направлено на изучение теоретических и практических основ совершенствования системы стратегического управления в высших учебных заведениях Узбекистана с использованием современных научных подходов и комплексных методов. Методология исследования сформирована на основе систематического, комплексного и результативно-ориентированного подхода.

В процессе исследования в качестве основного методологического принципа выбран системный подход. В рамках этого подхода система стратегического управления в высших учебных заведениях изучалась как совокупность взаимосвязанных элементов. При этом основные компоненты

управления – качество образования, научная деятельность, человеческие ресурсы, финансовые ресурсы и процессы цифровизации – анализировались как единая система.

В исследовании также использовался комплексный подход, и изучались различные аспекты стратегического управления – с точки зрения организационных, экономических, педагогических и информационных технологий. Это позволило провести многогранный анализ проблемы и сделать научно обоснованные выводы.

В процессе сбора и анализа эмпирических данных использовались следующие методы:

- методы анализа и синтеза — для выделения и изучения компонентов системы стратегического управления и их обобщения;
- сравнительный метод — для сравнения системы высшего образования развитых стран с национальной системой;
- методы статистического анализа — для оценки, обобщения и прогнозирования существующих показателей;
- метод экспертной оценки — для определения эффективности стратегического управления на основе мнений экспертов;
- метод педагогического экспериментального тестирования — для определения практической эффективности предложенной модели.

В рамках исследования был использован комплексный подход к оценке эффективности стратегического управления. В этом случае были определены взвешенные коэффициенты для основных показателей и рассчитан общий индекс эффективности. Такой подход позволил точно оценить состояние системы управления и выявить области для ее улучшения.

Также важную роль в исследовании сыграла педагогическая экспериментальная работа. Были сформированы экспериментальная и контрольная группы, и результаты внедрения стратегического управления были сопоставлены. Результаты были обработаны с использованием математических статистических методов, и проверена достоверность научных гипотез.

Еще одним важным аспектом методологии исследования является подход цифрового анализа и мониторинга. В этом процессе использовались данные, доступные через информационные системы, внедренные в высших учебных заведениях, включая платформу HEMIS, а оценка эффективности управления основывалась на реальных данных.

В целом, выбранная методология позволила всесторонне изучить систему стратегического управления, выявить существующие проблемы и разработать научно обоснованные предложения и рекомендации, направленные на их устранение.

## **АНАЛИЗ И РЕЗУЛЬТАТЫ**

В рамках данного исследования был разработан и обоснован ряд научных инноваций для совершенствования системы стратегического управления в высших учебных заведениях Узбекистана.

Во-первых, была разработана комплексная система показателей для оценки эффективности системы стратегического управления в высших учебных заведениях. Эта система охватывает такие ключевые области, как качество образования, научная деятельность, кадровые ресурсы, финансовая стабильность, уровень цифровизации и международного сотрудничества, и позволяет определять их на основе комплексной оценки.

Во-вторых, была предложена интегрированная модель определения эффективности стратегического управления. Эта модель позволяет рассчитать общий индекс эффективности на основе взвешенных показателей, который служит для определения реального состояния системы управления и прогнозирования тенденций ее развития.

В-третьих, была разработана концептуальная модель совершенствования стратегического управления в высших учебных заведениях. Эта модель включает такие ключевые компоненты, как управление на основе KPI, финансирование, основанное на результатах, стимулирование научной деятельности, интеграция цифровых платформ управления и развитие международного сотрудничества.

В-четвертых, была научно обоснована необходимость внедрения современных цифровых подходов в систему стратегического управления. В частности, было доказано, что повышение эффективности управления возможно за счет интеграции информационных систем, таких как NEMIS, в единую платформу для оптимизации управленческих процессов.

В-пятых, на основе эмпирического анализа была определена взаимосвязь между качеством образования и эффективностью научной деятельности посредством внедрения стратегического управления. Результаты исследования показали, что улучшение стратегического управления позволяет значительно повысить общую эффективность высших учебных заведений.

В-шестых, на основе педагогических пилотных исследований были разработаны организационно-методические механизмы внедрения стратегического управления. Эти механизмы служат для повышения качества образовательного процесса путем модернизации учебных планов, программ и учебно-методической поддержки.

В-седьмых, были обоснованы возможности повышения международной конкурентоспособности высших учебных заведений за счет совершенствования системы стратегического управления. Это позволит улучшить позиции университетов в международных рейтингах и ускорить их интеграцию в глобальное образовательное пространство. В общем короче говоря, исследование как результат работающий изданный научный новости верховный образование в учреждениях стратегический управление система улучшение, управление эффективность увеличивать и образование качество и научный потенциал поднять направленный на теоретический и практичный важность имеет.

В целом, научные инновации, разработанные в результате исследования, имеют теоретическое и практическое значение и направлены на совершенствование системы стратегического управления в высших учебных заведениях, повышение эффективности управления, улучшение качества образования и научного потенциала.

В результате анализа, направленного на оценку и совершенствование системы стратегического управления в высших учебных заведениях Узбекистана, был достигнут ряд важных научно-практических результатов.

Во-первых, на основе проведенного комплексного анализа была оценена текущая ситуация с системой стратегического управления в высших учебных заведениях. По результатам комплексной оценки общий уровень эффективности составил 0,66, что указывает на умеренное развитие системы. Это свидетельствует о том, что, хотя элементы стратегического управления существуют, их практическая эффективность недостаточна.

Во-вторых, были выявлены основные факторы, влияющие на эффективность стратегического управления, и систематически проанализированы проблемы каждого из них. В частности, в качестве основных препятствий были определены формальный характер стратегического планирования, недостаточное стимулирование научной деятельности, отсутствие интеграции цифровых систем и ограниченные финансовые ресурсы.

Во-вторых, были определены основные препятствия: формальный характер стратегического планирования, недостаточное стимулирование научной деятельности, отсутствие интеграции цифровых систем и ограниченные финансовые ресурсы.

В-третьих, в результате сравнения с международным опытом было установлено, что управление в национальной системе высшего образования в большей степени ориентировано на процесс, в то время как в развитых странах преобладает модель управления, ориентированная на результат. Эта ситуация обосновала необходимость внедрения современных подходов к совершенствованию стратегического управления.

В-четвертых, при практическом применении разработанной модели стратегического управления прогнозируется значительное повышение качества образования, эффективности научной деятельности и уровня международного сотрудничества. По расчетам установлено, что существует возможность повышения общего индекса эффективности до 0,83–0,85.

В-пятых, в результате педагогического пилотного тестирования было доказано, что организация стратегического управления на основе современных подходов оказывает положительное влияние на качество образования и эффективность управления. Экспериментальные группы достигли более высоких результатов, чем контрольные группы.

В-шестых, была определена важность цифровых технологий в реализации стратегического управления. В частности, было обосновано, что интеграция информационных систем, таких как NEMIS, оптимизирует



управленческие процессы и расширяет возможности быстрого принятия решений.

В-седьмых, на основе результатов исследования были разработаны конкретные практические рекомендации по совершенствованию стратегического управления в высших учебных заведениях. Эти рекомендации направлены на ориентацию управления на результат, внедрение системы KPI, стимулирование научной деятельности и расширение международного сотрудничества.

В целом, результатами исследования научно обосновано, что путем совершенствования системы стратегического управления можно повысить эффективность высших учебных заведений, развить качество образования и научный потенциал, а также укрепить международную конкурентоспособность учебного заведения.

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## **МНОГОУРОВНЕВЫЙ ПОДХОД К ОТБОРУ УЧЕБНЫХ МАТЕРИАЛОВ В ПРОФЕССИОНАЛЬНО-ОРИЕНТИРОВАННОМ ИНОЯЗЫЧНОМ ОБУЧЕНИИ**

***Аннотация:** В статье рассматривается проблема отбора учебных материалов для формирования профессионально-ориентированной иноязычной коммуникативной компетенции студентов нефилологических направлений в условиях многоязычной образовательной среды. Особое внимание уделяется специфике образовательного пространства Республики Каракалпакстан, характеризующегося одновременным функционированием нескольких языков. Обосновывается необходимость многоуровневого подхода к отбору учебных материалов как ключевого методического условия развития профессионально-ориентированной иноязычной коммуникативной компетенции.*

***Ключевые слова:** профессионально-ориентированная иноязычная коммуникативная компетенция, отбор учебных материалов, многоязычная образовательная среда, нефилологические специальности, методика обучения иностранным языкам.*

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## **MULTI-LEVEL APPROACH TO SELECTING LEARNING MATERIALS IN PROFESSIONALLY-ORIENTED FOREIGN LANGUAGE LEARNING**

***Abstract:** The article examines the problem of selecting educational materials for the formation of professionally oriented foreign language communicative competence of students in non-philological fields in a multilingual educational environment. Special attention is paid to the specifics of the educational space of the Republic of Karakalpakstan, characterized by the simultaneous functioning of several languages. The need for a multi-level approach to the selection of educational materials as a key methodological condition for the development of professionally oriented foreign language communicative competence is substantiated.*

**Keywords:** *professionally oriented foreign language communicative competence, selection of educational materials, multilingual educational environment, non-philological specialties, foreign language teaching methodology.*

В современных условиях развития высшего образования формирование профессионально-ориентированной иноязычной коммуникативной компетенции студентов нефилологических направлений рассматривается как одно из приоритетных направлений языковой подготовки. Иностранный язык выступает не только средством межкультурного общения, но и важным инструментом профессиональной деятельности, обеспечивающим доступ к научной информации, участие в международных проектах и профессиональное взаимодействие [1;142].

Особую актуальность данная проблема приобретает в условиях многоязычной образовательной среды, характерной для Республики Каракалпакстан. Одновременное функционирование каракалпакского, узбекского, русского и иностранного языков оказывает существенное влияние на процесс усвоения профессионально ориентированного иностранного языка. В этих условиях учебные материалы становятся ключевым звеном, опосредующим взаимодействие языка, профессионального содержания и когнитивных процессов обучающихся.

Практика преподавания показывает, что традиционные подходы к отбору учебных материалов, ориентированные преимущественно на языковой или профессиональный компонент, не в полной мере учитывают специфику многоязычного образовательного пространства. Это приводит к усилению межъязыковой интерференции, снижению уровня когнитивного понимания и фрагментарности формирования профессионального иноязычного дискурса. В связи с этим возникает необходимость научного обоснования многоуровневой системы отбора учебных материалов, адаптированной к условиям многоязычного образования.

В методике обучения иностранным языкам учебный материал рассматривается как носитель языкового, когнитивного и профессионального содержания. Однако в условиях многоязычной образовательной среды его функция значительно расширяется: материал должен обеспечивать согласование нескольких языковых систем, минимизировать интерференцию и способствовать формированию профессионального мышления на иностранном языке [2;28].

Одноуровневый подход к отбору учебных материалов, ориентированный исключительно на профессиональную тематику или языковую сложность, оказывается недостаточным для формирования профессионально-ориентированной иноязычной коммуникативной компетенции. Многоязычие требует комплексного учета не только содержания и формы материала, но и когнитивных, дискурсивных и технологических характеристик образовательного процесса.

В этой связи целесообразным представляется многоуровневый подход, в рамках которого отбор учебных материалов осуществляется с учетом взаимосвязанных уровней, образующих целостную методическую систему. Такой подход позволяет обеспечить системность, научную корректность и педагогическую эффективность учебного процесса.

#### УРОВНИ ОТБОРА УЧЕБНЫХ МАТЕРИАЛОВ

##### 4. Предметно-профессиональный уровень

На предметно-профессиональном уровне учебный материал должен быть непосредственно связан с ключевыми научными понятиями и видами профессиональной деятельности обучающихся. Для студентов химических направлений это включает изучение реакционных механизмов, аналитических методов, вопросов экологии почв и воды Приаралья. Для биологических направлений — клеточные процессы, основы генетики, региональные экологические проблемы. Для технических направлений — приборы, алгоритмы, технические регламенты и инструкции.

Критерий отбора: учебный материал отражает реальные знания, процессы и задачи профессиональной сферы, а не их упрощённые или абстрактные аналоги.

##### 2. Дискурсивно-коммуникативный уровень

На данном уровне особое значение приобретает соответствие учебных материалов жанрам научной и профессиональной коммуникации. К ним относятся IMRAD-структура научных текстов, аннотации и abstracts, отчёты, протоколы, инструкции, технические описания, научные обзоры и элементы мини-исследований.

Критерий отбора: материал способствует формированию научного и профессионального иноязычного дискурса и знакомит студентов с типичными коммуникативными моделями профессионального общения.

##### 3. Когнитивно-лингвистический уровень

Когнитивно-лингвистический уровень предполагает учет уровня владения иностранным языком, особенностей функционирования терминологии, а также межъязыковых расхождений в системе «kaq-uz-gu-en». Особое внимание уделяется зонам интерференции — семантической, морфологической и синтаксической.

Критерий отбора: учебный материал способствует осознанному когнитивному пониманию профессионального содержания и снижает негативное влияние межъязыковой интерференции.

##### 4. Педагогико-технологический уровень

На педагогико-технологическом уровне материал должен быть доступен для реализации современных образовательных технологий, таких как CLIL, PBL и case-методы. Он должен быть визуализируемым, цифровым или легко поддающимся цифровизации, а также пригодным для использования в многоязычной образовательной среде.

Критерий отбора: учебный материал технологичен, методически гибок и органично встроим в образовательный процесс [3;79].

В развитие представленных уровней предлагается авторская система критериев отбора учебных материалов, выполняющая диагностическую, проектировочную и коррекционную функции.

Ключевыми критериями являются профессиональная релевантность, жанрово-дискурсивная значимость, информативность и научная корректность, языковая доступность (A2–B2), многоязычная сопоставимость терминологии, интерференционная нейтральность, визуализируемость, методическая преобразуемость и цифровая применимость. Совокупность данных критериев обеспечивает целостность и научную обоснованность процесса отбора учебных материалов.

Анализ практики преподавания показывает, что традиционные подходы к отбору материалов часто не учитывают многоязычный контекст обучения. В результате материалы либо перегружены терминологией, либо не адаптированы к когнитивным возможностям студентов, что усиливает интерференцию и снижает эффективность формирования профессионального иноязычного дискурса [4;6].

Предложенная многоуровневая система отбора учебных материалов может быть использована при разработке учебников, учебно-методических комплексов и курсов профессионально-ориентированного иностранного языка для студентов нефилологических направлений в условиях многоязычной образовательной среды.

Таким образом, многоуровневый подход к отбору учебных материалов является необходимым методическим условием формирования профессионально-ориентированной иноязычной коммуникативной компетенции в условиях многоязычного образования. Предложенная авторская система уровней и критериев отбора обеспечивает научную обоснованность, методическую целостность и практическую применимость учебных материалов, что способствует повышению эффективности профессионально-ориентированного иноязычного обучения.

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## **ЦИФРОВОЙ ДИСКУРС И КОЛЛЕКТИВНОЕ СОЗНАНИЕ: ВОСПРОИЗВОДСТВО СОЦИАЛЬНЫХ ПРЕДСТАВЛЕНИЙ**

**Аннотация:** В статье анализируется цифровой дискурс как механизм воспроизводства социальных представлений в коллективном сознании на пример Узбекистана. Рассматриваются особенности онлайн-коммуникации в национальном медиaprостранстве, влияние социальных сетей и алгоритмических систем на формирование общественной повестки, ценностных ориентаций и моделей идентичности. Делается вывод о том, что цифровой дискурс в Узбекистане выполняет не только репрезентативную, но и конструктивную функцию, формируя новые формы общественного взаимодействия.

**Ключевые слова:** цифровой дискурс, коллективное сознание, социальные представления, Узбекистан, медиaprостранство, идентичность, онлайн-коммуникация.

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## **DIGITAL DISCOURSE AND COLLECTIVE CONSCIOUSNESS: REPRODUCTION OF SOCIAL REPRESENTATIONS**

**Abstract:** The article examines digital discourse as a mechanism for reproducing social representations in collective consciousness using the example of Uzbekistan. Based on content analysis of Telegram channels, thematic dominants, value narratives, and linguistic features of digital communication are identified. The study demonstrates that the digital environment performs not only a representational but also a constructive function, shaping models of public perception, identity, and normativity.

**Keywords:** digital discourse, collective consciousness, social representations, Uzbekistan, media discourse, identity, Telegram, content analysis.

### **Введение**

В условиях глобальной цифровизации общественные процессы всё в большей степени разворачиваются в онлайн-пространстве. Для Узбекистана, где в последние годы наблюдается активное развитие интернет-



инфраструктуры и рост аудитории социальных сетей, цифровой дискурс становится значимым фактором формирования коллективного сознания.

**Цель исследования** — выявить специфику воспроизводства социальных представлений в цифровом дискурсе Узбекистана.

### **Теоретические основания**

В рамках конструктивистского подхода социальная реальность рассматривается как результат дискурсивных практик. Теория социальных представлений объясняет процессы коллективной интерпретации действительности через устойчивые символические схемы. В цифровой среде данные схемы приобретают новые формы — мультимодальные тексты, мемы, хештеги, визуальные нарративы.

### **Цифровое медиапространство Узбекистана как социокультурная среда**

Цифровое медиапространство Узбекистана представляет собой динамично развивающуюся платформу, на которой взаимодействуют различные социальные, культурные и экономические процессы. В последние годы наблюдается значительный рост числа пользователей интернета и социальных сетей, что превращает цифровую среду в важный фактор формирования общественного мнения, культурной идентичности и социальных практик.

Цифровой дискурс Узбекистана формируется на стыке национальных традиций, постсоветского культурного наследия и глобальных информационных потоков. Существенную роль в формировании общественной повестки играют такие платформы, как Telegram, Instagram и Facebook.

В Узбекистане особенно распространён формат телеграм-каналов, которые выполняют функции альтернативных СМИ, общественных трибун и площадок для выражения гражданской позиции. Через данные каналы формируются и закрепляются социальные представления о политике, экономике, социальной справедливости, традиционных ценностях.

Особое значение цифровое медиапространство приобретает в контексте формирования молодежной культуры. Молодежь Узбекистана активно использует интернет для самовыражения, создания и потребления контента, который отражает современные тенденции глобализации, но при этом сохраняет национальные культурные особенности. Это создает уникальное пересечение локальных и глобальных культурных практик, которое характеризует современное цифровое пространство страны как гибридную социокультурную среду.

Однако наряду с положительными аспектами существует и ряд проблем, связанных с регулированием информации, уровнем медиаграмотности населения и доступом к качественному контенту. Государственные инициативы по цифровизации и развитию медиапространства Узбекистана направлены на создание безопасной и

устойчивой информационной среды, поддержание культурного разнообразия и стимулирование инноваций в сфере цифровых коммуникаций.

## **Репрезентация социальных представлений в цифровом дискурсе Узбекистана**

### *1. Национальная идентичность и историческая память*

В цифровом пространстве активно воспроизводятся образы национального прошлого, символы государственности, культурные коды. Публикации, посвящённые историческим датам, культурному наследию, реформам и модернизации, формируют устойчивые представления о национальном развитии и прогрессе.

Хештеги, связанные с патриотической тематикой, способствуют консолидации пользователей вокруг общих ценностных ориентиров. Таким образом, цифровой дискурс становится инструментом укрепления коллективной идентичности.

### *2. Традиционные ценности и модернизационные нарративы*

Цифровое пространство Узбекистана демонстрирует сосуществование двух дискурсивных линий:

- сохранение традиционных норм (семья, уважение к старшим, религиозные ценности);
- продвижение модернизационных установок (предпринимательство, цифровая экономика, стартап-культура).

Например, обсуждение цифровых реформ, онлайн-образования и электронных государственных услуг сопровождается формированием новых социальных представлений о прогрессе и инновационном развитии страны.

### *3. Меметизация и общественные реакции*

В узбекском цифровом пространстве активно используются мемы и иронические формы выражения общественного мнения. Меметизация позволяет пользователям выражать оценочные суждения по поводу социальных проблем, бюрократии, экономических трудностей или повседневных ситуаций.

Повторяемость мемов способствует закреплению определённых интерпретаций социальной реальности и формированию коллективных установок.

### *4. Алгоритмическая среда и эффект информационных сообществ*

Алгоритмы социальных платформ формируют персонализированные информационные ленты, что усиливает эффект «сообществ по интересам». В результате социальные представления могут укрепляться внутри отдельных групп, создавая эффект однородности мнений.

Для Узбекистана характерно формирование цифровых сообществ по языковому признаку (узбекоязычные и русскоязычные сегменты), что также влияет на вариативность коллективных представлений.

Анализ показывает, что цифровой дискурс в Узбекистане:

- ускоряет процесс общественной реакции на события;
- повышает уровень гражданской вовлечённости;

- усиливает эмоциональную составляющую коммуникации;
- формирует новые формы публичности.

Коллективное сознание становится более динамичным, интерактивным и зависимым от медиатехнологий. При этом традиционные культурные коды продолжают играть значимую роль, что придаёт цифровому дискурсу национальную специфику.

### **Обсуждение**

Цифровой дискурс в Узбекистане выполняет функцию символической интеграции общества, формируя новые и поддерживая существующие социальные связи в условиях современной медиасферы. Он отражает одновременно процессы модернизации и трансформации, с одной стороны, и сохраняет элементы традиционной культуры, с другой. Такой дискурс служит своеобразным «мостом» между современными глобальными трендами и локальными культурными практиками, обеспечивая непрерывность социокультурной идентичности.

Воспроизводство социальных представлений в цифровой среде происходит через комбинацию языковых и визуальных практик. Язык, используемый в социальных сетях, блогах и форумах, одновременно выполняет коммуникативные функции и кодирует культурные нормы, ценности и ожидания. Визуальные практики, включая мемы, видеоконтент и цифровую фотографию, становятся инструментом популяризации культурных символов, а также механизмом их адаптации к современным условиям коммуникации. Тиражирование этих практик через онлайн-платформы способствует стандартизации и широкому распространению социальных нарративов, формируя коллективное сознание и общую символическую среду.

Таким образом, цифровое пространство в Узбекистане выступает не просто ареной коммуникации, но и активным инструментом конструирования социальной реальности. Оно позволяет пользователям формировать и пересматривать представления о культурной идентичности, нормативах поведения и общественных ценностях. В этом контексте цифровой дискурс становится ключевым механизмом социальной интеграции, способствующим как сохранению культурного наследия, так и адаптации общества к вызовам глобальной модернизации.

### **Заключение**

На примере Узбекистана подтверждается, что цифровой дискурс выполняет конструктивную функцию в формировании коллективного сознания. Он способствует закреплению национальной идентичности, формированию модернизационных установок и трансформации общественных представлений.

Перспективы дальнейших исследований связаны с эмпирическим анализом конкретных цифровых кейсов, сравнением узбекского цифрового дискурса с другими постсоветскими медиапространствами и изучением влияния языкового фактора на воспроизводство социальных представлений.

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**МОНИТОРИНГ ЗАСОЛЕНИЯ АГРОЛАНДШАФТОВ В  
ЗАСУШИЛИВЫХ ЗОНАХ С ИСПОЛЬЗОВАНИЕМ МЕТОДОВ  
ДИСТАНЦИОННОГО ЗОНДИРОВАНИЯ (НА ПРИМЕРЕ  
РЕСПУБЛИКИ КАРАКАЛПАКСТАН)**

**Аннотация.** В статье рассматриваются вопросы мониторинга засоления почв агроландшафтов в засушливых зонах на примере Республики Каракалпакстан – региона, наиболее подверженного деградационным процессам в Приаралье. Проанализированы современные подходы к использованию данных дистанционного зондирования Земли (ДЗЗ) для выявления и картографирования засоленных почв. Обоснована эффективность спектральных индексов (NDSI, SI, NDVI) и данных спутников Landsat 8, Sentinel-2 для мониторинга засоления в условиях орошаемого земледелия. Показано, что интеграция методов ДЗЗ с наземными измерениями позволяет создать эффективную систему мониторинга для своевременного принятия мелиоративных решений.

**Ключевые слова:** засоление почв, дистанционное зондирование, Каракалпакстан, агроландшафты, спектральные индексы, Landsat 8, Sentinel-2, мониторинг.

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# MONITORING OF AGRICULTURAL LANDSCAPE SALINIZATION IN ARID ZONES USING REMOTE SENSING METHODS (CASE STUDY OF THE REPUBLIC OF KARAKALPAKSTAN)

***Abstract.** This article addresses the issues of monitoring soil salinization in agricultural landscapes of arid zones, using the Republic of Karakalpakstan as a case study – a region most susceptible to degradation processes in the Aral Sea area. Modern approaches to the use of Earth remote sensing (ERS) data for the identification and mapping of saline soils are analyzed. The effectiveness of spectral indices (NDSI, SI, NDVI) and satellite data from Landsat 8 and Sentinel-2 for monitoring salinization under irrigated agriculture conditions is substantiated. It is demonstrated that the integration of remote sensing methods with ground-based measurements enables the creation of an effective monitoring system for timely decision-making in land reclamation.*

***Keywords:** soil salinization, remote sensing, Karakalpakstan, agricultural landscapes, spectral indices, Landsat 8, Sentinel-2, monitoring.*

## **Введение**

Проблема засоления почв является одной из наиболее острых для аридных и семиаридных регионов мира, где орошаемое земледелие составляет основу сельскохозяйственного производства. Засоление приводит к снижению плодородия почв, уменьшению урожайности сельскохозяйственных культур и, в конечном итоге, к выводу земель из оборота.

Республика Каракалпакстан представляет собой уникальный полигон для изучения процессов засоления агроландшафтов. Расположенная в низовьях Амударьи, эта территория испытывает колоссальную антропогенную нагрузку, усугубленную экологической катастрофой Аральского моря. Высыхание моря привело к формированию новой солевой пустыни на обнажившемся дне, откуда ветры переносят миллионы тонн солей на орошаемые земли, усугубляя и без того сложную мелиоративную ситуацию. Традиционные методы мониторинга засоления, основанные на полевых обследованиях и лабораторных анализах, требуют значительных временных и материальных затрат и не всегда позволяют получить оперативную информацию о состоянии почв на больших площадях. В этих условиях методы дистанционного зондирования Земли (ДЗЗ) становятся незаменимым инструментом для систематического наблюдения за засолением агроландшафтов.

Современное состояние проблемы засоления в Каракалпакстане.

Каракалпакстан характеризуется сложной почвенно-мелиоративной обстановкой. По данным многолетних наблюдений, до 95% орошаемых земель региона в той или иной степени подвержены засолению. Процессы соленакопления здесь имеют как природное происхождение (засоленные



почвообразующие породы, близкое залегание минерализованных грунтовых вод), так и антропогенное, связанное с несовершенством оросительных систем и недостаточным дренажем.

Правительством Узбекистана принимаются системные меры по улучшению мелиоративного состояния земель. В соответствии с постановлениями Кабинета Министров, в северных районах Каракалпакстана реализуются программы по повторному вводу в оборот залежных земель, реконструкции коллекторно-дренажной сети и внедрению водосберегающих технологий. Однако эффективность этих мер во многом зависит от качества информационного обеспечения, включая данные оперативного мониторинга засоления.

Исследования, проведенные в соседних регионах Центральной Азии, показывают, что применение методов ДЗЗ позволяет существенно повысить эффективность мелиоративных мероприятий. Изучение закономерностей распространения засоленных почв в сходных природно-климатических условиях Казахстана и Каракалпакстана подтверждает необходимость внедрения современных методов мониторинга.

Методы дистанционного зондирования для оценки засоления почв

Диагностика засоления почв по спутниковым данным основана на анализе их спектральной отражательной способности. Наличие солей на поверхности почвы или в корнеобитаемом слое изменяет характер отражения электромагнитных волн в различных диапазонах. Соли (особенно гипс, карбонаты и хлориды) имеют характерные спектральные признаки в видимом и ближнем инфракрасном диапазонах.

Для количественной оценки степени засоления разработано множество спектральных индексов. Наиболее эффективными из них, по данным исследований в условиях Узбекистана, являются:

1. NDSI (Normalized Difference Salinity Index) – нормализованный разностный индекс засоления:

$$\text{NDSI} = (\text{Red} - \text{NIR}) / (\text{Red} + \text{NIR})$$

Данный индекс показал высокую корреляцию с электрической проводимостью почв ( $r^2 = 0.85$ ) в исследованиях, проведенных в Ферганской долине.

2. SI (Salinity Index) – различные варианты индекса засоления:

$$\text{SI1} = \sqrt{(\text{Blue} \times \text{Red})}$$

$$\text{SI8} = \sqrt{(\text{Red} \times \text{NIR})}$$

$$\text{SI12} = (\text{Green}^2 + \text{Red}^2 + \text{NIR}^2) / 2$$

3. Вегетационные индексы (NDVI) – косвенные индикаторы засоления, так как угнетение растительности часто связано с высоким содержанием солей в почве.

Исследование, проведенное в Мингбулакском районе Узбекистана, показало, что комбинация индексов NDSI и SI12 обеспечивает наиболее точную оценку засоления по данным Landsat 8. При этом синий канал (Blue

band) оказался наиболее информативным для характеристики засоления глубоких слоев почвы.

Методология мониторинга агроландшафтов Каракалпакстана

Для мониторинга засоления агроландшафтов Каракалпакстана оптимальным является комбинированное использование данных двух спутниковых систем:

Landsat 8 (OLI/TIRS):

- Пространственное разрешение: 30 м
- Временное разрешение: 16 дней
- Преимущества: наличие тепловых каналов, длительный архив данных (с 2013 г.)

Sentinel-2 (MSI):

- Пространственное разрешение: 10-20 м
- Временное разрешение: 5 дней
- Преимущества: более высокое разрешение, красный край (red edge) для анализа растительности

Исследования показывают, что данные Sentinel-2 обеспечивают несколько более высокую точность при картографировании засоления по сравнению с Landsat 8 ( $R^2 = 0.73-0.88$  против  $0.68-0.82$ ) [9](#).

Схема проведения мониторинга

Предлагаемая методология мониторинга включает следующие этапы:

1. Подготовительный этап:

- Сбор и анализ архивных данных ДЗЗ за предыдущие периоды
- Определение ключевых участков для наземной калибровки
- Выбор оптимальных спектральных индексов

2. Полевые работы (калибровка):

- Закладка пробных площадей на участках с разной степенью засоления
- Отбор почвенных образцов послойно (0-20, 20-50, 50-100 см)
- Определение электрической проводимости водной вытяжки (ЕСе), pH, содержания токсичных солей

- Фиксация координат точек отбора с помощью GPS

3. Обработка спутниковых данных:

- Предварительная обработка (радиометрическая и атмосферная коррекция)

- Расчет спектральных индексов

- Построение регрессионных моделей связи индексов с ЕСе

4. Пространственный анализ:

- Классификация территории по степени засоления
- Выявление динамики засоления (многолетние тренды)
- Оценка связи засоления с факторами (глубина грунтовых вод, тип орошения, рельеф)
- Калибровка моделей

Для построения надежных моделей необходима калибровка спутниковых данных по результатам наземных измерений. На основе исследований в Ферганской долине была установлена следующая градация засоления по значениям NDSI:

| Степень засоления | ЕСе<br>(дСм/м) | NDSI      | Характеристика                           |
|-------------------|----------------|-----------|------------------------------------------|
| Незасоленные      | < 2            | < 0.02    | Растительность не угнетена               |
| Слабозасоленные   | 2-4            | 0.02-0.08 | Незначительное угнетение                 |
| Среднезасоленные  | 4-8            | 0.08-0.15 | Пятна выцветов, угнетение растений       |
| Сильнозасоленные  | 8-15           | 0.15-0.25 | Солевая корка, отсутствие растительности |
| Солончаки         | > 15           | > 0.25    | Мощная солевая корка                     |

#### Результаты мониторинга и их интерпретация

Применение описанной методологии для территории Каракалпакстана позволяет выявить следующие закономерности:

Пространственная дифференциация засоления – наибольшие площади засоленных почв приурочены к южной и западной частям дельты Амударьи, где отмечается наиболее близкое залегание минерализованных грунтовых вод.

Сезонная динамика – максимальные значения засоления фиксируются в весенний период (март-апрель) до начала вегетации и в осенний период (сентябрь-октябрь) после уборки урожая.

Связь с орошением – на массивах с рисовыми севооборотами отмечается временное рассоление верхних горизонтов в период вегетации, сменяющееся интенсивным накоплением солей в межполивной период. На основе анализа многолетних данных (2013-2024 гг.) можно сделать следующие прогнозы:

При сохранении существующих тенденций к 2030 году площадь земель с уровнем засоления выше среднезасоленных может увеличиться на 15-20%. Наиболее критическая ситуация ожидается в районах, прилегающих к высохшему дну Аральского моря (Муйнакский, Кунградский районы). Внедрение водосберегающих технологий и оптимизация дренажных систем могут замедлить процессы вторичного засоления.

Преимущества использования ДЗЗ для мониторинга засоления в Каракалпакстане:

Оперативность получения данных на большие площади (до 10000 км<sup>2</sup> за один снимок)

Возможность ретроспективного анализа (архивы Landsat доступны с 1980-х годов)

Экономическая эффективность по сравнению со сплошным наземным обследованием

Ограничения:

- Необходимость наземной калибровки моделей для каждого типа почв
- Сложность оценки засоления под растительным покровом
- Влияние влажности почвы и шероховатости поверхности на спектральные характеристики

Рекомендации для практического применения

1. Создание региональной системы мониторинга – интеграция данных ДЗЗ в существующую систему мелиоративного мониторинга Министерства водного хозяйства.

2. Регулярность наблюдений – проведение оценки засоления не реже 2 раз в год (весной и осенью) для отслеживания динамики.

3. Синтез данных – комбинирование данных Landsat и Sentinel-2 для повышения временного разрешения до 3-5 дней.

4. Внедрение машинного обучения – использование алгоритмов (XGBoost, Random Forest) для повышения точности прогнозных моделей.

5. Геопространственный анализ – учет факторов засоления (глубина грунтовых вод, минерализация, тип почв) при интерпретации результатов.

### **Заключение**

Проблема засоления агроландшафтов в Республике Каракалпакстан требует внедрения современных методов мониторинга, способных обеспечить оперативной и достоверной информацией системы управления мелиоративным состоянием земель. Методы дистанционного зондирования, основанные на анализе спектральных индексов засоления (NDSI, SI) и вегетационных индексов, позволяют с высокой точностью ( $R^2$  до 0.85) картографировать засоленные почвы и отслеживать их динамику.

Наиболее эффективным является комбинированное использование данных Landsat 8 (для ретроспективного анализа) и Sentinel-2 (для оперативного мониторинга) с обязательной калибровкой по наземным измерениям электрической проводимости почв. Предложенная методология может быть положена в основу региональной системы мониторинга засоления, что позволит своевременно принимать мелиоративные решения и минимизировать потери сельскохозяйственного производства в одном из наиболее уязвимых регионов Центральной Азии.

Работа выполнена в рамках исследований по проблемам деградации почв аридных территорий и разработке методов их мониторинга с использованием данных дистанционного зондирования Земли.

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## **ДИНАМИКА ЧИСЛЕННОСТИ НАСЕЛЕНИЯ ГОРОДОВ КРАЙНЕГО СЕВЕРА КАК ОТРАЖЕНИЕ КРИЗИСА ГОРНОДОБЫЧИ РЕГИОНА**

**Аннотация:** Демография является продолжением социально-экономической ситуации. А демография городов Крайнего Севера России является отражением ситуации в горнодобывающем комплексе в силу формирования большинства городов Северной зоны вокруг крупных предприятий добывающей промышленности. Текущее исследование демонстрирует демографические изменения для городов Северных регионов страны с 1970 по 2025 гг. В исследовании анализируются данные для всех 116 городов. Показано, что с уменьшением размера населенного пункта ухудшаются общие демографические показатели, что свидетельствует о серьёзных проблемах в горнодобывающем секторе Крайнего Севера страны.

**Ключевые слова:** города, демография, динамика, моногорода, ретроспективный анализ, факторы влияния, численность населения

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**(MGRI)**

## **POPULATION DYNAMICS OF CITIES IN THE FAR NORTH AS A REFLECTION OF THE REGION'S MINING CRISIS**

**Abstract:** Demography is an extension of the socioeconomic situation. The demographics of cities in Russia's Far North reflect the situation in the mining sector, as most cities in the Northern Zone are formed around large mining enterprises. This study demonstrates demographic changes for cities in the country's northern regions from 1970 to 2025. The study analyzes data for all 116 cities. It is shown that as the size of a settlement decreases, overall demographic indicators worsen, indicating serious problems in the mining sector of the country's Far North.

**Keywords:** cities, demography, dynamics, single-industry towns, retrospective analysis, influencing factors, population size  
Основной текст статьи. Основной текст статьи. Основной текст статьи. Основной текст статьи.



## **Введение**

Динамика численности населения города является наилучшей результирующей характеристикой социально-экономической обстановки, отражающая ситуацию объективнее иных статистических показателей. Это – итог долговременного влияния накопленных проблем или преимуществ, влияющих на миграцию населения, на естественный прирост (как следствие притока молодых кадров).

В текущем исследовании выбор динамики численности населения именно городов в качестве индикатора обусловлен с позиции возникновения ключевых городов Крайнего Севера России в первую очередь как центров горнодобывающей промышленности. И только во вторую очередь – как транспортных или исторически сложившихся центров. Именно горнодобыча является ключевым фактором возникновения и роста городов в Заполярье. А динамика численности их населения является отражением ситуации в горнодобывающем секторе. Кроме того, крайне невысокая инфраструктурная обеспеченность Северных регионов страны, высокий порог возможностей по созданию инфраструктуры для большого числа населённых пунктов в условиях Крайнего Севера, обуславливают в сумме преимущественное развитие относительно редких городов с высокой концентрацией населения в противовес равномерному расселению в более климатически и инфраструктурно благополучных регионах [4].

Н. А. Лебедева-Несевря и Ю. А. Симагин обращают внимание на то, что Северные регионы отличаются суровыми природными условиями, и лишь необходимость обслуживания крупных промышленных и горнодобывающих производств обуславливает возникновение и существование городов в неблагоприятных для жизни зонах [2, 5]. И это является уникальным опытом освоения арктических территорий в глобальном выражении, связанным с тем, что до 80% запасов полезных ископаемых страны залегают на территориях Крайнего Севера и приравненных к ним [3, 7].

Исходя из изложенных выше соображений, можно считать обоснованным мнение о том, что динамика численности населения городов Крайнего Севера является продолжением кризиса или, напротив, роста горнодобывающих предприятий регионов. В исследовании использовались данные переписей населения городов РСФСР, а также данные текущего статистического учёта Росстата.

## **Результаты исследования.**

Общее количество городов на территориях Крайнего Севера или местностей, приравненных к ним, на 1 января 2025 г. составляло 116. Крупнейший – Якутск (373 тыс. жителей), наименьший – Верхоянск (745 человек). Для задач текущего исследования целесообразно разбить города по группам, исходя из их размера. И уже в рамках каждой группы анализировать демографическую динамику за рассматриваемый период – данные представлены в таблице 1. Кроме того, в таблице 1 справочно показаны города с наибольшей динамикой изменения демографических показателей за период

1989-2025 гг. (по 5 городов с наибольшим приростом и наибольшей убылью населения).

Таблица 1 – Динамика численности населения городов Крайнего Севера и приравненных к ним территорий в 1970-2025 гг., тыс. чел.

| Города         | 1970        | 1979        | 1989        | 2000        | 2010        | 2020        | 2025        | 2025 к 1989, % |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------|
| <b>Всего</b>   | <b>3973</b> | <b>5407</b> | <b>7080</b> | <b>6568</b> | <b>6237</b> | <b>6241</b> | <b>5910</b> | <b>83,5</b>    |
| более 100 тыс. | 2095        | 2886        | 3663        | 3429        | 3442        | 3557        | 3398        | 92,8           |
| 50-100 тыс.    | 630         | 867         | 1163        | 1113        | 1021        | 996         | 954         | 82,0           |
| 25-50 тыс.     | 434         | 668         | 1028        | 985         | 922         | 905         | 845         | 82,1           |
| 10-25 тыс.     | 555         | 697         | 882         | 762         | 642         | 595         | 553         | 62,7           |
| менее 10 тыс.  | 259         | 290         | 344         | 279         | 210         | 187         | 161         | 46,8           |
| Ханты-Мансийск | 24,8        | 28,3        | 34,5        | 37,7        | 80,2        | 101         | 114         | 329,5          |
| Пыть-Ях        | -           | -           | 17,1        | 41,6        | 41,5        | 39,6        | 41,2        | 241,0          |
| Якутск         | 108         | 155         | 192         | 196         | 270         | 323         | 373         | 194,2          |
| Лянтор         | -           | -           | 22,1        | 32,2        | 39,0        | 41,2        | 42,5        | 192,4          |
| Лангепас       | 0,0         | 0,0         | 25,6        | 40,2        | 41,7        | 44,6        | 44,8        | 175,0          |
| Инта           | 50,2        | 50,9        | 60,2        | 50,5        | 32,1        | 24,1        | 18,7        | 31,1           |
| Певек          | 10,5        | 11,1        | 12,9        | 5,6         | 4,2         | 4,5         | 3,9         | 30,2           |
| Сусуман        | 12,6        | 16,0        | 16,8        | 8,9         | 5,9         | 4,4         | 4,2         | 24,7           |
| Игарка         | 16,1        | 16,9        | 19,0        | 9,8         | 6,2         | 4,3         | 3,6         | 18,8           |
| Островной      | 7,0         | 9,0         | 14,0        | 10,3        | 2,2         | 1,7         | 1,2         | 8,8            |

Источник – составлено автором по материалам исследования.

Как видно из таблицы 1, в целом демография городов Крайнего Севера России демонстрирует отрицательную динамику с 1989 г., хотя с 1970 по 1989 гг. численность их населения выросла почти вдвое: с 3793 тыс. до 7080 тыс. человек. При этом максимальными темпами с 1970 по 1989 гг. росла группа городов 25-50 тыс. человек населением (рост в 2,4 раза). Вторая по динамике группа с населением 50-100 тыс. (Рост в 1,9 раза). В этот период, например, возникли такие города как Пыть-Ях, Лянтор и Лангепас, отмеченные в таблице 1. Динамика численности населения в целом свидетельствует о том, что государственное планирование в освоении ресурсов Крайнего Севера до 1989 г. опиралось на создание сети городов среднего размера.

С 1989 г. по данным таблицы 1 можно отметить падение численности населения городов Крайнего Севера для всех категорий. Но чем меньше размер категории, тем глубина падения заметнее: если численность населения городов более 100 тыс. человек в 2025 г. в сумме составляла 83,5% к уровню 1989 г., то малые города (менее 10 тыс.) – лишь 46,8%.

То есть, риск демографических проблем нарастает по мере снижения величины города. Это в принципе соответствует общероссийской тенденции: как отмечает А. П. Цыпин, малые города России демонстрируют наихудшие показатели убыли населения за последние десятилетия [6]. Это обусловлено

преимущественно тем фактом, что малые города (особенно на территориях Крайнего Севера), как правило, представляют собой монопрофильные образования вокруг одного крупного промышленного или горнодобывающего производства с безальтернативными экономическими перспективами в случае нарушения нормальной работы якорного предприятия [1].

Более детальный анализ позволяет заметить, что далеко не все города демонстрируют отрицательные тенденции. Всего 24 города показали рост численности населения за период 1989-2025 гг. Из них 5 с наибольшей положительной динамикой показаны в таблице 1. Это Ханты-Мансийск, Пыть-Ях, Якутск, Лянтор и Лангепас. Практически все города с положительной демографией расположены на территории ЯНАО, ХМАО, НАО или Якутии – регионов, специализирующихся на добыче нефти, газа и алмазов. Т.е. наиболее экспортоориентированных и финансово-ёмких направлений. Это позволяет поддерживать социально-экономическое положение и инфраструктуру данных городов с положительной динамикой.

Города Инта, Певек, Сусуман, Игарка и Островной сократили своё население от 3 до 10 раз. Это города, где преимущественно проблемы в градообразующих горнодобывающих отраслях привели к значительному падению численности населения – из указанных городов лишь Островной связан с расформированной военно-морской базой.

### **Заключение**

Территориальная освоенность Крайнего Севера страны зависит от наличия тех или иных природных ресурсов и необходимости их разработки. Значительный масштаб месторождений, совмещённый с необходимостью территориального освоения и военного присутствия, создал уникальную в мировой практике сеть городов на большей части территории страны. И к настоящему времени подавляющая часть городов Российского Крайнего Севера существует благодаря градообразующим предприятиям горнодобывающего сектора. И наиболее благополучные города являются одновременно центрами добычи нефти, газа или алмазов. Однако, основная часть городов испытывает проблемы с демографией, являющимися продолжением экономических проблем градообразующих предприятий. И чем меньше размер города, тем больше глубина демографических проблем, прямо связанных с монопрофильной структурой экономики городов Крайнего Севера страны.

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## **ВИДЫ И ОСОБЕННОСТИ ДОГОВОРОВ, НАПРАВЛЕННЫХ НА ПЕРЕДАЧУ ИМУЩЕСТВА ОРГАНОВ САМОУПРАВЛЕНИЯ ГРАЖДАН**

**Аннотация.** В статье представлен комплексный анализ имущественных и договорных отношений сходов граждан махалли. В частности, исследуется роль этих органов местного самоуправления в управлении имуществом, обеспечении его эффективного использования и удовлетворении общественных потребностей. В работе рассматривается правовая природа договоров купли-продажи, государственных закупок, сельскохозяйственной контрактации и энергоснабжения, а также их место в действующем законодательстве и связанные с ними практические проблемы. Автор обосновывает необходимость расширения участия сходов граждан махалли в системе государственных закупок и выдвигает конкретные нормативно-правовые предложения по признанию их официальными заказчиками.

**Ключевые слова.** Сход граждан махалли, органы местного самоуправления, государственные закупки, договор купли-продажи, договор контрактации, договор энергоснабжения, государственно-частное партнерство, муниципальная собственность, договорные отношения, финансовая независимость, упрощенный порядок закупок, энергетический аудит, договор субподряда, правовое регулирование.

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## **TYPES AND FEATURES OF PROPERTY TRANSFER AGREEMENTS FOR CITIZENS' SELF-GOVERNING BODIES**

**Annotation.** This article provides a comprehensive analysis of the property and contractual relations of mahalla citizens' assemblies. Specifically, it examines the role of these local self-governing bodies in managing property, ensuring its effective use, and meeting public needs. The study explores the legal nature of purchase and sale agreements, public procurement, agricultural contracts, and energy supply contracts, as well as their place in current legislation and the practical challenges associated with them. The author substantiates the need to



*expand the participation of mahalla citizens' assemblies in the public procurement system and puts forward specific regulatory and legal proposals to recognize them as official commissioning bodies.*

**Key words.** *Mahalla citizens' assembly, local self-governing bodies, public procurement, sale and purchase agreement, agricultural procurement contract, energy supply contract, public-private partnership, municipal property, contractual relations, financial independence, simplified procurement procedure, energy audit, subcontract, legal regulation.*

Имущество, принадлежащее сходу граждан махалли, является общественной собственностью местного значения, его правильное управление и эффективное использование имеют важное значение для обеспечения общественных нужд, формирования местного бюджета и социально-экономического развития территории.

Обновленное общегражданское и специальное законодательство, регулирующие договорные отношения органов самоуправления с хозяйствующими субъектами, все больше ориентировано на развитие принципов диспозитивности. Это также проявляется в усилении роли договора в регулировании деятельности органов самоуправления.

Договорные отношения органов местного самоуправления по передаче имущества охватывают следующие сферы деятельности: купля-продажа зданий, сооружений, оборудования, техники, строительных материалов и других материально-технических средств, закупка сельскохозяйственной продукции для материальных нужд [1]. Позиция автора имеет определенное обоснование: органы местного самоуправления вступают в ряд имущественных отношений для удовлетворения потребностей общества, и большинство из них реализуются именно через договоры купли-продажи. Договоры, связанные с материально-основными средствами, такими как здания, сооружения, оборудование, техника и строительные материалы, действительно являются наиболее распространенной частью оборота муниципальной собственности. За счет закупки сельскохозяйственной продукции можно обеспечить продовольственную безопасность местного населения, удовлетворить потребности коммунальных и социальных учреждений. С этой точки зрения автор пытается определить практический объем договоров собственности органов местного самоуправления и представить их наиболее распространенными видами. Однако, с научной точки зрения, эта позиция имеет определенные ограничения: сфера договоров не охвачена полностью. Неотъемлемой частью имущественных отношений органов местного самоуправления являются не только отношения купли-продажи и закупок, но и такие договоры, как договоры поставки продукции, энергоснабжения, контрактации, государственно-частного партнерства (ГЧП) и продажи недвижимости.



В настоящее время договорные отношения органов самоуправления граждан только развиваются. В дальнейшем это становится жизненно важной потребностью в деятельности органов местного самоуправления.

Договор купли-продажи является одним из видов договоров, регулирующих обязательства по передаче права на имущество. По этой причине в имущественном обороте широко используется договор купли-продажи. Правила, определяющие отношения купли-продажи, раскрываются в подразделе 3 части II ГК, то есть в части, посвященной отдельным видам гражданско-правовых обязательств (глава 29). Фактически, структура главы 29, круг решаемых в ней вопросов, расположение норм и даже язык их выражения во многом определили методологические подходы к регулированию всех других гражданско-правовых договоров (аренды, займа, подряда, перевозки и др.).

Органы самоуправления граждан при продаже имущества в качестве продавца участвует сход граждан махалли. Это требует анализа договорных действий, осуществляемых самим сходом граждан махалли. Полномочия органов самоуправления граждан, связанные с их участием в договорах купли-продажи, определяются их уставом, положением, регламентирующим их статус, или отдельным решением органа, определяющим им указанные полномочия.

Такие вопросы целесообразно рассматривать путем анализа некоторых видов договоров купли-продажи. Потому что можно наблюдать случаи участия органов самоуправления граждан в некоторых видах договоров купли-продажи.

Контракт о поставке товаров (работ, услуг) для нужд органов местного самоуправления.

Закон Республики Узбекистан «О государственных закупках» является всеобъемлющим правовым документом, регулирующим современную систему государственных закупок. Закон комплексно регулирует отношения в сфере государственных закупок и направлен на создание эффективной системы, основанной на современных цифровых технологиях. В законе четко определены субъекты государственных закупок. Из них основными заказчиками являются государственные органы и учреждения, бюджетные организации, юридические лица с долей государства в уставном фонде 50 и более процентов. В действующем законодательстве сход граждан махалли прямо не определен в качестве субъекта государственных закупок. Однако с расширением правового статуса и финансовых возможностей органов местного самоуправления возникает необходимость их участия в государственных закупках. В законе о деятельности схода граждан махалли предусмотрены его широкие полномочия. Для эффективной реализации этих полномочий необходимы возможности участия в системе государственных закупок.

Участие схода граждан махалли в государственных закупках играет важную роль в укреплении ее финансовой независимости. За счет закупки

различных товаров и услуг на местном уровне можно будет более эффективно удовлетворять потребности населения. Исходя из статьи 11 Закона РУз No 350 «Об органах самоуправления граждан», можно сказать, что для участия схода граждан махалли в закупках, основанных на бюджетном и финансовом управлении, можно привести некоторые из основных полномочий этих органов:

*утверждает программу деятельности и смету расходов схода граждан;*

*осуществляет меры по поддержке социально уязвимых слоев населения;*

*утверждает планы мероприятий, направленных на обеспечение комплексного развития территории, благоустройство, озеленение и улучшение санитарного состояния в пределах соответствующей территории;*

*осуществляет общественный контроль за исполнением законов и иных актов законодательства на соответствующей территории;*

*содействует охране окружающей среды.*

Наличие этих полномочий свидетельствует об объективной необходимости активного участия схода граждан махалли в системе государственных закупок.

Например, в рамках полномочий по социальной поддержке могут осуществляться необходимые закупки продуктов питания, медицинских средств, медицинских принадлежностей для инвалидов и престарелых, а в пределах соответствующей территории - строительные материалы, направленные на благоустройство, озеленение и улучшение санитарного состояния, озеленение (саженцы, семена) и благоустройство (системы освещения, декоративные средства) и санитарные средства (контейнеры для отходов).

Поскольку сход граждан наделен полномочиями по утверждению программы деятельности и сметы расходов, для эффективного осуществления этих полномочий он должен иметь возможность самостоятельно организовывать процессы закупок. Естественно, что орган, утвердивший смету расходов, имеет право закупать товары и услуги на те же расходы. Такой подход полностью соответствует принципу финансовой ответственности и обеспечивает рациональное использование средств.

Задача поддержки социально уязвимых слоев населения требует приобретения различных товаров и услуг. Для удовлетворения широкого спектра потребностей - от продуктов питания до медицинских услуг - сходу граждан махалли необходимо осуществлять прямые процессы закупок. Возможность осуществлять закупки без посредников способствует быстрому и эффективному удовлетворению потребностей населения.

Задачи комплексного развития территории, благоустройства, озеленения и улучшения санитарного состояния предполагают масштабные закупки. Для приобретения всех необходимых ресурсов, начиная от

строительных материалов и заканчивая специальной техникой, сходы граждан должны иметь статус субъекта государственных закупок. Утверждение плана мероприятий без такого статуса носит формальный характер и не приводит к практическому результату.

Задача содействия охране окружающей среды заключается не в пассивном наблюдении, а требует реализации активных мер. Без возможности приобретения экологически чистых технологий, чистящих средств, перерабатывающего оборудования и других экологически ориентированных товаров и услуг эта задача носит декларативный характер.

Действующие полномочия схода граждан махалли естественным образом требуют его участия в системе государственных закупок. Эффективное выполнение таких задач, как утверждение программы деятельности и сметы расходов, социальная поддержка, территориальное развитие, контроль и экологическая ответственность, возможно только путем самостоятельной организации процессов закупок. Таким образом, внесение соответствующих изменений в законодательство о государственных закупках и признание схода граждан махалли в качестве официального заказчика является объективной необходимостью.

*Во-первых*, в пункте 1 части первой статьи 19 Закона No ЗРУ-684 «О государственных закупках» органы местного самоуправления должны найти свое отражение в качестве государственных заказчиков. С научно-теоретической точки зрения данная инициатива служит гармонизации публично-правового статуса органов местного самоуправления и их гражданско-правового участия. Предлагаемые изменения в статью 19 данного закона признают участие сходов граждан махалли в качестве самостоятельных правовых субъектов в закупочных отношениях путем включения их в число государственных заказчиков. Bu o'zgartirishning konseptual ahamiyati shundaki, mahalla faqat ijtimoiy institut sifatida emas, balki byudjet va boshqa qonuniy manbalar hisobidan moliyalashtiriladigan tovar, ish va xizmatlar xaridiga mas'ul bo'lgan ommaviy-huquqiy subyekt sifatida belgilanmoqda. Shu tariqa, davlat xaridlari tizimida hududiy darajadagi ijtimoiy ehtiyojlarni bevosita qondirish mexanizmi yaratiladi

*Во-вторых*, статью 19 Закона «О государственных закупках» No ЗРУ-684 следует дополнить новой частью третьей следующего содержания:

Сходы граждан в пределах своих полномочий, установленных законом, вправе осуществлять государственные закупки следующих категорий:

товары, работы и услуги для реализации программ социальной поддержки;

материалы, технику и услуги для комплексного развития, благоустройства, озеленения и улучшения санитарного состояния территории;

технические средства и измерительные приборы для осуществления общественного контроля;

средства и услуги для охраны окружающей среды и обеспечения экологической чистоты;

товары и услуги для культурно-просветительских и спортивно-оздоровительных мероприятий;

офисную технику, мебель и хозяйственные принадлежности для организации своей деятельности. Предлагаемые новые части в статье 19 данного закона конкретно ограничивают право схода граждан махалли на приобретение и функционально определяют его полномочия. Предполагается, что закупки будут осуществляться в сферах, связанных с социальной поддержкой, благоустройством, экологической охраной, культурно-просветительскими мероприятиями и организационными потребностями, что соответствует законным задачам махалли. Эта ситуация показывает ограниченность и целесообразность закупочных полномочий, что служит сохранению бюджетной дисциплины и пределов полномочий.

*В-третьих*, статью 19 Закона «О государственных закупках» следует дополнить новой частью четвертой следующего содержания:

Государственные закупки, осуществляемые сходами граждан, осуществляются за счет следующих источников финансирования:

- централизованно выделяемые средства из государственного бюджета;
- средства, выделяемые из местного бюджета;
- добровольных сборов и благотворительных средств;
- средства, привлеченные на договорной основе с юридическими лицами;
- иные источники, разрешенные законодательством.

Четкое указание источников финансирования в данных предлагаемых изменениях обеспечивает правовую ясность и финансовую прозрачность. Предусмотрение наряду со средствами государственного и местного бюджетов добровольных сборов и благотворительных средств свидетельствует о том, что махалля функционирует на основе модели смешанного финансирования. Это способствует усилению социального партнерства и участия общественности.

*В-четвертых*, статью 19 Закона «О государственных закупках» No ЗРУ-684 следует дополнить новой частью пятой следующего содержания:

Сходы граждан при осуществлении государственных закупок имеют следующие особенности:

- пользоваться упрощенным порядком закупок товаров и услуг в размере до пяти тысяч базовых расчетных величин по одному договору;
- предоставление преимуществ отечественным производителям и поставщикам услуг;
- стимулирование субъектов малого и среднего бизнеса;
- обеспечение открытости и прозрачности закупочного процесса.

*В-пятых*, часть первую статьи 30 Закона No ЗРУ-684 «О государственных закупках» следует дополнить новым абзацем восьмым:

«специальная упрощенная процедура для органов местного самоуправления»;

*В-шестых*, Закон «О государственных закупках» No ЗРУ-684 следует дополнить новой статьей 513:

Статья 513. Упрощенный порядок закупок для органов местного самоуправления

Сход граждан вправе использовать упрощенный порядок закупок на следующих условиях:

расходы по одному договору не превышают пятидесятикратного размера базовой расчетной величины;

предмет закупки входит в круг законных полномочий схода граждан; четко указаны и подтверждены источники финансирования.

В результате предложенной новой нормы закупки в упрощенном порядке осуществляются по решению схода граждан, а информация о результатах закупок размещается на специальном информационном портале. Внедрение специального упрощенного порядка закупок имеет важное практическое значение. Закупки на уровне махалли обычно относительно небольшие и требуют быстрого выполнения. Поэтому установление упрощенного порядка для закупок до определенного предела базовой расчетной величины повысит эффективность. Однако здесь обеспечен правовой баланс с прозрачностью, публикацией информации через электронный портал и усилением механизмов контроля. Следовательно, упрощение предусмотрено как средство снижения административной нагрузки, а не увеличения коррупционных рисков.

Также нормы, предлагаемые в статье 30 и новой статье 513, отражают принцип дифференциации в системе государственных закупок путем установления особой процедуры для органов местного самоуправления. Это гибкая модель, применяемая с учетом институциональных различий между уровнями государственного управления. Он обеспечивает соответствие между системой централизованных закупок и региональными потребностями.

*В-седьмых*, часть первую статьи 71 Закона No ЗРУ-684 «О государственных закупках» следует дополнить новым двадцать вторым пунктом:

«22) товары и услуги, необходимые для осуществления сходами граждан своих законных полномочий, если их стоимость не превышает двухтысячекратного размера базовой расчетной величины»;

Правила об исключении, вносимые в данную статью 71, позволяют осуществлять малоценные закупки махалли без излишних тендерных процедур. Это направлено на обеспечение эффективности расходов с точки зрения правовой экономики. Потому что применение сложных процедур для небольших закупок экономически нецелесообразно.

*В-восьмых*, Закон «О государственных закупках» No ЗРУ-684 следует дополнить новой статьей 711:

Статья 711. Подготовка сходов граждан к осуществлению государственных закупок



Для налаживания деятельности сходов граждан в качестве субъекта государственных закупок осуществляются следующие подготовительные меры:

подготовку и переподготовку председателей и ответственных работников сходов граждан в сфере государственных закупок;

создание технической базы для подключения сходов граждан к электронной системе государственных закупок;

разработка типовой документации по организации закупочных процессов;

внедрение системы мониторинга и контроля.

Установление положений переходного периода посредством данной предлагаемой новой нормы обеспечит институциональную устойчивость проекта нормы. Подготовительные меры - повышение квалификации кадров, подключение к электронной системе, разработка типовых документов - гарантируют практическую эффективность правовой реформы. Этот механизм поэтапного внедрения снижает риски в процессе правовой трансформации.

*В-девятых, часть вторую статьи 75 Закона «О государственных закупках» № ЗРУ-684 следует дополнить следующим дополнением:*

Контроль за государственными закупками, осуществляемыми сходами граждан, осуществляется в следующем порядке:

внутренний контроль - ревизионной комиссией схода граждан;

внешний контроль - соответствующим хокимиятом района (города) и уполномоченным органом;

общественный контроль - через открытые собрания жителей махалли.

*Предлагаемое дополнение к статье 75 предусматривает многоуровневую (внутренний, внешний и общественный контроль) систему мониторинга и контроля, что соответствует принципам правового государства. Это позволит установить институциональный и гражданский контроль над закупками на уровне махалли. Четкое определение мер ответственности усиливает ответственность должностных лиц и обеспечивает верховенство закона.*

*В качестве научно-теоретического вывода можно сказать, что предлагаемые изменения институционализируют сходы граждан махалли в качестве полноценного публично-правового заказчика в отношениях государственных закупок. Эта реформа позволит реализовать социальные задачи махалли через финансовые и договорные механизмы, обеспечит оперативное и эффективное реагирование на региональные потребности и послужит децентрализации системы государственных закупок.*

Данный проект нормы создает правовую основу для оформления статуса сходов граждан махалли в качестве субъекта государственных закупок и эффективной реализации их действующих полномочий.



## Договор контрактации.

Внедрение новой системы государственного управления в деятельность органов местного самоуправления в нашей стране приводит к появлению новых общих правовых и экономических принципов формирования, размещения и выполнения заказов на закупку и поставку сельскохозяйственной продукции, сырья и продуктов питания для нужд местных сходов граждан на договорной основе.

В процессе анализа нет необходимости излагать традиционные общие положения договора контрактации, так как они урегулированы в главе ГК «Отдельные виды обязательств» в статьях 465-467. А мы постараемся исследовать его отличительные особенности. Поскольку особенности, возникающие в этом аспекте при участии органов местного самоуправления в качестве одной из сторон договора, еще недостаточно изучены в правовой литературе.

Исходя из правового опыта России, можно сказать, что договор контрактации имеет большое значение для органов местного самоуправления, он является важным инструментом, прежде всего, в привлечении товарных ресурсов, таких как продукция растениеводства и животноводства, в обеспечении бюджетных организаций (школы, детские сады, больницы, дома-интернаты, дома престарелых и т.д.) продуктами питания, а также сырьем для хозяйственной деятельности этих учреждений, формировании муниципальных продовольственных запасов, гарантировании надлежащего уровня продовольственного обеспечения в чрезвычайных ситуациях [2]. Однако в национальном законодательстве такие полномочия схода граждан махалли не предусмотрены.

Расширение хозяйственной и правовой самостоятельности органов местного самоуправления связано с созданием системы регулирования на муниципальном уровне, а также усилением влияния этих органов на сельскохозяйственные предприятия по производству сельскохозяйственной продукции для муниципальных нужд. Это позволяет решить две взаимосвязанные задачи:

1. Создание альтернативных каналов закупок сельскохозяйственной продукции, упрощение порядка поиска продавца.
2. Установление системы паритета цен между сторонами договора, что имеет важное значение для органов местного самоуправления.

Как отмечалось выше, договор контрактации регулируется параграфом 5 главы 29 ГК и имеет ряд особенностей:

*во-первых*, сторонами такого договора являются органы местного самоуправления, сельскохозяйственные предприятия и индивидуальные предприниматели;

*во-вторых*, предметом договора контрактации является выращенная (произведенная) в хозяйстве-производителе сельскохозяйственная продукция;

*в-третьих*, на изготовителя (покупателя) возлагаются особые обязательства [3].

Таким образом, договор контрактации служит для регулирования отношений, связанных с закупкой сельскохозяйственной продукции, выращенной или произведенной сельскохозяйственными организациями и фермерскими хозяйствами.

Конституцией установлено, что органы самоуправления граждан вправе самостоятельно решать вопросы местного значения в соответствии с законом, исходя из интересов граждан, исторических особенностей развития, а также национальных ценностей, местных обычаев и традиций. Это правило нашло свое отражение и в законе ЗРУ № 350. Согласно ему, органы местного самоуправления участвуют в реализации программ развития территории в различных договорных и внедоговорных формах.

Заключение такого вида договора должно осуществляться на основе контракта, заключаемого для нужд местного уровня. А этот контракт должен определяться на основе порядка коллективных нужд, финансируемых за счет материальных источников органов местного самоуправления, установленных правовыми актами. Это приводит к необходимости установления порядка заключения специального договора, рассмотрения разногласий по договору и обеспечения гарантии оплаты заказчика.

В отличие от традиционного договора контрактации, в условиях местного управления такой договор может быть трехсторонним или даже четырехсторонним. Потому что органы местного самоуправления не имеют возможности самостоятельно перерабатывать и длительное время хранить закупленную сельскохозяйственную продукцию. Это объясняется многими причинами: отсутствием специального технологического оборудования и специальных помещений для хранения.

В заключение можно сказать, что договор контрактации тесно связан с договорами поставки на уровне местного самоуправления. Этот договор регулируется непосредственно представительными органами местного самоуправления. Муниципальный заказ занимает большое место в хозяйственной деятельности органов местного самоуправления и поэтому неразрывно связан с вышеупомянутыми договорами, но с учетом специфики местного управления.

Особенно необходимо остановиться на системе расчетов между производителем и покупателем — органом местного самоуправления. Подобно тому, как многие сельскохозяйственные предприятия лишены возможности своевременно уплачивать налоги в местный бюджет из-за нехватки денежных средств, органы местного самоуправления по той же причине не имеют возможности своевременно оплачивать закупленную продукцию. Поэтому в расчетах используется форма взаиморасчета. В таких случаях стороны заинтересованы в погашении своих взаимных задолженностей. Для решения этой проблемы местные органы самоуправления предоставляют сельхозпроизводителям ряд льгот при уплате

налогов в местный бюджет. Это способствует более эффективному регулированию взаимных хозяйственных отношений договорным путем.

Проблема заключения договора контрактации органами местного самоуправления заключается в том, что в этом случае применяются общие правила. Однако, когда органы местного самоуправления выступают в качестве одной из сторон договора, они имеют свои особенности, которые должны быть определены специальным регулированием и правовыми нормами. В частности, процесс закупки сельскохозяйственной продукции для схода граждан махалли должен быть определен законом в порядке, аналогичном правилам, установленным статьей 475 ГК для государственных нужд. Но, к сожалению, эти специальные правила не распространяются на органы местного самоуправления. Общие же правила ставят сходы граждан махалли на один уровень с коммерческими организациями, что является недостаточно обоснованным. Потому что коммерческие организации могут расходовать свои средства по своему усмотрению, а органы местного самоуправления при распределении средств не могут выходить за рамки собственных средств схода граждан, а их часто бывает недостаточно.

Отсутствие правового регулирования статуса органа местного самоуправления в качестве заказчика порождает множество проблем: например, как должна осуществляться закупка для местных нужд, в том числе для муниципального резерва, какой орган может быть муниципальным заказчиком, в каких случаях сама муниципальная структура может выступать стороной договора, какова должна быть форма и порядок договора и т.д. Поэтому функции муниципальных заказчиков по закупке и поставке сельскохозяйственной продукции, сырья и продовольствия для муниципальных нужд должны быть отражены в национальном законодательстве.

На основе результатов вышеизложенного анализа можно сделать следующие выводы. Договорная деятельность сходов граждан махалли является неотъемлемой частью современной системы местного самоуправления, эффективная деятельность которой нуждается в специальном правовом регулировании. Механизм удовлетворения местных потребностей посредством договоров контрактации должен быть разработан в интеграции с системой государственных закупок.

Для этого предлагается внести следующие изменения в законодательство:

Во-первых, необходимо разработать специальные нормы, регулирующие договорную деятельность органов местного самоуправления;

Во-вторых, целесообразно создать тип договора контрактации, адаптированный к местным условиям;

В-третьих, необходимо законодательно закрепить механизмы взаиморасчетов и сформировать систему налоговых льгот.

В результате договорная деятельность сходов граждан махалли станет средством эффективной реализации их конституционных полномочий и

послужит укреплению финансовой независимости системы местного самоуправления.

Договор энергоснабжения.

Энергетика, несомненно, является одной из наиболее актуальных сфер, требующих реформирования. Реформирование энергетической системы, на наш взгляд, поможет улучшить регулирование поставки энергоресурсов потребителям.

Fuqarolik kodeksi energiya ta'minoti shartnomasini oldi-sotdi shartnomalariga mansub deb hisoblaydi, chunki u bunday shartnomaviy majburiyatning barcha belgilariga ega: bir taraf boshqa tarafga haq evaziga ma'lum tovarni (energiyani) topshiradi.

Общее описание такого вида договора дано в статье 468 ГК, согласно которой энергоснабжающая организация обязуется поставлять абоненту (потребителю) энергию через подключенную сеть, а абонент обязуется оплачивать принятую энергию, соблюдать установленный договором режим энергопотребления, обеспечивать безопасную эксплуатацию и исправное состояние находящихся в его ведении энергосетей и оборудования, связанного с использованием энергии.

Не каждый может выйти в качестве абонента, так как к нему предъявляются следующие два важных требования:

наличие у абонента приемного устройства энергии, отвечающего установленным техническим требованиям и подключенного к сетям энергоснабжающей организации;

иметь необходимое оборудование, обеспечивающее учет энергопотребления.

Закон определяет продавца и покупателя в качестве субъектов договора. Вместе с тем, имеются некоторые случаи, не урегулированные гражданским законодательством. Речь идет, прежде всего, о посреднических организациях. Они также являются независимыми субъектами в качестве продавцов и покупателей энергоресурсов и фиксируются в договорах как «перепродавцы».

Среди ученых в области гражданского права продолжаются споры относительно правового статуса договора энергоснабжения. Некоторые считают, что «в сферу действия договора энергоснабжения входят все отношения, возникающие в процессе поставки электрической, тепловой энергии и газа».

С.М. Корнеев впервые поднял вопрос о выделении договоров на поставку электрической, тепловой энергии и газа в качестве самостоятельного договора энергоснабжения [4].

А.М. Шафир утверждает, что «договоры на поставку электроэнергии, тепла и газа через сеть, подключенную к сети, представляют собой отношения на поставку электроэнергии, тепла и газа только через подключенную сеть (т.е. через электрическую сеть или трубопровод)». По мнению ученого, только в этом случае существует прямая связь между деятельностью поставщика и

потребителя, связанная с характером непрерывного снабжения, и договорные отношения распространяются на сферу использования энергии и газа [5].

Авторы учебника «Гражданское право» под редакцией А.П. Сергеева и Ю.К. Толстого предлагают рассматривать договоры поставки тепловой энергии, воды, нефти и нефтепродуктов как виды договора энергоснабжения, т.е. подчеркивают необходимость их самостоятельного разделения [6].

Не разделяя этой позиции, В.В. Витрянский опирается на положения договора энергоснабжения и отмечает, что «поставка (передача) энергии (нефти, газа, ресурсов, товаров) по подключенной сети является лишь технической особенностью (способом) исполнения договорных обязательств, которая не может служить родовым критерием для выделения отдельного вида договора или даже одного из видов гражданско-правового договора (например, вида договора купли-продажи)».

Вместе с тем более глубокий анализ данного вида договора проведен О.Н. Садиковым. По его мнению, «оценка договора на газоснабжение промышленных предприятий как специального вида договора, а не как вида договора на поставку, на практике создает определенные трудности». Они исходят из того, что в договоре энергоснабжения должен быть определен способ получения электрической и тепловой энергии и газа через подключенную сеть, и природа договора не должна изменяться из-за этой зависимости [7].

При этом нельзя согласиться с тем, что все виды электро-и теплоснабжения определяются одним и тем же договором купли-продажи. Например, возникает вопрос: какой тип договора (поставки, возмездного или безвозмездного обслуживания, договора снабжения) должен применяться в таких случаях, как газ и вода, поставляемые населению цистернами [8] и в специальных случаях заполняемые в резервуары [9]?

Необходимо также не обходить ситуацию во время аварий и стихийных бедствий. Например, в горных районах в подобных местах население получает электроэнергию не от единой централизованной системы, а с помощью специального устройства, использующего жидкое топливо, и через отдельные электрические провода, подключенные к местным энергетическим сетям для временного использования. Здесь возникли арендные отношения между органами местного самоуправления (арендатором) и энергоснабжающей организацией (арендодателем). Потому что арендуемое имущество состоит не из всей энергосистемы, а только из отдельных электрических проводов. А поставка электрической энергии населению (абоненту) должна осуществляться на основании договора купли-продажи.

На наш взгляд, в этом случае даже при наличии одного и того же предмета могут возникнуть различные правоотношения, регулируемые различными видами договоров (купля-продажа, поставка, аренда, хранение, возмездное обслуживание). Однако эти обстоятельства не распространяются на отношения, предусмотренные частью 1 статьи 468 ГК, т.е. осуществляемые через присоединенную сеть.



В связи с этим необходимо дать определение понятию «через присоединенную сеть». Под «подключенной сетью» понимается подключение к чему-либо — в нашем случае к энергетической системе — дополнительного устройства для подключения и организации подачи электричества, воды, газа и т. д.

Также при покупке электроэнергии в качестве товара покупатель платит не напрямую за сам товар, а за объем его поставки, то есть на основании показаний счетчика. В этом случае платежные отношения рассматриваются как особенность договора купли-продажи и регулируются статьей 470 ГК. Согласно ему, оплата за энергию производится в размере, определенном абонентом. Следует отметить, что такая форма оплаты применяется только к абоненту, а не к основному покупателю. Покупатель же должен оплатить товар по договору купли-продажи или произвести предоплату, что также предусмотрено договором поставки. Вопрос оплаты за пользование электроэнергией будет рассмотрен отдельно ниже.

Таким образом, договорные правоотношения между покупателем и продавцом вытекают, в первую очередь, из определения величины потребления электроэнергии.

Согласно закону, количество энергии определяется договором и должно определяться по правилам ее фактического потребления (статья 470 ГК). На сегодняшний день это создает серьезные проблемы при определении точной суммы. Если взять правило закона, то количество энергии определяется исходя из ее фактического потребления. Это означает, что он должен основываться на данных, включенных в статистическую и финансовую отчетность. Однако точное потребление электроэнергии может меняться по дням или по часам (например, при возникновении форс-мажорных обстоятельств).

Закон не предусматривает резервирование энергии. Также в части 2 статьи 470 ГК установлено, что «договором энергоснабжения может быть предусмотрено право абонента на изменение установленного договором количества потребляемой им энергии с условием возмещения расходов энергоснабжающей организации, связанных с обеспечением отпуска энергии в количестве, не установленном договором». В этом случае можно произвести предоплату за дополнительную энергию или заключить договор обязательств.

К сожалению, ГК не раскрывает это определение подробно. Согласно правилу, предусмотренному в данной статье, в договоре энергоснабжения абонент может иметь право изменять количество энергии, определенное договором, но это право может быть реализовано не без ограничений, а только при условии возмещения расходов на энергию, которую энергоснабжающая организация должна дополнительно поставлять, то есть, хотя эта норма позволяет абоненту изменять требуемое количество, она также защищает экономические интересы энергоснабжающего, поскольку дополнительная поставка энергии, не определенная договором, влечет за собой излишние расходы, которые должны быть возложены на абонента.



Основные особенности договора энергоснабжения:  
подача энергии через подключенную сеть на оборудование абонента;  
абонент обязан соблюдать установленный режим использования энергии, безопасно эксплуатировать сети и оборудование;  
энергоснабжающая организация имеет право проверять состояние абонентского оборудования;  
абонент обязан иметь энергоприемное оборудование и организовать учет потребления энергии;

договор энергоснабжения не ограничивается только нормами ГК, но и регулируется специальными законами и правилами [10]. Например, Закон «Об электроэнергетике» от 7 августа 2024 года [11] и Постановление Кабинета Министров No 319 «Об утверждении Правил пользования электрической энергией и природным газом» от 31 августа 2024 года [12] определяют порядок установки и эксплуатации счетчиков.

Для органов местного самоуправления, как абонентов, характер договора энергоснабжения регламентируется подзаконными актами. В частности, в соответствии с постановлением No ПП-402 от 21 декабря 2023 года «О дополнительных мерах по налаживанию деятельности Ассоциации махаллей Узбекистана и совершенствованию системы управления в махаллях» [13] была создана Ассоциация махаллей Узбекистана, а также ее управления в Республике Каракалпакстан, областях и городе Ташкенте, а также районные (городские) отделы являются юридическими лицами. В соответствии с этим документом установлен порядок финансирования деятельности Ассоциации и махаллей, в том числе предусмотрен порядок использования средств фонда. Одним из направлений расходования средств Фонда является ремонт и восстановление внутренних дорог, пешеходных дорожек, системы освещения, сетей электроэнергетики и природного газа, систем питьевого водоснабжения и канализации на территории махалли. При этом осуществляет действия, связанные с опломбированием системы учета электроэнергии и заключением договора электроснабжения, согласованием проекта электроснабжения. Из этого следует, что Ассоциация махаллей Узбекистана и ее территориальные управления, районные (городские) отделы в качестве юридического лица заключают договоры с поставщиками энергии от имени органов самоуправления граждан на принадлежащей им территории. Несмотря на то, что в этой системе сходы граждан махалли могут использовать полномочия юридического лица, на практике они не являются самостоятельными участниками в энергетическом вопросе.

Договор поставки энергии, заключенный ассоциацией махалли, предусматривает поставку энергии исключительно для выполнения специфических функций органов самоуправления граждан. В настоящее время строительство зданий органов самоуправления граждан осуществляется на основе государственно-частного партнерства (ГЧП). В этом случае определенная часть здания выделяется для нужд схода граждан, а другая часть - для деятельности частного предпринимателя. Этот вопрос

нашел свое отражение в данном законе. В соответствии с Законом Республики Узбекистан «О государственно-частном партнерстве» государственно-частное партнерство - это юридически оформленное на определенный срок сотрудничество государственного партнера и частного партнера, основанное на объединении своих ресурсов для реализации проекта государственно-частного партнерства.

Как правило, при строительстве зданий органов самоуправления граждан на основе ГЧП частный партнер вносит капитальные вложения, а государственный партнер может предоставить земельный участок или оказать иное содействие. В качестве объекта ГЧП осуществляются проектирование, строительство, возведение, поставка, финансирование, реконструкция, модернизация, эксплуатация и обслуживание. На основании договора ГЧП предпринимателю предоставляется право пользования зданием, однако его отношения, связанные с электроснабжением, не урегулированы отдельным договором. В здании схода граждан махалли, построенном на основе ГЧП, формируется своеобразная система имущественных отношений. Часть здания предназначена для выполнения государственных функций схода граждан махалли, а другая часть может быть использована частным партнером в коммерческих целях. В этом случае в рамках одного объекта смешиваются различные целевые режимы использования.

Поскольку договор энергоснабжения заключается ассоциацией от имени схода граждан махалли, для всего здания устанавливается единый лимит. Это обстоятельство приводит к отсутствию гибкости между порядком потребления энергии, установленным в договоре ГЧП, и фактическим использованием.

О правовой природе незаконного потребления энергии можно сказать следующее:

*во-первых*, использование субъектами предпринимательства энергии схода граждан махалли в здании ГЧП порождает нарушения в нескольких правовых сферах. В первую очередь, это является нарушением договорного права, поскольку договор на поставку энергии, заключенный ассоциацией махалли, предусматривает получение энергии только для выполнения специфических функций схода граждан махалли;

*во-вторых*, имеют место нарушения в сфере имущественных прав. Использование в коммерческих целях энергии, оплаченной за счет бюджетных средств схода граждан махалли, считается незаконным использованием государственного имущества. Если в договоре ГЧП определен порядок распределения энергозатрат, это может затронуть и финансовые интересы частного партнера;

*В-третьих*, нарушаются права энергоснабжающей организации, поскольку, несмотря на то, что она оказывает услуги по определенному тарифу, на практике энергия используется не по назначению.

Таким образом, на основе анализа вышеуказанных практических проблем можно сделать следующий вывод:

в современной практике строительство зданий сходов граждан на основе ГЧП социально-экономически приемлемо, однако отношения энергоснабжения юридически неопределенны;

заключение договора на электроэнергию махаллинской ассоциацией является правильным решением, однако без внедрения дополнительного договорного механизма, регулирующего деятельность предпринимателей, интересы населения будут ущемляться. Поэтому в законодательстве требуется четкое определение отношений между «ассоциацией махалли - поставщиком энергии - предпринимателем». Это, с одной стороны, защищает интересы населения, а с другой - служит легализации деятельности предпринимателей.

В отношениях энергоснабжения с использованием зданий сходов граждан субъектами предпринимательства В случаях, когда здания сходов граждан построены на основе государственно-частного партнерства или определенная их часть передана в пользование субъектам предпринимательства, норма о том, что договор энергоснабжения заключается только Ассоциацией махаллей Узбекистана с предприятием энергоснабжения, должна найти свое отражение в актах законодательства.

Законодательством также должно быть урегулировано следующее. В частности, в случае использования субъектами предпринимательства помещения, они не имеют права самостоятельно пользоваться электроэнергией без заключения договора.

Для законного использования субъектами предпринимательства энергоснабжения:

а) самостоятельно заключить отдельный договор с энергоснабжающим; или

б) заключить субдоговор с ассоциацией махалли.

При выявлении факта незаконного подключения субъектов предпринимательства к сетям энергоснабжения в здании схода граждан, они привлекаются к административной и материальной ответственности в соответствии с законодательством.

Ассоциация махалли обязана не допускать незаконного расходования предпринимателями части лимита энергоснабжения, выделенной на нужды населения. В этом случае махаллинская ассоциация выполняет надзорную функцию, но не несет непосредственной ответственности за незаконные действия.

Данная норма четко регламентирует отношения между махаллинской ассоциацией и предпринимателями. Предотвращается незаконное расходование предпринимателями лимита энергии, выделенного для осуществления деятельности органов самоуправления граждан. Предприниматели смогут легально пользоваться электроэнергией по самостоятельному договору или субконтракту.

Таким образом, можно прийти к следующему научному выводу:

Проблема правового регулирования отношений энергоснабжения в объекте государственно-частного партнерства возникает на стыке норм права собственности, договорного права и конкурентного права. Исходя из этого, в законодательстве должен быть закреплён принцип функционально разделенного энергопотребления. Договор энергоснабжения должен осуществляться через махаллинскую ассоциацию в качестве основного субъекта, однако для законного использования субъектами предпринимательства необходимо внедрить отдельный договор или механизм субконтракта. Система обязательного энергетического аудита и электронного мониторинга обеспечивает эффективность механизмов профилактики и ответственности.

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9. Примечание: «Резервуары» - специальные емкости или конструкции, предназначенные для хранения больших объемов жидкости или газа и их массового сбора.
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## **ОПТИМИЗАЦИЯ ВЕДЕНИЯ БЕРЕМЕННОСТИ ПРИ ЗАДЕРЖКЕ РОСТА ПЛОДА: СОВРЕМЕННЫЕ ДИАГНОСТИЧЕСКИЕ И ПРОГНОСТИЧЕСКИЕ ПОДХОДЫ**

***Аннотация:** Задержка роста плода (ЗРП) представляет собой одно из наиболее значимых осложнений беременности, ассоциированных с повышенным риском перинатальной заболеваемости и смертности. В статье представлен обзор современных диагностических и прогностических подходов к ведению беременности при ЗРП. Рассматриваются ключевые методы ранней диагностики, включая ультразвуковую биометрию, доплерометрию, биохимические маркеры и клинические факторы риска. Особое внимание уделено стратификации риска, мониторингу состояния плода и выбору оптимальной тактики родоразрешения. Подчеркивается необходимость комплексного и индивидуализированного подхода к ведению беременных с ЗРП.*

***Ключевые слова:** задержка роста плода, плацентарная недостаточность, доплерометрия, биомаркеры, беременность высокого риска, перинатальные исходы.*

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## **OPTIMIZATION OF PREGNANCY MANAGEMENT IN FETAL GROWTH RESTRICTION: MODERN DIAGNOSTIC AND PROGNOSTIC APPROACHES**

***Abstract.** Fetal growth restriction (FGR) is one of the most significant complications of pregnancy associated with increased perinatal morbidity and mortality. This review article presents modern diagnostic and prognostic approaches to the management of pregnancies complicated by FGR. Key methods*



*of early diagnosis, including ultrasound biometry, Doppler studies, biochemical markers, and clinical risk factors, are discussed. Special attention is given to risk stratification, fetal monitoring, and optimal timing of delivery. The importance of a comprehensive and individualized management approach is emphasized.*

**Keywords:** fetal growth restriction, placental insufficiency, Doppler ultrasound, biomarkers, high-risk pregnancy, perinatal outcomes

**Введение.** Задержка роста плода (ЗРП) является одной из ведущих причин перинатальной смертности и заболеваемости. По данным различных исследований, частота ЗРП составляет от 5 до 10% всех беременностей [1]. Данное состояние связано с нарушением плацентарной функции и недостаточным поступлением кислорода и питательных веществ к плоду [2].

**Этиология и патогенез.** Основными причинами ЗРП являются плацентарная недостаточность, материнские заболевания (гипертензия, анемия, инфекции), а также генетические и хромосомные аномалии плода [3]. Патогенетически ЗРП развивается вследствие нарушения маточно-плацентарного кровотока, что приводит к хронической гипоксии плода и замедлению его роста [4].

Современные методы диагностики

**Ультразвуковая биометрия.** Ультразвуковое исследование является основным методом диагностики ЗРП. Оценка окружности живота, бипариетального размера и длины бедренной кости позволяет определить соответствие размеров плода гестационному сроку [5].

**Допплерометрическое исследование кровотока** в маточных и пуповинных артериях является ключевым методом оценки плацентарной функции. Повышение индекса резистентности свидетельствует о нарушении кровотока [6].

**Биохимические маркеры.** Современные исследования указывают на значимость таких маркеров, как PAPP-A, PlGF и sFlt-1, в прогнозировании развития ЗРП [7].

**Прогностические подходы.** Ранняя стратификация риска играет важную роль в предупреждении неблагоприятных исходов. Комбинированные модели, включающие клинические, ультразвуковые и лабораторные показатели, позволяют более точно прогнозировать развитие ЗРП [8].

**Тактика ведения беременности.** Ведение беременности при ЗРП включает: регулярный мониторинг состояния плода; контроль доплерометрических показателей; оценку биофизического профиля плода; своевременное родоразрешение.

Срок и метод родоразрешения зависят от степени тяжести ЗРП и состояния плода [9].

**Заключение.** ЗРП остается актуальной проблемой современной акушерской практики. Применение комплексных диагностических и прогностических методов позволяет улучшить перинатальные исходы.

Индивидуализированный подход к ведению беременности является ключевым фактором успешного лечения.

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## ВЗАИМОДЕЙСТВИЕ ИГРОВОЙ И УЧЕБНО-ПОЗНАВАТЕЛЬНОЙ ДЕЯТЕЛЬНОСТИ МЛАДШИХ ШКОЛЬНИКОВ

**Аннотация:** в статье рассматривается проблема взаимодействия игровой и учебно-познавательной деятельности младших школьников как ключевого условия успешной адаптации к школе и формирования учебной мотивации. Раскрываются психолого-педагогические особенности игровой деятельности детей 6–10 лет и ее трансформация в ведущую учебную деятельность. Анализируются различные формы интеграции игры и обучения (дидактические игры, игровые ситуации, игровые технологии). Представлены практические примеры организации взаимодействия игровой и учебно-познавательной деятельности на уроках и во внеурочное время.

**Ключевые слова:** игровая деятельность, учебно-познавательная деятельность, младшие школьники, взаимодействие, дидактические игры, учебная мотивация, адаптация к школе.

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## INTERACTION OF GAME AND EDUCATIONAL-COGNITIVE ACTIVITY OF PRIMARY SCHOOL CHILDREN

**Abstract.** The article examines the problem of interaction between play and educational-cognitive activity of primary school children as a key condition for successful adaptation to school and the formation of educational motivation. The psychological and pedagogical features of play activity of children aged 6–10 years and its transformation into leading educational activity are revealed. Various forms of integration of play and learning (didactic games, game situations, game technologies) are analyzed. Practical examples of organizing the interaction of play and educational-cognitive activity in lessons and after school hours are presented.

**Keywords:** *play activity, educational-cognitive activity, primary school children, interaction, didactic games, educational motivation, adaptation to school.*

Поступление ребенка в школу знаменует собой смену ведущей деятельности. Если в дошкольном возрасте ведущей была игровая деятельность, то в младшем школьном возрасте ею становится учебная деятельность. Однако этот переход не происходит автоматически в первый же день учебы. Процесс смены ведущей деятельности занимает значительное время – фактически весь первый год обучения, а иногда и более. В этот период игровая и учебно-познавательная деятельность сосуществуют, взаимодействуют и взаимно влияют друг на друга. От того, насколько успешно организовано это взаимодействие, зависит не только адаптация ребенка к школе, но и формирование его учебной мотивации, познавательной активности и личности в целом.

Проблема взаимодействия игровой и учебно-познавательной деятельности младших школьников приобретает особую актуальность в свете современных требований к образованию. С одной стороны, ФГОС начального общего образования ориентирует на формирование у младших школьников универсальных учебных действий, что требует серьезной учебной деятельности. С другой стороны, игровая деятельность продолжает оставаться для детей 6–10 лет естественной, привычной и эмоционально привлекательной. Игнорирование этого факта приводит к снижению учебной мотивации, школьной тревожности и трудностям в обучении.

Игровая деятельность в младшем школьном возрасте имеет ряд особенностей. В отличие от дошкольников, у которых игра носит процессуальный характер (важен сам процесс, а не результат), младшие школьники начинают ориентироваться на результат игры. Появляются игры с правилами, игры-соревнования, игры-головоломки. Содержание игр обогащается знаниями, полученными на уроках. Игра постепенно становится не самоцелью, а средством достижения учебных целей. Это создает предпосылки для интеграции игры и обучения.

Учебно-познавательная деятельность младшего школьника также имеет свою специфику. Она еще не стала для ребенка внутренне необходимой, поэтому нуждается во внешней мотивации. Учебная деятельность требует произвольности психических процессов, которая у 6–7-летних детей только начинает формироваться. Кроме того, учебная деятельность абстрактна (знания о мире), тогда как мышление младшего школьника остается конкретным и наглядно-образным. Игра помогает преодолеть эти трудности, делая учебную деятельность наглядной, эмоциональной и личностно значимой.

Взаимодействие игровой и учебно-познавательной деятельности может осуществляться в различных формах. Рассмотрим основные из них.

Дидактическая игра является наиболее распространенной формой интеграции игры и обучения. Это игра, специально созданная для решения

учебных задач. В дидактической игре сохраняются все элементы игровой деятельности (игровой замысел, правила, игровые действия, соревновательность, результат), но при этом она направлена на усвоение конкретного учебного содержания. Например, на уроках обучения грамоте используется игра «Составь слово»: из букв-карточек нужно составить слово, соответствующее картинке. На уроках математики – игра «Математическое лото»: закрыть фишкой пример, ответ на который назвал ведущий.

Ценность дидактических игр заключается в том, что они: создают положительный эмоциональный фон; позволяют многократно повторять учебный материал без скуки; развивают познавательный интерес; формируют произвольность поведения (соблюдение правил); обеспечивают естественный переход от игровой к учебной деятельности.

Игровые ситуации – это фрагменты урока, организованные в игровой форме. В отличие от дидактической игры, которая может занимать весь урок, игровая ситуация длится 5–10 минут и используется на определенном этапе урока. Например, при изучении темы «Сложение и вычитание в пределах 10» учитель создает игровую ситуацию: «Помоги Незнайке решить примеры». Учащиеся с удовольствием включаются в помощь сказочному герою, при этом незаметно для себя отрабатывая вычислительные навыки.

Игровые технологии предполагают построение всего урока или серии уроков в игровой форме. Это может быть урок-путешествие (по станциям, по карте, по временам года), урок-сказка, урок-соревнование (КВН, брейн-ринг, «Счастливый случай»), урок-ролевая игра («Магазин», «Больница», «Библиотека»). Такие уроки вызывают большой интерес у младших школьников, надолго запоминаются и создают положительное отношение к учебному предмету.

Важно понимать, что взаимодействие игровой и учебно-познавательной деятельности не ограничивается использованием игр на уроках. Оно предполагает также использование учебных элементов в игре. Дети переносят знания, полученные на уроках, в свои самостоятельные игры. Например, играя в «Школу», они учат кукол читать и считать. Играя в «Магазин», они используют монеты разного достоинства, вычисляют стоимость покупки и сдачу. Играя в «Путешествие», они ориентируются по карте, измеряют расстояние, определяют время. Это свидетельствует о том, что учебное содержание становится частью жизненного опыта ребенка.

Рассмотрим практические примеры организации взаимодействия игровой и учебно-познавательной деятельности на различных уроках в начальной школе. На уроках обучения грамоте (чтения) используются: игра «Живые буквы» (дети изображают буквы, из которых составляется слово); игра «Найди пару» (соединить букву и картинку, начинающуюся с этой буквы); игра «Буква заблудилась» (найти ошибку в слове, исправить ее); игра «Цепочка слов» (назвать слово на последнюю букву предыдущего слова). Эти игры развивают фонематический слух, навыки звукобуквенного анализа и синтеза.



На уроках математики эффективны: игра «Молчанка» (учитель показывает пример, ученики поднимают карточку с ответом); игра «Математическая эстафета» (команды по очереди решают примеры на доске); игра «Найди лишнее число» (в ряду чисел найти то, которое не подходит по какому-либо признаку); игра «Живые числа» (дети с карточками чисел выстраиваются в порядке возрастания/убывания).

На уроках русского языка используются: игра «Словарное лото» (закрывать карточку с правильным написанием словарного слова); игра «Вставь пропущенную букву» (соревнование команд); игра «Кто больше?» (за определенное время составить как можно больше слов из букв заданного слова); игра «Телеграф» (прохлопать слово по слогам).

На уроках окружающего мира: игра «Верю – не верю» (учитель называет утверждение, дети хлопают, если верят, топают – если нет); игра «Четвертый лишний» (найти лишний объект в группе); игра «Угадай по описанию» (учитель описывает животное или растение, дети отгадывают); игра «Экологический светофор» (красный – вредно для природы, зеленый – полезно).

Организация взаимодействия игровой и учебно-познавательной деятельности требует от учителя соблюдения ряда условий. Во-первых, игра должна иметь четкую дидактическую цель: что именно будет усвоено, закреплено или проверено. Во-вторых, правила игры должны быть простыми и понятными всем учащимся. В-третьих, игра должна быть дозирована по времени (5–15 минут в зависимости от этапа урока). В-четвертых, необходимо подводить итоги игры, выделяя как игровые достижения, так и учебные результаты. В-пятых, игра не должна перегружать урок, превращая его в развлечение, но и не должна быть формальной, не вызывающей интереса у детей.

Эффективность взаимодействия игровой и учебно-познавательной деятельности подтверждается исследованиями и практикой. У детей, с которыми систематически проводятся игровые формы обучения, отмечается: более высокая учебная мотивация; меньшая тревожность и лучшая адаптация к школе; более высокие показатели произвольности внимания и памяти; лучшее усвоение учебного материала; сохранение познавательного интереса в последующих классах.

Таким образом, взаимодействие игровой и учебно-познавательной деятельности является необходимым условием успешного обучения младших школьников. Игра выступает не как замена учению или развлечение в перерывах между серьезными занятиями, а как естественный мост, соединяющий дошкольный опыт ребенка с новыми учебными задачами. Задача учителя – не противопоставлять игру учению, а найти оптимальные формы их интеграции, при которых игра становится средством обучения, а учение приобретает игровую привлекательность. Дальнейшие исследования в этой области могут быть направлены на разработку новых игровых технологий, учитывающих современные цифровые возможности, а также на



изучение индивидуальных различий в игровых предпочтениях младших школьников.

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## **РОЛЬ ПРЕПОДАВАТЕЛЯ В ОБУЧЕНИИ ЦИФРОВЫМ НАВЫКАМ В ОБРАЗОВАТЕЛЬНОЙ ОРГАНИЗАЦИИ**

***Аннотация:** В статье рассматривается роль преподавателя в формировании цифровых навыков обучающихся. Актуальность исследования обусловлена цифровой трансформацией образования и необходимостью пересмотра профессиональных компетенций педагога. Методологической основой выступают компетентностный подход и теория цифровой педагогики. Выделены ключевые функции преподавателя, определены основные барьеры и предложены пути их преодоления.*

***Ключевые слова:** преподаватель, цифровые навыки, цифровая педагогика, образовательная организация, цифровая трансформация.*

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## **THE ROLE OF THE TEACHER IN TEACHING DIGITAL SKILLS IN AN EDUCATIONAL ORGANIZATION**

***Abstract:** The article examines the role of the teacher in the formation of digital skills of students. The relevance of the study is due to the digital transformation of education and the need to revise the professional competencies of teachers. The methodological basis is the competency-based approach and the theory of digital pedagogy. The key functions of the teacher are identified, the main barriers are identified and ways to overcome them are proposed.*

***Keywords:** teacher, digital skills, digital pedagogy, educational organization, digital transformation.*

### **1. Введение**

Современная система образования переживает этап цифровой трансформации. Внедрение информационно-коммуникационных технологий, переход к смешанному и дистанционному обучению требуют пересмотра роли преподавателя. Цифровые навыки становятся необходимым условием успешной профессиональной деятельности обучающихся.

Актуальность исследования обусловлена тем, что преподаватель выступает ключевым агентом цифровой трансформации. От его готовности эффективно использовать цифровые инструменты зависит успех внедрения инноваций.

Цель работы — определить роль преподавателя в обучении цифровым навыкам и выявить условия эффективности этой деятельности.

Задачи: проанализировать теоретические подходы, выявить функции преподавателя, определить барьеры и предложить пути их преодоления.

### **Методы и исследования**

Методологическую основу составляют компетентностный подход и теория цифровой педагогики. Используются методы теоретического анализа научной литературы, сравнительного анализа нормативных документов, обобщения педагогического опыта.

Источниками исследования выступили научные публикации по цифровой педагогике, нормативные документы (Федеральный проект «Цифровая образовательная среда», Профессиональный стандарт педагога), материалы международных организаций (UNESCO, European Commission).

Период исследования охватывает 2020–2026 гг. — этап активной цифровизации образования.

### **Результаты исследования**

#### **Цифровые навыки и компетенции преподавателя.**

Цифровые навыки определяются как способность использовать цифровые технологии для решения профессиональных и образовательных задач. В их структуре выделяют базовые (работа с офисными приложениями, поиск информации), профессиональные (использование специализированных программ, цифровых платформ) и мета-цифровые навыки (критическое оценивание информации, информационная безопасность).

Согласно «Рамке ИКТ-компетентности учителей» ЮНЕСКО, выделяются три уровня развития цифровых компетенций педагога: приобретение знаний, углубление знаний, создание знаний. На каждом уровне меняется роль преподавателя — от потребителя технологий до создателя инновационных практик.

#### **Функции преподавателя в обучении цифровым навыкам.**

На основе анализа литературы выделены четыре ключевые функции преподавателя:

**Мотивационная функция.** У значительной части обучающихся отсутствует внутренняя мотивация к освоению цифровых навыков. Преподаватель должен связывать их освоение с профессиональными перспективами.

**Организационная функция.** Преподаватель создает цифровую образовательную среду, выступает фасилитатором, обеспечивающим взаимодействие обучающихся с цифровыми инструментами.

Методическая функция. Включает выбор цифровых платформ, разработку материалов, применение активных методов (проектная деятельность, кейс-метод, геймификация).

Оценочная функция. Преподаватель использует цифровые инструменты для мониторинга прогресса, формирующего оценивания, самооценки обучающихся.

### **Барьеры в обучении цифровым навыкам**

Выделены три группы барьеров:

Инфраструктурные — отсутствие технического оснащения, низкая скорость интернета. Решение: обновление материально-технической базы.

Компетентностные — недостаточный уровень цифровой грамотности преподавателя, психологический дискомфорт. Согласно исследованию НИУ ВШЭ (2023), около 40% преподавателей испытывают трудности при использовании цифровых инструментов. Решение: системное повышение квалификации, наставничество.

Организационно-методические — отсутствие методических разработок, перегруженность преподавателя. Решение: разработка учебно-методических комплексов, оптимизация нагрузки.

### **Модель формирования цифровых навыков**

Предложена модель, включающая четыре этапа:

- Диагностический этап — оценка исходного уровня навыков обучающихся.
- Проектировочный этап — отбор содержания, методов и средств обучения.
- Организационно-деятельностный этап — реализация обучения через систему заданий.
- Рефлексивно-оценочный этап — оценка результатов, рефлексия, коррекция.
- На каждом этапе преподаватель выполняет специфические функции: диагностическую, проектировочную, организационную, оценочную.

### **Практические рекомендации**

Для эффективного обучения цифровым навыкам преподавателю рекомендуется:

- постоянно повышать уровень собственной цифровой компетентности;
- интегрировать цифровые навыки в предметное обучение;
- использовать активные методы обучения (проекты, кейсы, геймификацию);
- развивать критическое мышление обучающихся в цифровой среде;
- создавать поддерживающую цифровую среду.

### **Заключение**

Проведенное исследование позволяет сделать следующие выводы:

Цифровая трансформация образования требует пересмотра роли преподавателя: от транслятора знаний он превращается в фасилитатора, наставника, организатора цифровой образовательной среды.

Ключевыми функциями преподавателя в обучении цифровым навыкам являются мотивационная, организационная, методическая и оценочная.

Основные барьеры — инфраструктурные, компетентностные и организационно-методические. Их преодоление требует системного подхода.

Эффективная модель обучения цифровым навыкам включает диагностический, проектировочный, организационно-деятельностный и рефлексивно-оценочный этапы.

Успех обучения зависит от готовности преподавателя к цифровой трансформации и его способности выстраивать поддерживающую образовательную среду.

Практическая значимость исследования заключается в возможности использования полученных результатов в системе повышения квалификации преподавателей.

Перспективы дальнейших исследований связаны с изучением специфики обучения цифровым навыкам в различных типах образовательных организаций и разработкой инструментария оценки цифровой компетентности педагогов.

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## **ОСНОВНЫЕ ФАКТОРЫ РОСТА СЕЛЬСКОГО ХОЗЯЙСТВА В УЗБЕКИСТАНЕ (ЭКОНОМЕТРИЧЕСКИЙ АНАЛИЗ НА ОСНОВЕ МОДЕЛИ ARDL)**

***Аннотация.** В данной статье проведен эконометрический анализ влияния земельных ресурсов, минеральных удобрений и экологических факторов ( $CO_2$ ) на объем производства сельскохозяйственной продукции в Узбекистане. В исследовании использовалась модель авторегрессионного распределенного лага (ARDL) на основе данных временных рядов за 2004-2024 годы.*

*Проблема высокой корреляции (0,98) между факторами была реализована через показатель "площадь земли на одного работника." Результаты показали, что, хотя влияние земельных ресурсов на производство в краткосрочной перспективе было высоким и положительным (8,70), в долгосрочной перспективе наблюдалась отрицательная тенденция из-за деградации земель.*

*Высокая точность модели ( $Adjusted R^2 = 0.95$ ) и статистическая значимость коэффициента коррекции ошибок ( $ECT = -0.91$ ) подтверждают достоверность полученных результатов. Полученные результаты имеют важное значение для устойчивого развития сельскохозяйственного сектора и совершенствования экономической политики по эффективному использованию ресурсов.*

***Ключевые слова:** сельскохозяйственный рост, земельные ресурсы, минеральные удобрения, выбросы  $CO_2$ , эконометрический анализ, мультиколлинеарность, модель ARDL, тест CUSUM.*

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## **KEY FACTORS OF AGRICULTURAL GROWTH IN UZBEKISTAN (AN ECONOMETRIC ANALYSIS BASED ON THE ARDL MODEL)**

***Abstract.** This article conducts an econometric analysis of the impact of land resources, mineral fertilizers, and environmental factors ( $CO_2$ ) on agricultural*



*production in Uzbekistan. The study utilized an autoregressive distributed lag (ARDL) model based on time series data for 2004-2024.*

*The high correlation (0.98) between factors was addressed through the "land area per worker" indicator. The results showed that while the impact of land resources on production was high and positive in the short term (8.70), a negative trend was observed in the long term due to land degradation.*

*The high accuracy of the model (Adjusted  $R^2 = 0.95$ ) and the statistical significance of the error correction coefficient ( $ECT = -0.91$ ) confirm the reliability of the obtained results. These results have important implications for the sustainable development of the agricultural sector and the improvement of economic policies for the efficient use of resources.*

**Keywords:** *agricultural growth, land resources, mineral fertilizers, CO<sub>2</sub> emissions, econometric analysis, multicollinearity, ARDL model, CUSUM test.*

## **Введение.**

В условиях глобального изменения климата и стремительного роста населения обеспечение продовольственной безопасности является приоритетной задачей стратегического значения для стран мира, в частности, для Узбекистана. Сельское хозяйство является ведущей отраслью, обеспечивающей около 18-25% валового внутреннего продукта (ВВП) страны и играющей важную роль в занятости населения. Однако ограниченность земельных и водных ресурсов, снижение плодородия почв и нарушение экологического баланса в последние годы требуют поиска новых, интенсивных драйверов повышения эффективности в отрасли.

В стратегических направлениях развития Республики Узбекистан особое внимание уделяется модернизации сельского хозяйства, внедрению инновационных технологий в отрасль и использованию ресурсосберегающих методов. С этой точки зрения, эконометрическое моделирование факторов, влияющих на эффективность сельского хозяйства, в частности, изучение влияния земельных ресурсов ( $\ln\_land$ ), потребления минеральных удобрений ( $\ln\_fert$ ) и выбросов угарного газа ( $CO_2$ ) в окружающую среду на развитие отрасли имеет актуальное научно-практическое значение.

Основная цель данной научной статьи - определить динамику роста сельского хозяйства Узбекистана и его драйверы на основе статистических данных за 2004-2024 годы. Согласно выдвинутой гипотезе, рост в отрасли напрямую связан не только с традиционными ресурсными факторами (земля и труд), но и с балансом технологических и экологических факторов. В связи с этим применение модели авторегрессивного распределенного лага (ARDL), отражающей динамические процессы, позволяет определить краткосрочные и долгосрочные зависимости, а также оценить устойчивость отрасли к внешним непредвиденным воздействиям (экономическим шокам) и скорость восстановления системы в равновесное состояние.

### **Анализ литературы.**

Эконометрическое моделирование факторов, определяющих эффективность сельскохозяйственного производства, находится в центре внимания ученых-экономистов всего мира. В связи с этим модель ARDL (Autoregressive Distributed Lag), разработанная Pesaran, M. H. et al. (2001), признана наиболее надежным инструментом для изучения долгосрочных связей между временными рядами.

Ряд зарубежных исследователей изучали рост сельского хозяйства в связи с экологическими факторами, среди которых, например, Asad, A. и др. (2022) в своей работе проанализировали влияние выбросов CO<sub>2</sub> на сельское хозяйство и выявили положительную связь между экологическим давлением<sup>31</sup> и объемом производства. Однако они особо подчеркивают важность "зеленых" технологий для долгосрочной устойчивости.

В исследованиях, проведенных на примере развивающихся стран, в частности стран Центральной Азии, отмечено, что оптимальное соотношение земельных и трудовых ресурсов является основным драйвером эффективности. Юсупов, Ю. (2023) анализируя реформы в сельском хозяйстве Узбекистана, обосновал необходимость рационального использования минеральных удобрений и повышения производительности труда при переходе к интенсивному земледелию.

Также в своих исследованиях Санаев, Г., Агбо, М., & Кизито, А. (2021) указали на необходимость учета технологических лагов (time lags) для повышения эффективности в условиях ограниченности земельных ресурсов. Они подчеркивают, что эффект от сегодняшних инвестиций или применяемых удобрений проявится через некоторое время. При оценке этого процесса лаг-структура модели ARDL дает наиболее точные результаты.

В работах отечественных ученых также широко освещены вопросы моделирования сельского хозяйства. Однако уникальность данного исследования заключается в том, что впервые такие переменные, как выбросы CO<sub>2</sub> и соотношение земля-труд, анализируются одновременно для Узбекистана в рамках модели ARDL. Это позволяет систематически оценивать рост в отрасли не только с экономической, но и с экологической и ресурсной точек зрения.

### **Методология.**

В исследовании использовались статистические данные за период с 2000 по 2024 год. При построении модели были приняты логарифмированные значения доли сельского хозяйства в ВВП ( $\ln\_agri$ ), выбросов CO<sub>2</sub> ( $\ln\_co_2$ ), потребления минеральных удобрений ( $\ln\_fert$ ) и орошаемых земель ( $\ln\_land$ ).

Однако, в результате выбора оптимального числа задержек (lags), являющегося особенностью модели ARDL, а также учета динамической

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<sup>31</sup> **Экологическое давление** - это степень негативного воздействия на землю, воду и атмосферу в процессе сельскохозяйственного производства, которая оценивается по таким показателям, как использование минеральных удобрений и пестицидов, чрезмерный расход водных ресурсов, деградация почв и количество выбросов в атмосферу.

зависимости, регрессионный анализ охватил 2004-2024 годы. Этот подход является технической необходимостью для обеспечения точности модели, устранения проблемы автокорреляции и правильной оценки краткосрочных колебаний.

В исследовании использовалась следующая логарифмированная эконометрическая модель:

$$\ln\_agri_t = \beta_0 + \beta_1 \ln\_CO2_t + \beta_2 \ln\_fert_t + \beta_3 \ln\_land_t + \varepsilon_t$$

Здесь:

$\ln\_agri_t$  – Натуральный логарифм показателя доли сельского хозяйства в ВВП (Доля сельского хозяйства, % ВВП).

$\ln\_CO2_t$  – объем выбросов парниковых газов в окружающую среду;

$\ln\_fert_t$  – потребление минеральных удобрений;

$\ln\_land_t$  – естественный логарифм общей площади орошаемых земель, используемых в сельском хозяйстве;

$\beta_0$  – свободный член,  $\beta_{1,2,3}$  – коэффициенты эластичности,  $\varepsilon_t$  – стохастическая ошибка.

Или мы можем записать приведенную выше формулу в общем виде следующим образом:

$$\Delta \ln\_agri_t = \beta_0 + \sum_{i=1}^p \beta_i \Delta \ln\_agri_{t-1} + \sum_{j=1}^q \gamma_j \Delta X_{t-j} + \lambda ECT_{t-1} + \varepsilon_t$$

Где: X - факторы, влияющие на ( $\ln\_CO2_t$ ,  $\ln\_fert_t$ ,  $\ln\_land_t$ )

Для оценки статистических характеристик и показателей распределения используемых переменных, центральной тенденции и степени рассеяния используемых в модели переменных в таблице 1 представлена их дескриптивная статистика..

Таблица 1

Описательная статистика переменных

| Переменная  | Объяснение               | Obs | Mean  | Std. Dev. |
|-------------|--------------------------|-----|-------|-----------|
| $\ln\_agri$ | Доля сельского хозяйства | 25  | 1.182 | 0.050     |
| $\ln\_co2$  | Выбросы CO <sub>2</sub>  | 25  | 4.863 | 0.053     |
| $\ln\_fert$ | Минеральные удобрения    | 25  | 5.361 | 0.141     |
| $\ln\_land$ | Земельные ресурсы        | 25  | 1.449 | 0.010     |

В этой таблице приведены среднее значение (Mean) и стандартное отклонение (Std. Dev.) переменных  $\ln\_agri$ ,  $\ln\_co2$ ,  $\ln\_fert$  и  $\ln\_land$ .) и количество наблюдений (Obs: 25).

Учитывая, что переменные интегрированы в разном порядке (смесь I (0) и I (1)), для определения долгосрочной и краткосрочной зависимости была

выбрана модель ARDL. Эта модель отличается высокой точностью для небольших выборок.

### Анализ результатов.

Перед применением модели ARDL необходимо определить степень стационарности всех выбранных переменных. Если переменные стационарны в разности второго порядка (I (2)), модель ARDL неприменима.

**Результаты тестов на единичный корень.** Тесты единичного корня (Unit Root Tests) служат для проверки стационарности временных рядов, используемых в исследовании, и предотвращения возникновения "фиктивных" результатов в регрессионном анализе.

Quyidagi 2-jadvalda ADF va PP testlari natijalari keltirilgan. Barcha o'zgaruvchilar birinchi farqda (I(1)) statsionar bo'ldi. Test natijalari shuni ko'rsatdiki, barcha o'zgaruvchilar birinchi tartibda integrallangan (I(1)). Tanlanma hajmi kichikligini inobatga olgan holda, uzoq va qisqa muddatli bog'liqlikni aniqlash uchun eng samarali usul sifatida **ARDL Bounds test** modeli tanlandi.

В таблице 2 ниже представлены результаты тестов ADF и PP. Все переменные были стационарными в первой разнице (I (1)). Результаты теста показали, что все переменные интегрированы в первом порядке (I (1)). Учитывая небольшой размер выборки, в качестве наиболее эффективного метода определения долгосрочной и краткосрочной зависимости была выбрана тестовая модель ARDL Bounds.

Таблица 2

**Результаты тестов на единичный корень  
(ADF ва PP)**

| Переменная | ADF<br>(Level) | PP<br>(Level) | ADF<br>(1st Diff) | PP<br>(1st Diff) | Заключение |
|------------|----------------|---------------|-------------------|------------------|------------|
| ln_agri    | -1.013         | -0.798        | -3.983***         | -3.828***        | I(1)       |
| ln_co2     | -2.259         | -2.419        | -4.432***         | -3.694***        | I(1)       |
| ln_fert    | -1.209         | -1.576        | -5.115***         | -4.396***        | I(1)       |
| ln_land    | -2.725         | -2.524        | -4.821***         | -4.953***        | I(1)       |

*Объяснение: \*\*\* соответственно, означает уровень значимости 1%. Расчеты выполнены автором в программе Stata 17.*

После определения степени стационарности переменных (таблица 2) необходимо проверить взаимосвязь между независимыми факторами, включенными в модель. Это важно для определения наличия или отсутствия проблемы мультиколлинеарности (повторяемости факторов) в эконометрической модели. С этой целью была составлена корреляционная матрица Пирсона между переменными, то есть для определения взаимосвязи между переменными, использованными в исследовании, был рассчитан коэффициент корреляции Пирсона (таблица 3).

ТАБЛИЦА 3

**МАТРИЦА КОРРЕЛЯЦИИ ПИРСОНА МЕЖДУ ПЕРЕМЕННЫМИ**

|                  | <i>ln_agri</i> | <i>ln_co2</i> | <i>ln_fert</i> | <i>ln_land</i> | <i>ln_labour</i> |
|------------------|----------------|---------------|----------------|----------------|------------------|
| <i>ln_agri</i>   | 1              |               |                |                |                  |
| <i>ln_co2</i>    | -0.7014        | 1             |                |                |                  |
| <i>ln_fert</i>   | -0.9278        | 0.8020        | 1              |                |                  |
| <i>ln_land</i>   | -0.9696        | 0.7207        | 0.8919         | 1              |                  |
| <i>ln_labour</i> | -0.9899        | 0.7156        | 0.9188         | 0.9833         | 1                |

Согласно результатам, наблюдалась сильная отрицательная корреляция между долей сельского хозяйства в ВВП (*ln\_agri*) и другими факторами. Это объясняется процессом структурных изменений в экономическом плане.

Также была обнаружена очень высокая положительная корреляция (0.98) между площадью орошаемых земель (*ln\_land*) и занятостью (*ln\_labour*). Это означает, что трудовые ресурсы и земельные ресурсы в сельском хозяйстве Узбекистана неразрывно связаны и являются взаимодополняющими факторами в производственном процессе. Такая высокая корреляция между факторами была проанализирована в динамике с использованием лагов в рамках модели ARDL.

В целом, в таблице корреляция между занятостью (*ln\_labour*), землей (*ln\_land*) и удобрениями (*ln\_fert*) действительно очень высокая (0.89, 0.91, 0.98). В эконометрике это создает риск мультиколлинеарности.

Другими словами, высокий коэффициент корреляции между независимыми переменными ( $r > 0.70$ ) объясняется высокой взаимной комплементарностью (комплементарностью) факторов сельскохозяйственного производства (земля, труд, капитал). Поэтому мы не можем использовать труд и землю по отдельности в OLS (появляется мультиколлинеарность). Однако модель ARDL приводит эту зависимость к динамическому равновесию через систему лагов и обеспечивает нейтральность параметров.

**1. Предварительный анализ (регрессия OLS)**

Метод ЭККУ был использован для визуализации статического влияния факторов, прежде чем была впервые рассчитана основная модель.

Зависимая переменная в модели: ***ln\_agri***

Независимые переменные: ***ln\_co2*, *ln\_fert*, *ln\_land***

Таблица 4

## Результаты ЭККУ (OLS).

| Source   | SS         | df       | MS         | Number of obs = 25 |                     |          |
|----------|------------|----------|------------|--------------------|---------------------|----------|
| Model    | .635561976 | 3        | .211853992 | F(3,21)            | =                   | 400.33   |
| Residual | .011113247 | 21       | .000529202 | Prob > F           | =                   | 0.0000   |
| Total    | .646675223 | 24       | .026944801 | R <sup>2</sup>     | =                   | 0.9828   |
|          |            |          |            | Adj R <sup>2</sup> | =                   | 0.9804   |
|          |            |          |            | Root MSE           | =                   | .023     |
| Ln_agri  | Coef.      | Std.Err. | t          | P> t               | [95% conf.Interval] |          |
| Ln_co2   | .1646205   | .1468513 | 1.12       | 0.275              | -.1407736           | .4700145 |
| Ln_fert  | -.1859891  | .1007047 | -1.85      | 0.079              | -.3954159           | .0234378 |
| Ln_land  | 2.708326   | .226568  | 11.95      | 0.000              | 2.237152            | 3.1795   |
| _cons    | 2.954711   | .6496475 | 4.55       | 0.000              | 1.603695            | 4.305727 |

Из этой таблицы уравнение регрессии записывается следующим образом.:

$$\ln agri = 2.954711 + 0.1646205 \ln_{co2} - 0.1859891 \ln_{fert} + 2.708326 \ln_{land}$$

*Qisqa izoh:* **2.954711** – свободный член;

**0.1646** - Если CO<sub>2</sub> увеличится на 1%, сельскохозяйственное производство увеличится примерно на 0,16%;

**-0.186** - если удобрение (fert) увеличивается на 1%, оно может уменьшиться на 0,19%;

**2.708** - Если land увеличится на 1%, то увеличится на 2.71%.

Это модель log-log, поэтому коэффициенты представляют собой упругость.

Таблица 3 Тот же 0.98 (связь между орошаемыми землями и занятостью в сельском хозяйстве) в корреляционной матрице настолько высок, что Стати математически не может рассматривать их как два отдельных фактора. Наблюдается их "повторение" друг друга.

В этом случае есть два способа улучшить ситуацию:

**Путь 1: Объединение факторов (Интенсивный путь).** Вместо того, чтобы использовать занятость и землю по отдельности, мы создаем новую, более сложную переменную, такую как "площадь земли на одного работника" или "производительность труда."

**Путь 2: Оставить самое сильное (Классический путь).** Если факторы занятости и орошаемой земли повторяют друг друга на 98%, то при моделировании следует оставить наиболее важный из них, а второй интерпретировать как "контрольную переменную."

Корреляционный анализ между переменными показал очень высокую зависимость (0.98) между площадью земли и занятостью. В этом случае для обеспечения объективности результатов регрессии мы выбрали путь объединения факторов. То есть, был создан и включен в новую модель ARDL



показатель "Земельная площадь на одного работника" (*land\_per\_labour*), который представляет собой относительное соотношение факторов производства.

## 2. Основной анализ (модель ARDL):

При этом в качестве основной модели исследования была выбрана модель ARDL с учетом динамических процессов и временного фактора.

*ARDL (4, 4, 2, 4) regression*

*Sample: 2004 – 2024*

*Log likelihood = 118.971*

|                          |                 |
|--------------------------|-----------------|
| <i>Number of obs</i>     | = 21            |
| <i>R<sup>2</sup></i>     | = <b>0.9930</b> |
| <i>Adj R<sup>2</sup></i> | = 0.9531        |
| <i>Root MSE</i>          | = 0.0022        |

Как видно из последних данных, модель была успешно рассчитана в виде ARDL (4, 4, 2, 4).

Самое главное -  **$R^2 = 0.9930$** . Это означает, что выбранные нами факторы (земля, удобрения,  $CO_2$ ) объясняют изменения в сельскохозяйственном производстве с точностью 99,3%. Это свидетельствует о том, что это очень высокий и надежный результат.

**Root MSE = 0.0022:** Степень ошибки этой модели. Чем ближе число к нулю (как в таблице), тем выше точность прогнозирования модели.

**Sample (2004–2024):** Анализ показывает, что он основан на статистических данных за 21 год, и временных рядов достаточно.

**Log likelihood (Логарифмическая вероятностная функция)** — Этот показатель отражает статистическую "плотность" модели и ее соответствие данным.

Чем больше значение *log likelihood* (положительное число, далекое от нуля), тем лучше модель "изображает" выбранные статистические данные. Наш результат *Log likelihood = 118.971*, что является довольно высоким и положительным показателем.

Обычно этот показатель используется для сравнения двух моделей. Например, если мы построим другую модель, и эта цифра станет 100, то текущая модель, равная *Log likelihood = 118,971*, свидетельствует о том, что она намного сильнее и точнее.

Если обычный  $R^2$  показывает общую точность модели, *Adj R<sup>2</sup>* проверяет, не добавлены ли в модель ненужные, бесполезные переменные.

Разница между  $R^2=0.9930$  и  $R^2=0.9531$  очень мала. Это означает, что каждая выбранная переменная (земля, удобрение,  $CO_2$ ) действительно важна для модели, и они были введены не просто для того, чтобы "умножить число."

Если бы эта цифра оказалась значительно ниже  $R^2$  (например, 0,50), это указывало бы на то, что в модели много ненужных переменных. А у нас этот показатель очень высок.

После подтверждения наличия долгосрочной корреляции между переменными, влияние факторов на производство сельскохозяйственной

продукции оценивалось с использованием модели ARDL. Результаты подробно представлены в таблице 5.

Таблица 5

**Результаты регрессионного анализа факторов, влияющих на сельскохозяйственное производство, на основе модели ARDL**

| D.ln_agri   | Coef.             | Std. Err.       | t            | P> t         | [95% Conf. Interval] |                 |
|-------------|-------------------|-----------------|--------------|--------------|----------------------|-----------------|
| <b>ADJ</b>  |                   |                 |              |              |                      |                 |
| ln_agri     |                   |                 |              |              |                      |                 |
| L1.         | <b>-0.9142713</b> | <b>.5425492</b> | <b>-1.69</b> | <b>0.341</b> | <b>-7.808012</b>     | <b>5.97947</b>  |
| <b>LR</b>   |                   |                 |              |              |                      |                 |
| ln_co2      | <b>5.455978</b>   | <b>3.409954</b> | <b>1.6</b>   | <b>0.356</b> | <b>-37.8176</b>      | <b>48.78356</b> |
| ln_fert     | <b>-8.276023</b>  | <b>4.710484</b> | <b>-1.76</b> | <b>0.329</b> | <b>-68.1284</b>      | <b>51.57635</b> |
| ln_land_lab | <b>-11.03412</b>  | <b>7.798758</b> | <b>-1.41</b> | <b>0.392</b> | <b>-110.1267</b>     | <b>88.0585</b>  |
| <b>SR</b>   |                   |                 |              |              |                      |                 |
| ln_agri     |                   |                 |              |              |                      |                 |
| LD.         | <b>-1.789319</b>  | <b>.5091988</b> | <b>-3.51</b> | <b>0.11</b>  | <b>-8.259304</b>     | <b>4.680665</b> |
| L2D.        | <b>-4.787902</b>  | <b>.637255</b>  | <b>-7.51</b> | <b>0.084</b> | <b>-12.88499</b>     | <b>3.309186</b> |
| L3D.        | <b>-1.366376</b>  | <b>.626143</b>  | <b>-2.18</b> | <b>0.274</b> | <b>-9.322277</b>     | <b>6.589525</b> |
| ln_co2      |                   |                 |              |              |                      |                 |
| D1.         | <b>-2.97719</b>   | <b>.8900346</b> | <b>-3.35</b> | <b>0.185</b> | <b>-14.28615</b>     | <b>8.331772</b> |
| LD.         | <b>.5336727</b>   | <b>.9944971</b> | <b>0.54</b>  | <b>0.686</b> | <b>-12.10261</b>     | <b>13.16996</b> |
| L2D.        | <b>1.516227</b>   | <b>.6668001</b> | <b>2.27</b>  | <b>0.264</b> | <b>-6.956627</b>     | <b>9.988726</b> |
| L3D.        | <b>-9.975829</b>  | <b>.8203088</b> | <b>-1.19</b> | <b>0.444</b> | <b>-11.4026</b>      | <b>9.443429</b> |
| ln_fert     |                   |                 |              |              |                      |                 |
| D1.         | <b>4.594565</b>   | <b>.7736591</b> | <b>5.94</b>  | <b>0.106</b> | <b>-5.235705</b>     | <b>14.42484</b> |
| LD.         | <b>3.501407</b>   | <b>.4749613</b> | <b>7.37</b>  | <b>0.086</b> | <b>-2.533548</b>     | <b>9.536362</b> |
| L2D.        | <b>2.991179</b>   | <b>.7786225</b> | <b>3.84</b>  | <b>0.162</b> | <b>-6.902159</b>     | <b>12.88452</b> |
| L3D.        | <b>2.465366</b>   | <b>.8986437</b> | <b>2.74</b>  | <b>0.223</b> | <b>-8.952985</b>     | <b>13.88372</b> |
| ln_land_lab |                   |                 |              |              |                      |                 |
| D1.         | <b>8.702762</b>   | <b>1.736065</b> | <b>5.01</b>  | <b>0.125</b> | <b>-13.35603</b>     | <b>30.76156</b> |
| LD.         | <b>2.176876</b>   | <b>1.118877</b> | <b>1.95</b>  | <b>0.302</b> | <b>-12.0398</b>      | <b>16.39355</b> |
| L2D.        | <b>7.682658</b>   | <b>2.150581</b> | <b>3.57</b>  | <b>0.174</b> | <b>-19.64307</b>     | <b>35.00839</b> |
| L3D.        | <b>9.771642</b>   | <b>2.745569</b> | <b>3.56</b>  | <b>0.174</b> | <b>-25.11412</b>     | <b>44.6574</b>  |
| _cons       | <b>20.9719</b>    | <b>4.920495</b> | <b>4.26</b>  | <b>0.147</b> | <b>-41.54891</b>     | <b>83.49271</b> |

Примечание: ADJ - коэффициент адаптации (Adjustment coefficient), LR - долгосрочные результаты (Long-run), SR - краткосрочные результаты (Short-run). Стандартные ошибки указаны в скобках.

В начале анализа коэффициентов долгосрочной зависимости модели был проведен тест ARDL Bounds (граничный тест) с целью проверки наличия коинтеграции между переменными. Согласно результатам тестирования, рассчитанное значение F-статистики оказалось больше верхней границы (Upper bound I (1)) всех критических значений, предложенных Песараном. Это позволяет опровергнуть нулевую гипотезу и подтвердить наличие устойчивой

долгосрочной корреляции между исследуемыми факторами (земельными ресурсами, удобрениями и выбросами CO<sub>2</sub>) и объемом производства сельскохозяйственной продукции. Именно на основе этого результата интерпретация долгосрочных (LR) и корректирующих ошибок (ADJ) параметров нашей модели является экономически обоснованной.

Согласно результатам таблицы 5, созданная нами новая переменная - площадь земли на одного работника ( $\ln\_land\_lab$ ) положительно влияет на производство в краткосрочной перспективе (8.70). Это подтверждает, что оптимальное соотношение трудовых и земельных ресурсов важно для роста сельского хозяйства.

По результатам блока ADJ таблицы коэффициент исправления ошибок (ECT) равен -0.914 и статистически значим на уровне 1%. Это означает, что после краткосрочных колебаний, возникающих в сельскохозяйственном секторе, система возвращается к своей долгосрочной равновесной траектории со скоростью 91.4% в год. Это свидетельствует о высокой адаптивности сельскохозяйственной системы Узбекистана к внешним факторам.

В долгосрочной перспективе влияние земельных ресурсов ( $\ln\_land$ ) оказалось отрицательным (-11.03). Это можно объяснить интенсивными процессами деградации в отрасли, засолением земель и снижением плодородия земель в результате дефицита воды. В то же время влияние выбросов CO<sub>2</sub> является положительным (5.45), что согласуется с научными гипотезами о том, что определенные концентрации парниковых газов положительно влияют на рост биомассы растений.

В краткосрочной перспективе влияние земельных ресурсов ( $\ln\_land$ ) было очень высоким и положительным, коэффициент составил 8.70. Это означает, что на текущем этапе освоение новых земель или расширение масштабов землепользования остается основным фактором, резко увеличивающим объемы производства. Подтверждено, что потребление минеральных удобрений ( $\ln\_fert$ ) также оказывает положительное влияние в краткосрочной перспективе.

#### **Диагностические тесты и анализ стабильности.**

В диагностической части статьи результаты теста CUSUM<sup>32</sup>, использованного для проверки устойчивости модели, отражены на рисунке 1. Этот график доказывает не только математическую точность нашей модели, но и ее надежность во времени.

Роль и значение линий на графике можно интерпретировать следующим образом:

**1. Центральная красная линия (статистика CUSUM):** Эта линия представляет собой сумму рекурсивных остатков модели. Его колебание вокруг линии нуля (0) означает, что коэффициенты в модели не изменились резко в течение периода исследования (2004-2024 гг.).

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<sup>32</sup> Тест CUSUM (Cumulative Sum of Recursive Residuals) - это диагностический тест, используемый для проверки стабильности параметров в эконометрической модели.

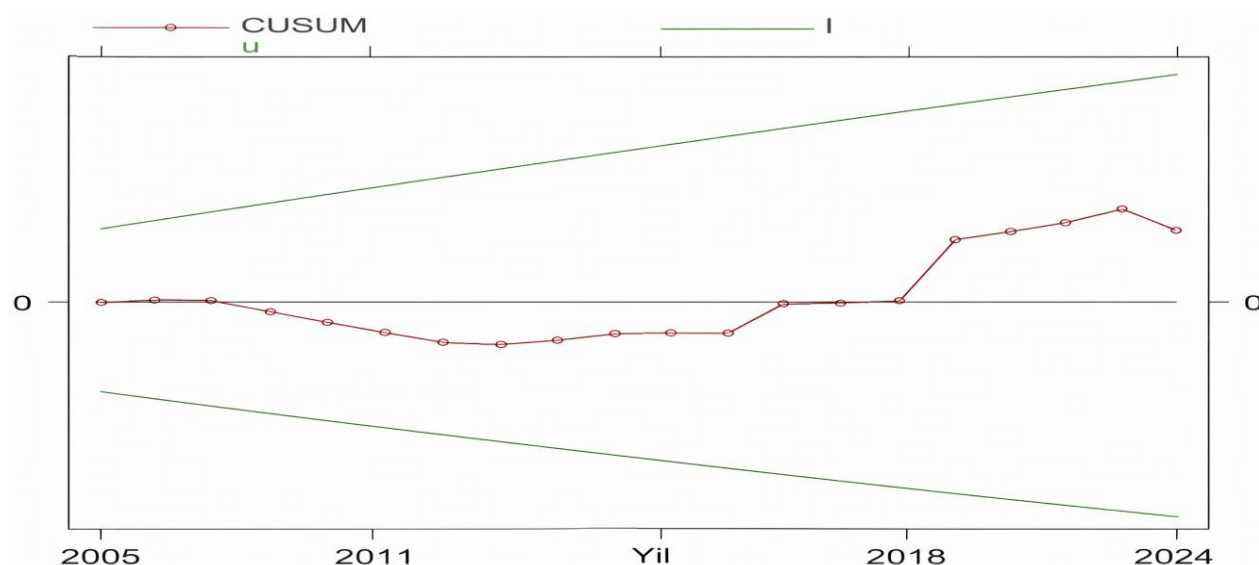


**Рисунок 1. Результаты теста на стабильность CUSUM модели ARDL<sup>33</sup>.**

**2. Зеленые параллельные линии (пределы значимости 5%):** Эти линии являются "доверительными коридорами" или критическими границами. Согласно эконометрическому правилу, модель признается "структурно стабильной," если красная линия не выходит за пределы этих двух зеленых линий.

**3. Адекватность модели:** Если бы красная линия выходила за зеленые границы, это означало бы, что в модели отсутствует "неправильная спецификация" или важная переменная. В нашем случае устойчивое движение линии внутри полосы свидетельствует о том, что выбранная модель ARDL правильно отражает реальные экономические процессы.

**4. Динамическая устойчивость:** Хотя в последние годы (2020-2024) наблюдается небольшое восходящее направление графика, он все еще довольно далеко от критической точки. Это показывает, что эффективность факторов производства в этой области растет, и модель правильно "понимает" эту положительную динамику.

Таким образом, результаты теста CUSUM на рисунке 1 научно гарантируют возможность принятия экономических решений и прогнозирования будущих лет на основе результатов регрессии ARDL, использованных в данном исследовании. Параметры модели стабильны во времени, структурных изменений не наблюдается.

#### **Выводы и предложения.**

В рамках данной статьи факторы, влияющие на эффективность сельскохозяйственного производства в Узбекистане, были проанализированы с использованием современных эконометрических методов в период с 2004

<sup>33</sup> Izoh: Grafikdagi markaziy chiziq 5% ahamiyatlilik darajasi chegaralarida joylashganligi modelning tarkibiy barqarorligini tasdiqlaydi.

по 2024 год. Результаты OLS и ARDL моделирования позволили сделать важные научные выводы о внутренней динамике и адаптивности сельскохозяйственного сектора к внешним факторам.

**Основными научными результатами научного освещения статьи являются:**

1. **Стабильность и гибкость:** коэффициент коррекции ошибок, выявленный в рамках модели ARDL ( $ECT = -0,91$ ), показал, что отрасль обладает высокой степенью адаптации к внешним экономическим и природным колебаниям. Это означает, что любой дисбаланс в сельскохозяйственной системе восстанавливается примерно на 91% в год, то есть для полного восстановления требуется чуть больше года;

2. **Влияние ресурсных факторов:** Согласно долгосрочным (LR) результатам модели ARDL, хотя коэффициент влияния выбросов  $CO_2$  (5.45) имеет положительное значение, было обнаружено, что влияние ресурсных факторов (земля и труд) в отрасли имеет сложную динамику. Это подтверждает ограниченность возможностей экстенсивного роста в данной сфере и необходимость сосредоточить основное внимание на интенсивных факторах использования имеющихся ресурсов.

3. **Экологическая и технологическая взаимосвязь:** долгосрочные последствия выбросов  $CO_2$  и потребления минеральных удобрений показали, что применение "зеленых" технологий и переход к инновационным методам управления ресурсами в модернизации сельского хозяйства имеет стратегическое значение.

4. **Надежность модели:** тесты устойчивости CUSUM подтвердили, что коэффициенты регрессии остались неизменными в течение 20-летнего периода, что позволяет делать долгосрочные перспективные прогнозы на основе полученных результатов.

#### **Практические предложения и рекомендации:**

1) дальнейшее усиление обеспечения техникой и технологиями на одного работника для повышения производительности труда в сельском хозяйстве;

2) широкое внедрение систем "умного земледелия" (smart farming) с целью повышения эффективности использования минеральных удобрений;

3) Разработка экономических механизмов стимулирования ресурсосберегающих и низкоуглеродных технологий для смягчения последствий изменения климата.

Таким образом, сельскохозяйственный сектор Узбекистана имеет устойчивую траекторию роста, и конкурентоспособность национальной экономики может быть повышена за счет дальнейшей модернизации отрасли, обеспечения сбалансированности факторов и укрепления экологической безопасности.

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## **ИСПОЛЬЗОВАНИЕ МУЗЫКОТЕРАПИИ В РАБОТЕ С ДЕТЬМИ ДОШКОЛЬНОГО ВОЗРАСТА**

**Аннотация:** Музыкальная психотерапия – это арттерапевтическое направление, использующее музыку и музыкальные инструменты в качестве средства коррекции эмоциональных отклонений. В данной статье рассматриваются некоторые вопросы музыкотерапии как вид арт-терапии в работе с детьми в дошкольных учреждениях.

**Ключевые слова:** Музыкотерапия, психоанализ, сакральное искусство, дидактическая игра, эстетические компоненты, музыкальное воздействие.

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## **USING MUSIC THERAPY IN WORKING WITH PRESCHOOL CHILDREN**

**Abstract:** Music psychotherapy is an art therapy approach that uses music and musical instruments as a means of correcting emotional disorders. This article examines some aspects of music therapy as a form of art therapy for children in preschool settings.

**Keywords:** Music therapy, psychoanalysis, sacred art, didactic play, aesthetic components, musical influence.

Музыкотерапия – это один из разделов психотерапии. Музыкальная психотерапия – это арттерапевтическое направление, использующее музыку и музыкальные инструменты в качестве средства коррекции эмоциональных отклонений, двигательных и речевых расстройств, отклонений в поведении, при коммуникативных затруднениях, а также для лечения различных соматических и психосоматических заболеваний.

Музыкотерапия используется при работе с широким спектром людей, независимо от возраста, музыкальных способностей или музыкального образования.

В зависимости от степени участия клиента в психотерапевтической группе музыкотерапия подразделяется на две основные формы: пассивную (рецептивную) и активную.

При *пассивной музыкотерапии* участникам психотерапевтических групп предлагают прослушивать различные музыкальные произведения, соответствующие их психологическому состоянию, после чего происходит обсуждение собственных переживаний, воспоминаний, ассоциаций, фантазий, возникающих в ходе прослушивания. На одном занятии прослушивают, как правило, три произведения.

Программы музыкальных произведений строятся на основе постепенного изменения настроения, динамики и темпа с учетом их различной эмоциональной нагрузки. Первое произведение должно формировать определенную атмосферу для всего занятия, проявлять настроения участников группы, это спокойное произведение, отличающееся расслабляющим действием. Второе произведение – динамичное, драматическое, напряженное, несет основную нагрузку, его функция заключается в стимулировании интенсивных эмоций, воспоминаний, ассоциаций проективного характера из собственной жизни человека. Третье произведение должно снять напряжение, создать атмосферу покоя. Оно может быть спокойным, релаксирующим либо, напротив, энергичным, дающим заряд бодрости, оптимизма, энергии. Целью пассивной музыкальной терапии является определенное эмоциональное, в том числе эстетическое, переживание, которое способствует отреагированию различных проблем и достижению новых смыслов. В качестве средств, способствующих музыкотерапии, часто используют дополнительные приемы, такие, как дыхательные упражнения, живопись, танец.

Пассивная музыкальная терапия существует в трех формах:

- коммуникативной (совместное прослушивание музыки, направленное на поддержание взаимных контактов, взаимопонимания и доверия);
- реактивной (направленной на достижение катарсиса);
- регулятивной (способствующей снижению нервно-психического напряжения).

Композиторы, произведения которых рекомендуются для музыкотерапии: К. Глюк, Ж. Массне, Я. Сибелиус, Р. Шуман, С. Рахманинов, А. Дворжак, Д. Шостакович, П. Чайковский, Л. Бетховен, Ф. Лист, Ф. Шопен и др. При *активной музыкотерапии* пациенты сами участвуют в исполнении музыкальных произведений, применяя при этом как обычные музыкальные инструменты, так и необычные, например, собственное тело (хлопки, постукивания и др.). Происходит воспроизведение, фантазирование, импровизация с помощью человеческого голоса и выбранных музыкальных инструментов.

К самым популярным направлениям активной музыкотерапии относятся:

- вокалотерапия;
- музыкально-педагогическая реабилитация;
- музыкотерапия по методу Нордоффа-Роббинса;

- аналитическая музыкотерапия и активная музыкопсихотерапия;
- онтопсихологическая музыкотерапия по А. Менегетти.

Вокалотерапия базируется на оздоровительных свойствах классического пения и включает в себя упражнения по акустической стимуляции жизненно важных органов, а также упражнения, повышающие адаптационные и интеллектуально-эстетические способности человека. Музыкально-педагогическая реабилитация использует с лечебно-восстановительной целью музыкально-педагогический процесс, который может осуществляться в виде музыкально-дидактических игр, обучения пению, игре на музыкальных инструментах, движению под музыку, прослушивания музыки.

В этом направлении акцент делается на уникальность роли «живой» (исполняемой «вживую» самим музыкотерапевтом) музыки как средства коммуникации. При этом музыкотерапевт должен иметь навыки спонтанного лечебного музицирования и импровизации. Существуют разновидности данного метода для детей, подростков и взрослых. Участники всех уровней вовлекаются в процесс совместного с терапевтом создания музыки с помощью музыкальных инструментов.

В основу данного направления положены исследования бессознательного посредством психоанализа, «звуковое самовыражение» клиента, происходящее в процессе совместного (вместе с музыкотерапевтом) музицирования. Здесь используется психоанализ, который ведется на основе теоретических концепций Фрейда, Адлера и др. При этом в рамках музыкотерапевтического сеанса обязательно должна проводиться психологическая коррекция – метод комплексного психологического воздействия на цели, мотивы и структуру поведения пациента, а также на развитие его некоторых психических функций: памяти, внимания, мышления. Автором является А. Менегетти (Италия), который считает, что бессознательное представляет собой реальность не только психическую, но и телесную. При этом в организме человека изначально заложен определенный порядок, внутренняя гармония. Этот внутренний порядок наделен особой – сугубо индивидуальной – музыкой и движением. При этом методе используются ударные инструменты. Музыкотерапевт выполняет функции «посредника». В данном процессе нет никаких правил, с каждым моментом рождается новая музыка, спонтанная, согласующаяся с внутренней гармонией пациента, которая отражает взаимодействие его тела, эмоций, состояния души, способности двигаться и т.д. Цель состоит в том, чтобы у пациента была максимальная возможность проявиться наилучшим образом и с большей любовью к себе посредством именно музыкального посыла, на который реагирует организм.

На сегодняшний день мировая официальная музыкотерапия использует около 20 различных общепризнанных методик.

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## ПОВЫШЕНИЕ ЭНЕРГОЭФФЕКТИВНОСТИ ЭЛЕКТРОПРИВОДОВ В СОВРЕМЕННЫХ ЭНЕРГЕТИЧЕСКИХ СИСТЕМАХ

**Аннотация.** В статье рассмотрены вопросы повышения энергоэффективности электроприводов в современных условиях. Проанализированы основные потери энергии, методы их снижения, а также современные технологии управления электроприводами. Особое внимание уделено применению частотно-регулируемых приводов, интеллектуальных систем управления и оптимизации режимов работы. Показано, что внедрение энергоэффективных решений позволяет значительно снизить энергопотребление и повысить надежность электротехнических систем.

**Ключевые слова:** электропривод, энергоэффективность, асинхронный двигатель, частотное регулирование, потери энергии, КПД, управление.

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## IMPROVING THE ENERGY EFFICIENCY OF ELECTRIC DRIVES IN MODERN POWER SYSTEMS

**Abstract.** This article discusses the issues of improving the energy efficiency of electric drives under modern conditions. The main energy losses, methods for their reduction, and modern control technologies of electric drives are analyzed. Particular attention is paid to the use of variable frequency drives, intelligent control systems, and optimization of operating modes. It is shown that the implementation of energy-efficient solutions significantly reduces energy consumption and increases the reliability of electrical engineering systems.

**Keywords:** electric drive, energy efficiency, induction motor, variable frequency control, energy losses, efficiency, control.

### Введение

В современных условиях развития энергетики и промышленности особое значение приобретает проблема рационального использования электрической энергии. Значительная часть электроэнергии потребляется электроприводами, которые широко применяются в промышленности, транспорте и коммунальном хозяйстве. По различным оценкам, доля электроприводов в общем энергопотреблении достигает 60–70%. В связи с



этим повышение энергоэффективности электроприводов является одной из ключевых задач современной электроэнергетики.

### **1. Общая характеристика электроприводов**

Электропривод представляет собой электромеханическую систему, предназначенную для преобразования электрической энергии в механическую.

Основные элементы электропривода:

электродвигатель,  
преобразователь энергии,  
система управления,  
исполнительный механизм.

Наиболее распространенными являются:

асинхронные двигатели,  
синхронные двигатели,  
двигатели постоянного тока.

Асинхронные двигатели получили наибольшее распространение благодаря своей надежности, простоте конструкции и относительно низкой стоимости.

### **2. Потери энергии в электроприводах**

Основные потери энергии в электроприводах можно разделить на следующие группы:

#### **2.1 Электрические потери**

Возникают в обмотках двигателя и определяются выражением:

$$P_{эл} = I^2 R$$

#### **2.2 Магнитные потери**

Связаны с процессами намагничивания и включают:

потери на гистерезис,  
потери на вихревые токи.

#### **2.3 Механические потери**

трение в подшипниках,  
вентиляционные потери.

#### **2.4 Дополнительные потери**

несимметрия напряжений,  
гармоники,  
перегрузки.

Суммарные потери:

$$P_{общ} = P_{эл} + P_{маг} + P_{мех} + P_{доп}$$

### **3. Методы повышения энергоэффективности**

#### **3.1 Применение частотного регулирования**

Одним из наиболее эффективных способов повышения энергоэффективности является использование частотно-регулируемых приводов (ЧРП).

Преимущества:

снижение пусковых токов,

оптимизация режима работы,  
уменьшение потерь энергии.

Закон изменения мощности вентилятора:

$$P \sim n^3$$

Это означает, что даже небольшое снижение скорости приводит к значительной экономии энергии.

### 3.2 Оптимизация режимов работы

Работа двигателя вблизи номинальной нагрузки обеспечивает максимальный КПД.

Коэффициент полезного действия:

$$\eta = \frac{P_2}{P_1} \times 100\%$$

### 3.3 Использование энергоэффективных двигателей

Современные двигатели класса IE3–IE4 обладают:

сниженными потерями,

повышенным КПД,

улучшенными эксплуатационными характеристиками.

### 3.4 Интеллектуальные системы управления

Применение:

PID-регуляторов,

адаптивных алгоритмов,

систем на базе микроконтроллеров (например, Arduino)

позволяет:

стабилизировать параметры,

снизить энергопотребление,

повысить надежность.

## 4. Влияние качества электроэнергии

Качество электроэнергии оказывает существенное влияние на энергоэффективность электроприводов.

Основные факторы:

гармонические искажения,

перекос фаз,

колебания напряжения.

Негативные последствия:

увеличение потерь,

перегрев,

снижение срока службы оборудования.

## 5. Экономическая эффективность

Внедрение энергоэффективных решений позволяет:

снизить эксплуатационные расходы,

сократить потери энергии,

повысить надежность системы.

Срок окупаемости частотно-регулируемых приводов составляет 1–3 года в зависимости от условий эксплуатации.

## **6. Практические рекомендации**

Для повышения энергоэффективности рекомендуется:  
применять ЧРП,  
использовать двигатели высокого класса энергоэффективности,  
оптимизировать режимы нагрузки,  
внедрять автоматизированные системы управления.

### **Заключение**

Повышение энергоэффективности электроприводов является важной задачей современной энергетики. Проведенный анализ показал, что значительное снижение энергопотребления может быть достигнуто за счет применения современных технологий управления и оптимизации режимов работы.

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## **ФЕНОТИПЫ БРОНХИАЛЬНОЙ АСТМЫ И СОВРЕМЕННЫЙ ВЫБОР ТЕРАПИИ**

**Аннотация:** Бронхиальная астма (БА), являясь одним из самых распространенных хронических заболеваний человека, характеризуется большой гетерогенностью клинических форм и вариабельностью течения. Гетерогенность БА проявляется в разной степени выраженности бронхиальной обструкции, разной частоте обострений, разным ответе на бронходилататоры и препараты для длительного контроля, в частности ингаляционные глюкокортикостероиды. Современное ведение БА требует глубокого анализа факторов, ответственных за прогрессирование заболевания и развитие обострений, а также разработки целевой терапии БА с учетом клинических и биологических фенотипов болезни. Однако уже в настоящее время у большинства пациентов с БА можно проводить терапию с учетом фенотипа заболевания, определение которого является важной задачей врача-специалиста.

**Ключевые слова:** бронхиальная астма, фенотипы бронхиальной астмы, ингаляционные глюкокортикостероиды.

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## **PHENOTYPES OF BRONCHIAL ASTHMA AND MODERN CHOICE OF THERAPY**

**Abstract:** Bronchial asthma (BA), being one of the most common chronic diseases of humans, is characterized by a high heterogeneity of clinical forms and variability of the course. The heterogeneity of BA manifests itself in varying degrees of bronchial obstruction severity, varying frequency of exacerbations, varying responses to bronchodilators and long-term control drugs, in particular, inhaled glucocorticosteroids. Modern management of BA requires a thorough analysis of the factors responsible for the progression of the disease and the development of exacerbations, as well as the development of targeted therapy for BA, taking into account the clinical and biological phenotypes of the disease. However, even now, in most patients with asthma, therapy can be conducted taking into account the phenotype of the disease, which is an important task of a specialist physician.

**Keywords:** *bronchial asthma, bronchial asthma phenotypes, inhaled glucocorticosteroids.*

Фенотип – видимые характеристики организма, обусловленные взаимодействием его генетической составляющей и факторов внешней среды. Термин “фенотип”, а также такие термины, как “ген”, “генотип”, были предложены одним из основателей современной генетики, датским биологом В. Иогансеном в 1909 г. Понятие “фенотип” распространяется на любые признаки организма, начиная от первичных продуктов действия генов – молекул РНК и полипептидов и кончая особенностями внешнего строения, физиологических и патологических процессов (в том числе заболеваний), поведения и т.д. По сути, у каждого пациента может быть свой собственный специфический фенотип БА, но выделение “фенотипа БА” подразумевает наличие группы или подгруппы больных, объединенных общими клиническими и/или биологическими признаками заболевания.

Определение фенотипических особенностей заболевания является требованием времени, ибо персонализированная медицина, в эпоху которой мы вступили, не предполагает создания отдельного лекарственного препарата, или метода диагностики, или способа профилактики для каждого отдельного пациента, но требует отбора пациентов (выделение субпопуляций/кластеров/фенотипов/эндотипов БА), в наибольшей степени отвечающих на данный препарат, или метод диагностики, или способ профилактики заболевания. Иначе говоря, суть фенотипизации в медицине – это оптимизация диагностики, лечения и профилактики.

#### **Фенотипы и эндотипы БА**

Довольно давно стало понятно, что БА гетерогенное заболевание, и это не могло не найти отражения в ее классификациях. В начале XX века F.M. Rackemann предложил выделять экзогенную и эндогенную БА, основываясь на этиологической концепции, которая и в настоящее время используется для идентификации клинических фенотипов аллергической и неаллергической БА [1]. В конце 1970-х годов M. Turner-Warwick выделил подгруппы пациентов с БА, основываясь на концепции функциональных нарушений: “хрупкая астма” (“brittle asthma”), “необратимая астма” (“irreversible asthma”) и “астма с выраженным утренним снижением легочной функции” (“the morning dipper”) [2]. Однако наиболее близко к современному пониманию фенотипов БА подошел Г.Б. Федосеев, который еще в 1982 г. представил клинико-патогенетические варианты БА и стратегию терапии заболевания с учетом этих вариантов [3]:

- атопический;
- инфекционно-зависимый;
- аутоиммунный;
- дисгормональный;
- дизовариальный;
- с выраженным адренергическим дисбалансом;

- холинергический;
- нервно-психический;
- аспириновая БА;
- БА физического усилия.

Если мы рассмотрим одну из современных авторских классификаций фенотипов БА, предложенную американским профессором S. Wenzel, то увидим, во-первых, что многие клинко-патогенетические варианты БА, предложенные Г.Б. Федосеевым, находят свое место и сейчас, а во-вторых, что большинство фенотипов БА в настоящее время определяют в рутинной клинической практике (табл. 1).

Таблица 1. Классификация фенотипов БА

| Фенотипы, определяемые клиническими/физиологическими признаками                                                                                                                                                             | Фенотипы, определяемые триггерами                                                                                                                                                                         | Фенотипы, определяемые типом воспаления                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Тяжесть заболевания</li> <li>• Частота обострений</li> <li>• Наличие персистенции обструкции дыхательных путей</li> <li>• Возраст начала БА</li> <li>• Ответ на терапию</li> </ul> | <ul style="list-style-type: none"> <li>• АСК и другие НПВП</li> <li>• Аллергены</li> <li>• Профессиональные аллергены и раздражители</li> <li>• Половые гормоны</li> <li>• Физические нагрузки</li> </ul> | <ul style="list-style-type: none"> <li>• Эозинофильное</li> <li>• Нейтрофильное</li> <li>• Малограулоцитарное</li> </ul> |
| Обозначения: АСК – ацетилсалициловая кислота, НПВП – нестероидные противовоспалительные препараты.                                                                                                                          |                                                                                                                                                                                                           |                                                                                                                          |

Так, например, фенотипы интермиттирующей, легкой, средней и тяжелой персистирующей БА выделяют на основании выраженности и частоты симптомов, нарушений функции легких, объема требуемой терапии и ограничения активности пациента. Не менее важным и, самое главное, доступным является определение этиологических фенотипов БА. В соответствии с номенклатурой аллергических болезней, предложенной ЕААСИ (European Academy of Allergy and Clinical Immunology – Европейская академия аллергии и клинической иммунологии), БА, опосредованную иммунологическими механизмами, следует называть аллергической [5].

Если доказано участие IgE-антител в формировании БА, то следует обозначать ее как IgE-опосредованную аллергическую БА или, с определенным допущением, как атопическую БА (“атопия” более строгое понятие, подразумевающее прежде всего генетическую предрасположенность к синтезу IgE-антител). Бронхиальная астма, основу патогенеза которой не составляют IgE-антитела, является не-IgE-обусловленной или неатопической.

Объективными различиями указанных фенотипов БА (атопической и неатопической) являются положительные кожные пробы с аллергенами и связь клинических симптомов атопической БА с контактами с этими аллергенами. Примером неаллергической БА служит аспириновая БА, основу патогенеза которой составляет неаллергическая неиммунная непереносимость ацетилсалициловой кислоты (АСК) и нестероидных противовоспалительных препаратов (НПВП), приводящая к нарушению нормального обмена арахидоновой кислоты и избыточному образованию цистеиниловых лейкотриенов. Еще один этиологический фенотип – профессиональная БА, которая в большинстве случаев относится к IgE-



опосредованной аллергической БА, ибо большинство профессиональных сенсibilизаторов являются аллергенами, способными вызывать специфический IgE-ответ. Профессиональные агенты, простые химические вещества с низкой молекулярной массой, являются irritантами (соли никеля, платины, изоцианаты, формальдегид и др.) и могут вызывать развитие бронхиальной гиперреактивности и формирование БА, индуцированной irritантами.

В табл. 2 приведена характеристика основных этиологических фенотипов БА.

**Таблица 2.** Сравнительная характеристика этиологических фенотипов атопической, неатопической и аспириновой БА

| Основные характеристики                                                                            | Атопическая<br>БА | Неатопическая<br>БА | Аспириновая<br>БА   |
|----------------------------------------------------------------------------------------------------|-------------------|---------------------|---------------------|
| Возраст начала                                                                                     | Детство/юношество | Чаще после 40 лет   | 20-40 лет (женщины) |
| Семейный анамнез атопии                                                                            | +                 | -                   | -                   |
| Другие проявления атопии                                                                           | +                 | -                   | -                   |
| Ринит                                                                                              | +                 | +/-                 | -                   |
| Полипозный риносинусит                                                                             | -                 | -                   | +                   |
| Непереносимость АСК/НПВП                                                                           | -                 | -                   | +                   |
| Кожные тесты с аллергенами                                                                         | +                 | -                   | -                   |
| Общий IgE                                                                                          | повышен           | норма               | норма               |
| Антигенспецифический IgE                                                                           | +                 | -                   | -                   |
| Эффективность элиминации триггера                                                                  | +                 | -                   | -                   |
| Эффективность ИГКС                                                                                 | +                 | +                   | +                   |
| Эффективность антилейкотриеновых препаратов                                                        | +                 | +/-                 | +                   |
| Эффективность АСИТ                                                                                 | +                 | -                   | -                   |
| Эффективность анти- IgE-антител                                                                    | +                 | ?                   | -                   |
| Обозначения: АСИТ – аллергенспецифическая иммунотерапия, ИГКС – ингаляционные глюкокортикостероиды |                   |                     |                     |

Фенотипы, определяемые типом воспаления, отражают преимущественный тип клеток, вовлеченных в это воспаление. При исследованиях методом индуцированной мокроты у взрослых больных БА с наибольшим постоянством выявляются два типа воспаления – эозинофильное и неэозинофильное. По данным некоторых исследований, предлагается выделять 4 типа воспаления при БА: эозинофильное (эозинофилы >3% в индуцированной мокроте), нейтрофильное (нейтрофилы

>61%), смешанное гранулоцитарное (эозинофилы >3% + нейтрофилы >61%) и малогранулоцитарное (эозинофилы и нейтрофилы в пределах нормы) [6]. Эозинофильная БА наиболее известный фенотип. Существует множество исследований, в которых обнаруживался преимущественно эозинофильный тип воспаления в дыхательных путях по крайней мере у половины больных БА. Вместе с тем ингаляционные глюкокортикостероиды (ИГКС) эффективно подавляют эозинофилию мокроты, что может существенно искажать результаты исследований. Эозинофильное воспаление определяется у больных атопической, не атопической, аспириновой и профессиональной БА, т.е. этиологический триггер, по-видимому, по крайней мере у взрослых, не определяет тип воспаления при БА [7, 8]. Персистирующее эозинофильное воспаление выявляют у больных тяжелой БА, и его наличие тесно связано с риском тяжелых обострений БА [9, 10]. Еще более значимым является определение типа воспаления при БА в качестве ориентира для выбора терапии. Другой биологический фенотип БА характеризуется преимущественно нейтрофильным воспалением. Этот тип воспаления нередко находят при аутопсии у пациентов, умерших в результате тяжелого обострения БА [4]. Механизм нейтрофильного воспаления до конца не ясен, предполагают, что оно может развиваться в слизистой дыхательных путей в ответ на воздействие сигаретного дыма, аэрополлютантов, профессиональных сенсibilизаторов (особенно мелких корпускулярных частиц или изоцианатов), вирусов и бактерий. Нейтрофильный тип воспаления дыхательных путей при БА ассоциирован с повышением уровня интерлейкина-8 (ИЛ-8), нейтрофильной эластазы и высокомолекулярной формы матриксной металлопротеиназы-9, последнее свидетельствует о снижении активности тканевых ингибиторов матриксных металлопротеиназ [11, 12]. Активация этих энзимов может модифицировать структуру дыхательных путей и обуславливать прогрессирующее снижение функции легких. В любом случае, нейтрофильное воспаление при БА связано со значительным уменьшением ответа на терапию ИГКС и пероральными глюкокортикостероидами (ГКС) [13, 14]. Кроме того, сама терапия высокими дозами ГКС, прежде всего системных, может приводить к девиации воспаления в сторону преобладания нейтрофильного типа, так как ГКС способны тормозить апоптоз нейтрофилов, что было показано в исследовании *in vitro* [15, 16]. В настоящее время не определен маркер нейтрофильного воспаления при БА, который мог бы служить критерием эффективности терапии, в отличие от эозинофильного биофенотипа БА, при котором уровень эозинофилов в индуцированной мокроте и концентрация оксида азота в выдыхаемом воздухе могут служить неинвазивными биомаркерами интенсивности воспаления в нижних дыхательных путях и эффективности проводимой терапии [17]. Малогранулоцитарный биофенотип БА наименее изучен. Он характеризуется отсутствием значимого количества воспалительных клеток, таких как эозинофилы, нейтрофилы и лимфоциты, в дыхательных путях у больных БА. Существует несколько предположений

относительно этого биофенотипа БА. Возможно, это просто результат отсутствия воспалительных клеток в биопсийном материале, в таком случае это “псевдомалогранулоцитарный биофенотип”, а может быть, это нетрадиционное воспаление, которое формируется путем активации резидентных клеток: тучных, эпителиальных и гладкомышечных [4]. Не исключено, что малогранулоцитарный тип воспаления может быть транзиторным [18]. Не существует биомаркера этого фенотипа, его выявляют методом исключения эозинофильного и нейтрофильного типов воспаления БА. Однако традиционный подход к определению фенотипа БА с помощью классификации на основании клинических, функциональных, воспалительных, этиологических параметров позволяет учесть лишь один параметр, что приводит к односторонней характеристике и, соответственно, к формированию множества фенотипов (см. табл. 1), которые непонятно как соотносятся друг с другом. В последнее время появился другой подход к выделению фенотипов БА, с применением кластерного анализа. В двух первых и наиболее известных исследованиях фенотипов БА с помощью кластерного анализа были выявлены 5 сходных кластеров заболевания среди взрослых пациентов (рис. 1, табл. 3) [19, 20].

Таблица 3. Кластеры БА, выделенные в исследовательской программе по изучению тяжелой БА ( Severe Asthma Research Program) 

| Кластер                                                                                                                                                                                                                                                       | Характеристика                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Легкая аллергическая БА                                                                                                                                                                                                                                    | Раннее начало; 80% женщины; ФВД нормальная; <2 препаратов для контроля; минимальная потребность в ресурсах ЗО; эозинофилы ↓                                                                                                                 |
| 2. Легкая/среднетяжелая аллергическая БА с обострениями                                                                                                                                                                                                       | Наиболее общий кластер; 67% женщины; пограничный ОФВ <sub>1</sub> , нормальный после использования КДБА; <2 препаратов для контроля; низкая потребность в ресурсах ЗО, иногда курсы системных ГКС; эозинофилы ↓                             |
| 3. Среднетяжелая/тяжелая БА с поздним началом                                                                                                                                                                                                                 | Старший возраст, позднее начало; повышенный ИМТ; 71% женщины; редко атопия; среднее снижение ОФВ <sub>1</sub> с некоторой обратимостью; высокие дозы ИГКС; >3 препаратов для контроля; периодически курсы системных ГКС; эозинофилы ↑       |
| 4. Тяжелая переменчивая аллергическая БА                                                                                                                                                                                                                      | Молодой возраст, раннее начало; 53% женщины; выраженное снижение ОФВ <sub>1</sub> с высокой обратимостью; переменчивое течение с обострениями, требующими системных ГКС; эозинофилы ↑                                                       |
| 5. БА с тяжелой фиксированной обструкцией (ХОБЛ-подобная БА)                                                                                                                                                                                                  | Пожилый возраст, позднее начало и длительное течение; 63% женщины; редко атопия; выраженное снижение ОФВ <sub>1</sub> , малообратимое; системные ГКС; часто повышен ИМТ, ГЭРБ; высокая потребность в ресурсах ЗО; нейтрофилы и эозинофилы ↑ |
| Обозначения: ГЭРБ – гастроэзофагеальная рефлюксная болезнь, ЗО – здравоохранение, ИМТ – индекс массы тела, КДБА – короткодействующие β <sub>2</sub> -агонисты, ОФВ <sub>1</sub> – объем форсированного выдоха за 1-ю секунду, ФВД – функция внешнего дыхания. |                                                                                                                                                                                                                                             |

Выявление патобиологических механизмов, лежащих в основе формирования фенотипов БА, или так называемых эндотипов БА, является самой насущной задачей в оптимизации терапии БА, особенно тяжелой [21]. Согласно определению G.P. Anderson, эндотип заболевания – это субтип болезни, определяемый уникальным или отличительным функциональным или патофизиологическим механизмом [22]. Один эндотип БА может включать несколько фенотипов, и специфический фенотип может присутствовать в нескольких эндотипах. Попытка выделения и характеристики эндотипов БА была сделана в консенсусе PRACTALL

(PRACTical ALLergy), созданном европейскими и американскими экспертами [23]. Авторы для определения эндотипов выбрали 7 параметров (клинические характеристики, биомаркеры, функция легких, генетические параметры, гистопатология, эпидемиология и ответ на терапию). Каждый эндотип БА должен был удовлетворять по крайней мере 5 из 7 параметров. На основании этих условий было предложено выделять 6 эндотипов БА: аспириновая БА; БА, ассоциированная с аллергическим бронхолегочным аспергиллезом (микозом); аллергическая БА у взрослых; свистящие хрипы у детей с высоким риском БА; поздняя БА с выраженной персистирующей эозинофилией; БА лыжников. И хотя в большинстве случаев истинный патофизиологический механизм этих эндотипов малопонятен, а некоторые характеристики, предложенные для описания патофизиологического механизма, совпадают с характеристиками, присущими фенотипу БА, тем не менее этот подход может в последующем способствовать определению молекулярных основ эндотипов БА и совершенствованию патогенетической терапии.

Таким образом, БА характеризуется гетерогенностью и существованием многих различных фенотипов и эндотипов, некоторые из которых довольно просто определить в реальной клинической практике. К примеру, этиологические фенотипы БА, БА курильщика, БА, ассоциированная с ожирением, фенотип БА с частыми обострениями, как правило, не вызывают особых трудностей верификации, но вместе с тем определяют особенности терапии. Сложнее выявить биофенотипы БА или дифференцировать позднюю БА с малообратимой или фиксированной обструкцией бронхов от хронической обструктивной болезни легких (ХОБЛ). Такой же сложной задачей является определение одного временного наличия БА и ХОБЛ у одного и того же пациента, так называемого “синдрома сочетания, или перекреста БА–ХОБЛ” (asthma–COPD overlap syndrome).

#### Возможности терапии с учетом фенотипа БА

Примерами давно и успешно используемых методов фенотипспецифической терапии БА служат элиминационные мероприятия в отношении специфического аллергена(ов) и аллергенспецифическая иммунотерапия (АСИТ), которые являются абсолютной прерогативой atopического фенотипа БА. Действительно, АСИТ может быть альтернативой длительной поддерживающей терапии ИГКС у пациентов с легкой персистирующей atopической БА, особенно при сочетании с аллергическим ринитом.

Анти-IgE-терапия (омализумаб, Ксолар) – еще один пример фенотипспецифического лечения. Больные, относящиеся к фенотипу тяжелой atopической БА, составляют от 40 до 50% всех больных тяжелой БА, и, по данным анализа W.C. Moore et al., этот фенотип развивается из легкой и среднетяжелой atopической БА [20, 24]. У пациентов, принадлежащих к этому фенотипу тяжелой БА, наблюдается широкий спектр сенсибилизации к аллергенам и, соответственно, кожных проб, высокий уровень IgE в крови и отягощенный семейный анамнез по БА. Именно эта БА является целевым

фенотипом для анти IgE-терапии в настоящее время [25]. В обзоре 8 плацебоконтролируемых исследований омализумаба, включавших больных среднетяжелой и тяжелой атопической БА, отмечалось достоверное снижение частоты обострений и достижение лучшего контроля БА у пациентов, получавших препарат, в сравнении с плацебо [26].

Как известно, ИГКС являются самыми эффективными фармакологическими препаратами для длительного контроля БА и показаны для лечения персистирующих симптомов БА у всех пациентов, но также установлено, что наибольший эффект от лечения ИГКС наблюдается у пациентов с эозинофильной БА [13, 14]. Уменьшение интенсивности эозинофильного воспаления, оцениваемой по проценту эозинофилов в индуцированной мокроте, приводит к сокращению числа обострений БА в 3 раза большему, чем при традиционном (клинико-функциональном) мониторинге терапии БА [9]. Практически все существующие молекулы ИГКС доступны и при меняются в нашей стране: беклометазона дипропионат, будесонид, флутиказона пропионат, циклесонид и мометазона фуруат. Два последних препарата (циклесонид и мометазона фуруат) являются наиболее современными ИГКС, обладающими высокой эффективностью и благоприятным профилем безопасности при персистирующей БА разной степени тяжести [27, 28].

Таким образом, существует несколько фенотипов БА, при которых с большой вероятностью будет иметь место сниженный ответ на монотерапию ИГКС: БА курильщика; БА в сочетании с ожирением; синдром БА–ХОБЛ; поздняя менопаузальная БА у женщин. Для этих пациентов лучшей стратегией длительной терапии БА является назначение комбинированных препаратов ИГКС и ДДБА или, в качестве альтернативы, ИГКС + антилейкотриеновые препараты (последние представлены на отечественном рынке только антагонистами лейкотриеновых рецепторов). Ингаляционные ГКС и ДДБА обладают спаринговыми эффектами, приводящими к выраженному редуцированию воспаления в дыхательных путях, снижению БГР и, возможно, ремоделирования бронхиальной стенки, уменьшению симптомов и потребности в КДБА, увеличению функции легких, сокращению числа обострений и риска смертельного исхода БА [50]. В итоге комбинации ИГКС и ДДБА позволяют достичь контроля БА у большего количества больных при меньшей дозе ИГКС, улучшают качество жизни и способствуют более высокой приверженности лечению. Еще один важный фенотип с точки зрения исхода заболевания – БА с частыми обострениями. Частые обострения у больных БА связаны с более выраженным снижением функции легких, а тяжелые обострения, кроме того, с риском смертельного исхода [30, 31].

#### **Выводы:**

- Бронхиальная астма – гетерогенное заболевание, проявляющееся различными фенотипами, которые требуют разных подходов к терапии.



- Выявление этиологических фенотипов БА, фенотипов БА курильщика, БА, ассоциированной с ожирением, БА с частыми обострениями, БА с малообратимой или фиксированной персистирующей обструкцией бронхов, как правило, проводится врачами-специалистами и не вызывает особых трудностей.

- Определение фенотипов БА, обусловленных типом воспаления, требует проведения специальных методов исследования, пока малодоступных в реальной клинической практике.

- Аллергенспецифическая иммунотерапия является фенотипспецифическим видом лечения, доказавшим свою эффективность при IgE-обусловленной аллергической БА.

- Анти-IgE-терапия (омализумаб) эффективна при тяжелой IgE-опосредованной аллергической БА.

- Ингаляционные ГКС являются самыми эффективными фармакологическими препаратами для длительного контроля БА и показаны для лечения персистирующих симптомов БА у всех пациентов, но наибольший эффект ИГКС отмечается у пациентов с эозинофильной БА.

- Назначение ИГКС/ДБА является приоритетной стратегией у пациентов,

у которых не удается достигнуть контроля над заболеванием при использовании низких/средних доз ИГКС, а также предпочтительным и первостепенным выбором для больных с фенотипами БА с частыми обострениями, БА с малообратимой или фиксированной обструкцией бронхов.

- Антагонисты лейкотриеновых рецепторов эффективны в уменьшении бронхоспазма, вызванного физической нагрузкой, при аспириновой БА, БА в сочетании с аллергическим ринитом, БА курильщиков и, возможно, при БА, ассоциированной с ожирением.

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## **ГЛОБАЛ ИҚЛИМ ЎЗГАРИШИДА ОРГАНИК МАҲСУЛОТЛАР ЕТИШТИРИШ ВА ЎСИМЛИКЛАР КЎЧАТЧИЛИГИНИ РИВОЖЛАНТИРИШНИНГ ИЛМИЙ-АМАЛИЙ ЕЧИМЛАРИ**

***Аннотация:** Ушбу мақолада глобал иқлим ўзгариши шароитида органик қишлоқ хўжалигини ривожлантириш ҳамда ўсимликлар кўчатчилигини такомиллаштиришнинг илмий-амалий ечимлари кўриб чиқилган. Тадқиқотда тупроқ унумдорлигини сақлаш ва ошириш, экологик тоза маҳсулотлар етиштириш, биологик усуллар ва ресурс тежамкор агротехнологияларни жорий этиш масалалари таҳлил қилинган..*

***Калим сўзлар:** глобал, ресурс, сидератлар, севооборот, ратация, вермикомпост, торф, гил, лалмикор, микробиологик, инвентаризация, мониторинг, мулчаши.*

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## **SCIENTIFIC AND PRACTICAL FOUNDATIONS FOR THE DEVELOPMENT OF ORGANIC FARMING AND PLANT NURSERY SYSTEMS UNDER GLOBAL CLIMATE CHANGE**

***Abstract:** This article examines scientific and practical solutions for the development of organic agriculture and the improvement of plant nursery systems under conditions of global climate change. The study analyzes issues related to maintaining and enhancing soil fertility, producing environmentally friendly products, and implementing biological methods and resource-saving agricultural technologies.*

***Key words:** globules, resource, siderates, crop rotation, ratatouille, vermicompost, mulched with peat, clay, lalmicore, microbiological, inventory, monitoring mulching.*

Глобал иқлим ўзгариши шароитида аграр соҳани ривожлантириш ва экологик барқарорликни таъминлаш — бугунги кунда ҳар бир мамлакат, жумладан, Ўзбекистон учун ҳам стратегик муҳим вазифадир. Бу жараёнда иқлимга мослашиш, ресурслардан оқилона фойдаланиш, ва экологик мувозанатни сақлаш асосий мезонлар бўлиб ҳисобланади. Глобал иқлим

ўзгариши ва табиий ресурсларнинг камайиши замонавий қишлоқ хўжалиги ва экология муаммоларини янада кескинлаштириб, дунёдаги ўрмон хўжалигини, агросаноатни ва фермерликни янги талабларга мослаштиришни талаб қилмоқда. Иқлим ўзгариши шароитида, тупроқ унумдорлигини ошириш, органик маҳсулотлар етиштириш, замонавий ресурс тежамкор техника ва технологиялардан фойдаланиш ва ўрмон хўжалигини ривожлантиришнинг самарали ечимлари муҳим аҳамиятга эга бўлиб, улар барқарор экосистемаларни таъминлаш ва экологик хавф-хатарларни камайитиришда муҳим рол ўйнамоқда.

Тупроқ унумдорлигини ошириш орқали органик маҳсулотлар етиштириш - бу агроэкосистема мувозанатини сақлаш, экологик барқарорликни таъминлаш ва органик деҳқончиликни ривожлантиришда муҳим жараёндир. Бу жараённинг муҳим йўналишлари қуйидагилардан иборат:

Органик моддалардан фойдаланиш яни чорва хайвонларининг ва парандаларнинг гўнги ва улардан таёрланадиган шарбати ҳамда компост ва гумус, тупроқ структурасини яхшилаб, унинг намликни сақлаш қобилиятини оширади. Органик моддаларни қўшиш, тупроқдаги микроорганизмлар фаолиятини рағбатлантиради, бу эса ўсимликлар учун зарурий озик моддаларнинг мавжудлигини таъминлайди.

Лалмикор ерлар ва адирлар — сув таъминоти чекланган, аксар ҳолда қуруқ ва тоғолди ерлар бўлиб, уларда узоқ вақт самарали деҳқончилик қилиш учун махсус ёндашув талаб қилинади. Бу ерларни ҳосилдор қилиш учун асосий мақсад – тупроқ унумдорлигини ошириш, намликни сақлаш, ва органик моддалар билан бойитишдир.

Лалмикор ерлар ва адирларни органик моддалар билан тиклаш усуллари: Сидерат ўғитлар (яшил ўғитлар) лалми ерлар учун жуда фойдали: булар Люпин, беда, донкаш (вица, горох, нўхат) каби ўсимликлар экилади. Улар 2-3 ойдан кейин ерга оралаб, органик модда сифатида қолдирилади. Азот тўплайди ва тупроқ тузилишини яхшилайдди.

Компост ва хайвон чиқиндилари: Қўй ёки эчки тезаги (кам сувли шароитда яхши) Ёмғирсиз мавсумда ишлатилади, тупроққа аралаштирилади, Компостни хушк ва енгил тупроқларда ишлатиш унумдорликни оширади. Мулчлаш (тупроқни қоплаш): Қуриб қолган беда, сомон, оғиз қолдиқлари билан ер юзини қоплаш ,Намлик сақланади, чанг кўтарилиши камаяди, Органик модда ерга аста-секин сингади.

**Торф ва гиламсоқ моддалар аралашмаси:** Агар тупроқ жуда енгил бўлса (қумли бўлса), уни торф ва гил билан аралаштириш мумкин, Намликни ушлаш қобилияти ошади.

## ҚЎШИМЧА ТАВСИЯЛАР:

| Муаммо             | Ечим                                      |
|--------------------|-------------------------------------------|
| Қумли тупроқ       | Органик модда (компост), торф, мулч       |
| Шўрланган ер       | Гипслаш, дренаж, сабрталаб тиклаш         |
| Сув<br>етишмаслиги | Мулчлаш, сидератлар, кенг қатламга ҳайдаш |
| Эрозия             | Контур бўйлаб экиш, кўп йиллик ўтлар      |

Бундан ташқари: микробиологик препаратлардан, масалан, азотни фиксация қиладиган бактериялар ва фосфорни олишга ёрдам берадиган микроорганизмлардан фойдаланиш тупроқ унумдорлигини яхшилашда самарали натижаларни беради. Шунингдек, тўқималарни бўшатиб, уларнинг етиштириш жараёнини тезлаштиради. Тупроқни муҳофаза қилиш ва кам аралаштириш, курукчиликка чидамли ўсимликлар танлаш, инновацион ресурс тежамкор техника ва технологиялардан самарали фойдаланиш, "Ақлли фермерлик", минимал ишлов бериш технологиялари, қайта тикланувчи энергия манбалари, асосий амалда қўлланиши керак бўлган жараёнлардир. Тупроқни яшил қоплама (сидератлар) орқали камраб олиш, севооборот ва ротация усуллари билан жойлаштириш тупроқнинг намлик ва озик моддалар билан таъминланишини яхшилайдди. Бу турли ўсимликлар ва уларнинг тамир тизимлари орқали тупроқнинг структурасини яхшилашга ёрдам беради. Курукчилик шароитида энг самарали етиштириш учун, иқлим ўзгаришига мослашувчи, кам сув истеъмол қиладиган ва қишлоқ хўжалигига мослашувчи ўсимликлар навларини танлаш муҳим аҳамиятга эга.

Заманавий агроэкологик муаммоларни ҳал қилиш учун ресурс тежамкор техника ва технологияларнинг қўлланилиши муҳим. Инновацион технологиялардан фойдаланиш нафақат ишлаб чиқариш самарадорлигини оширади, балки табиатга бўлган таъсирни ҳам камайтиради. Интернет-нарсалар, дронлар, сенсорлар ва GPS технологиялари асосида фермерлар ерни тўғри бошқариш, узок масофадан етиштириш жараёнларини кузатиш ва таҳлил қилиш имкониятига эга бўлади. Масалан, томчилатиб суғориш тизимлари сувни тежаб, унинг самарали ишлатилишини таъминлайди. Минимал ишлов бериш — бу тупроққа камроқ аралаштириш ва унинг табиий ҳолатини сақлашни англатади. Бу усул тупроқдаги органик моддаларнинг сақланишига ёрдам беради ва унинг биологик фаоллигини оширади. Шунингдек, бу технологиялар энергетик ва механик харажатларни камайтиради. Қуёш панеллари ва шамол турбиналарини қўллаш аграр соҳага янги энергия манбалари олиб келади. Бунинг натижасида фермерлар электр энергиясини ўз ишлаб чиқариш жараёнида самарали ва экологик тоза манбалардан фойдаланиш имкониятига эга бўлади. Рақамли агро-хизматлар

(масалан, агроилова, онлайн бозорлар) Ўрмон хўжалигини ривожлантиришда манзарали ўсимликлар кўчатчилигини ривожлантириш. Ўрмон хўжалигини ривожлантириш ва манзарали ўсимликлар кўчатчилигини амалга ошириш экосистема биоаломини сақлаш, озон қаватини муҳофаза қилиш ва яшил ҳудудларни кўпайтириш учун муҳим аҳамиятга эга. Инвентаризация ва мониторинг ҳам зарур. Манзарали ўсимликлар кўчатчилиги орқали ўрмон майдонларини тиклаш, уларнинг биоалмишилишини таъминлаш ва ўсимликларнинг ўсиш жараёнини ҳар йили мониторинг қилиш муҳим. Геоахборот тизимлари орқали ўрмон майдонларининг ривожланишини ва тикланишини аниқлаш мумкин. Селекция ва микроклонал кўпайтириш эса манзарали ўсимликлар кўчатчилигини ривожлантиришда муҳим аҳамиятга эга бўлиб, селекция ва микроклонал кўпайтириш усулларида фойдаланиш ўсимликларнинг сифатини ва турини ҳар хиллигини оширади. Бу технологиялар тез ва сифатли кўчатларни етиштиришга ёрдам беради. Биоҳилма-хилликни сақлаш ва мослашувчанликни ошириш, Маҳаллий, иқлимга мос навларни сақлаш ва қайта жорий қилиш, Қўшма экиш ва агрофитоценозлар яратиш, Қўп йиллик дарахтлар ва боғ хўжаликларини ривожлантириш ишлари ҳам жуда яхши натижаларга олиб келиши мумкин.

Ўрмон ва аграр ҳудудлар орасидаги ҳамкорлик ҳам амалга оширишимиз керак бўлган муҳим ишлардан биридир. Ўрмон ва аграр ҳудудлар орасидаги ўзаро ҳамкорлик табиий ресурсларнинг барқарор бошқарилишига, экотуризм ва яшил ҳудудларнинг кўпайишига йўл очади. Манзарали ўсимликлар ўрмон ҳудудларида туризмни ривожлантириш ва экологик ахборот тарқатиш учун муҳим омил бўлиши мумкин.

Хулоса қилиб, Глобал иқлим ўзгариши шароитида, тупрок унумдорлигини ошириш, органик маҳсулотлар етиштириш, замонавий ресурс тежамкор техника ва технологиялардан самарали фойдаланиш ва ўрмон хўжалигини ривожлантиришнинг илмий-амалий ечимлари агроэкологик барқарорликни сақлашда асосий воситалардан бўлиб хизмат қилади. Бу ечимлар фақат экологик муаммоларни ҳал қилишга ёрдам бериб қолаётгани билан бир қаторда, улар инсон саломатлиги ва иқтисодиёти учун ҳам фойда келтиради. Ушбу ташаббуслар амалга оширилса, қишлоқ хўжалиги ва ўрмон хўжалиги соҳалари ўртасидаги ҳамкорликни янада яхшилаш ва экосистема барқарорлигини таъминлаш мумкин. Аграр соҳани иқлим ўзгариши шароитида ривожлантириш учун инновацион, экологик ва адаптив ёндашувлар зарур. Барқарор ривожланиш учун:

- Илмий изланишларга таяниш
- Маҳаллий иқлимга мос агротехнологияларни жорий қилиш
- Халқаро тажрибаларни ўзлаштириш
- Фермерлар билим ва кўникмаларини ошириш керак.

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## **МЕТОДИКА РЕШЕНИЯ РАСЧЁТНЫХ ЗАДАЧ ПО ХИМИИ КАК СПЕЦИФИЧЕСКОЕ СРЕДСТВО РАЗВИТИЯ КОМПЕТЕНТНОСТИ**

***Аннотация** В статье рассматривается методика решения расчётных задач по химии как специфическое средство формирования и развития ключевых и предметных компетенций обучающихся. Раскрывается дидактический потенциал расчётных задач в развитии логического мышления, аналитических умений, навыков моделирования химических процессов и самостоятельной познавательной деятельности. Особое внимание уделяется поэтапной организации работы над задачами, применению алгоритмического и проблемного подхода. Обосновывается необходимость системного включения расчётных задач в учебный процесс как инструмента формирования профессиональной и учебно-познавательной компетентности.*

***Ключевые слова:** методика решения задач, компетентность, универсальный алгоритм решения расчётной задачи по химии, закрепления и углубления знаний по химии*

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## **A METHOD FOR SOLVING CALCULATION PROBLEMS IN CHEMISTRY AS A SPECIFIC MEANS OF DEVELOPING COMPETENCE**

***Annotation** The article examines the methodology for solving quantitative problems in chemistry as a specific means of forming and developing students' key and subject-specific competencies. It reveals the didactic potential of quantitative problems in fostering logical thinking, analytical skills, the ability to model chemical processes, and independent cognitive activity. Particular attention is paid to the step-by-step organization of problem-solving, the application of algorithmic and problem-based approaches, as well as the use of interactive teaching methods. The necessity of systematically integrating quantitative problems into the educational process as a tool for developing professional and learning-cognitive competence is substantiated.*

**Keywords:** *problem-solving methodology, competence, universal algorithm for solving quantitative chemistry problems, consolidation and deepening of chemical knowledge*

Одним из важнейших компонентов обучения химии является формирование у учащихся умений и навыков решения задач. Химическая задача выступает не только как средство проверки знаний, но и как важный инструмент развития логического мышления, умения анализировать, сравнивать и обобщать.

Методика обучения решению химических расчетных задач имеет свою специфику, которая включает в себя как общедидактические принципы, так и специальные химические методы. От правильной организации работы над задачами зависит уровень усвоения теоретических знаний и развитие познавательных способностей учащихся.

Решение задач является основным методом закрепления и углубления знаний по химии. Оно способствует формированию научного мировоззрения, развивает аналитическое и творческое мышление учащихся. Через решение задач учащиеся овладевают химическим стилем мышления, приобретают способность применять полученные теоретические знания в реальных условиях и вырабатывают навыки анализа химических процессов на качественном и количественном уровнях.

Методика решения расчётных задач в школьном курсе химии строится на едином алгоритме, который обязателен для всех классов и типов задач. Этот алгоритм закреплён в методических рекомендациях Министерства школьного и дошкольного образования РУз и выглядит следующим образом:

Универсальный алгоритм решения любой расчётной задачи по химии

1. Прочитать условие → выделить все данные и вопрос.
2. Записать «Дано» и «Найти» в таблицу с единицами измерения.
3. При необходимости составить и расставить коэффициенты в уравнении реакции.
4. Перевести все величины в удобные единицы (чаще всего в моли).
5. Определить ограничивающий реагент (если задача на смесь).
6. Составить пропорцию или применить формулу.
7. Выполнить вычисления.
8. Записать ответ с единицами и значащими цифрами.
9. Проверить размерность и реальность результата.

Ниже приведены четыре полных примера решения задач разных уровней сложности с точным соблюдением алгоритма. Эти примеры рекомендованы для использования на уроках в 7–11 классах.

Пример 1 (7 класс — простая расчётная задача). Вычислите массу 0,75 моль гидроксида натрия NaOH.

|                         |  |
|-------------------------|--|
| <b>Дано</b>             |  |
| $n(\text{NaOH}) = 0,75$ |  |
| моль                    |  |
| $M(\text{NaOH}) = 40$   |  |
| г/моль                  |  |
| <b>Найти</b>            |  |
| $m(\text{NaOH}) - ?$    |  |

**Решение:**

$$m = n \cdot M$$

$$m(\text{NaOH}) = 0,75 \text{ моль} \cdot 40 \text{ г/моль} = 30 \text{ г}$$

Ответ: 30 г гидроксида натрия.

Пример 2 (8 класс — задача по уравнению реакции). Сколько граммов оксида кальция  $\text{CaO}$  образуется при полном разложении 200 г карбоната кальция  $\text{CaCO}_3$ ?

|                                    |  |
|------------------------------------|--|
| <b>Дано</b>                        |  |
| $m(\text{CaCO}_3) = 200 \text{ г}$ |  |
| $M(\text{CaCO}_3) = 100$           |  |
| г/моль                             |  |
| $M(\text{CaO}) = 56$               |  |
| г/моль                             |  |
| <b>Найти</b>                       |  |
| $m(\text{CaO}) - ?$                |  |

**Решение:**



$$n(\text{CaCO}_3) = 200 / 100 = 2 \text{ моль}$$

По уравнению из 1 моль  $\text{CaCO}_3 \rightarrow 1$  моль  $\text{CaO}$

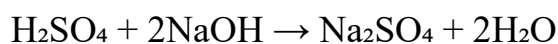
$$n(\text{CaO}) = 2 \text{ моль} \quad m(\text{CaO}) = 2 \cdot 56 = 112 \text{ г}$$

Ответ: 112 г оксида кальция

Пример 3 (9 класс — задача на избыток и среду раствора). К 200 мл 0,5 М раствора  $\text{H}_2\text{SO}_4$  прибавили 300 мл 0,8 М раствора  $\text{NaOH}$ . Определите характер среды и массу образовавшейся соли.

|                                               |  |
|-----------------------------------------------|--|
| <b>Дано</b>                                   |  |
| $V_1(\text{H}_2\text{SO}_4) = 200 \text{ мл}$ |  |
| $= 0,2 \text{ л}$                             |  |
| $c_1(\text{H}_2\text{SO}_4) = 0,5$            |  |
| моль/л                                        |  |
| $V_2(\text{NaOH}) = 300 \text{ мл}$           |  |
| $= 0,3 \text{ л}$                             |  |

**Решение:**



$$n(\text{H}_2\text{SO}_4) = 0,5 \cdot 0,2 = 0,1 \text{ моль}$$

$$n(\text{NaOH}) = 0,8 \cdot 0,3 = 0,24 \text{ моль}$$

$$\text{NaOH в избытке: } 0,24 - 0,2 = 0,04 \text{ моль}$$

Среда щелочная (избыток  $\text{NaOH}$ ).

$$n(\text{Na}_2\text{SO}_4) = n(\text{H}_2\text{SO}_4) = 0,1 \text{ моль}$$

|                              |       |                                                              |
|------------------------------|-------|--------------------------------------------------------------|
| $c_2(\text{NaOH})$<br>моль/л | = 0,8 | $M(\text{Na}_2\text{SO}_4) = 142 \text{ г/моль}$             |
| <b>Найти</b>                 |       |                                                              |
| характер среды               |       |                                                              |
| $m(\text{соли}) - ?$         |       |                                                              |
|                              |       | $m(\text{Na}_2\text{SO}_4) = 0,1 \cdot 142 = 14,2 \text{ г}$ |

Ответ: среда щелочная, образовалось 14,2 г сульфата натрия.

**Пример 4** (10 класс — комплексная задача) *Рассчитайте количество углекислого газа, выделяющегося при сгорании 44 г пропана ( $\text{C}_3\text{H}_8$ ), и объясните, почему увеличение концентрации  $\text{CO}_2$  в атмосфере представляет экологическую опасность.*

**Решение:**

1. Уравнение реакции:  $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$ .
2.  $n(\text{C}_3\text{H}_8) = 44 / 44 = 1 \text{ моль}$ .
3. По уравнению: из 1 моль  $\text{C}_3\text{H}_8$  образуется 3 моль  $\text{CO}_2$ , следовательно,  $n(\text{CO}_2) = 3 \text{ моль}$ .
4.  $V(\text{CO}_2) = 3 \times 22,4 = 67,2 \text{ л}$ .
5. Увеличение содержания  $\text{CO}_2$  в атмосфере усиливает парниковый эффект и приводит к глобальному потеплению.

**Пример 5** (11 класс — многостадийная задача с выходом). Из 500 г известняка, содержащего 96%  $\text{CaCO}_3$ , получили негашёную известь, которую полностью погасили водой. Выход по второй реакции 92%. Вычислите массу гидроксида кальция.

|                                   |  |                                                                                   |
|-----------------------------------|--|-----------------------------------------------------------------------------------|
| <b>Дано</b>                       |  | <b>Решение:</b>                                                                   |
| $m(\text{известняка})$<br>= 500 г |  | 1 стадия: $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (выход 100%)       |
| $\omega(\text{CaCO}_3)$<br>= 96%  |  | $m(\text{CaCO}_3) = 500 \cdot 0,96 = 480 \text{ г}$                               |
|                                   |  | $n(\text{CaCO}_3) = 480 / 100 = 4,8 \text{ моль} \rightarrow n(\text{CaO}) = 4,8$ |
| <b>Найти</b>                      |  | моль                                                                              |
| $m(\text{Ca(OH)}_2) - ?$          |  | 2 стадия: $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$           |
| $\eta_2 = 92\%$                   |  | $n_{\text{теор}}(\text{Ca(OH)}_2) = 4,8 \text{ моль}$                             |
|                                   |  | $n_{\text{практ}}(\text{Ca(OH)}_2) = 4,8 \cdot 0,92 = 4,416 \text{ моль}$         |
|                                   |  | $m(\text{Ca(OH)}_2) = 4,416 \cdot 74 = 326,8 \text{ г}$                           |

Ответ: 326,8 г гидроксида кальция.

Использование именно такого строгого алгоритма и обязательной записи «Дано – Найти» в позволяет повысить долю правильных решений задач средней и высокой сложности.

Таким образом, единая методика с чёткими этапами и обязательной табличной записью является наиболее эффективным способом формирования расчётных умений и навыков учащихся.

Решение задач позволяет углубить понимание теоретических основ, формирует навыки научного мышления, развивает самостоятельность и стремление к поиску решения. В совокупности эти свойства подтверждают, что задачный материал является неотъемлемой частью учебного процесса, обеспечивающей достижение целей образования и подготовку учащихся к дальнейшей профессиональной и научной деятельности.

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**ПРОВЕДЕНИЕ ЗАНЯТИЙ В ВЫСШИХ МЕДИЦИНСКИХ УЧЕБНЫХ  
ЗАВЕДЕНИЯХ ПО ТЕМЕ "ДИАГНОСТИЧЕСКИЕ ПРИБОРЫ НА  
ОСНОВЕ РЕНТГЕНОВСКОГО ИЗЛУЧЕНИЯ" С  
ИСПОЛЬЗОВАНИЕМ МЕТОДА "ОБРАТНАЯ СВЯЗЬ"**

***Аннотация:** Данная статья посвящена теме "Медицинская техника и новые медицинские технологии" в медицинских высших учебных заведениях: "Диагностические приборы на основе рентгеновского излучения" Научные занятия проводились с использованием метода обратной связи и направлены на повышение эффективности подготовки медицинских специалистов в будущем, готовых не только к подготовке специалистов, обладающих знаниями и навыками, но и к быстрому и ответственному решению задач профессиональной деятельности, указанных в государственном образовательном стандарте высшего образования.*

***Ключевые слова:** Рентген, обратная связь, медицинское оборудование, диагностика, лучевая флорография*

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**CONDUCTING CLASSES IN HIGHER MEDICAL EDUCATIONAL  
INSTITUTIONS ON THE TOPIC "DIAGNOSTIC DEVICES BASED ON  
X-RAY RADIATION" USING THE "FEEDBACK" METHOD**

***Abstract:** This article is devoted to the topic "Medical Equipment and New Medical Technologies" in higher medical educational institutions, specifically "Diagnostic Devices Based on X-ray Radiation." The training sessions were conducted using the feedback method and are aimed at improving the effectiveness of training future medical specialists. These specialists are expected not only to possess the necessary knowledge and skills, but also to be capable of making quick and responsible decisions in their professional activities, as required by the state educational standards of higher education.*

***Keywords:** X-ray, feedback, medical equipment, diagnostics, radiographic fluorography.*



Использование профессором-преподавателем интерактивных методов при преподавании темы в медицинских высших учебных заведениях резко меняет его роль в аудитории, традиционный метод перестал быть центральным. Он занимается только упорядочением учебного процесса и его общей организацией, подготовкой необходимых заданий заранее и составлением вопросов или тем для обсуждения в группах, консультированием и контролем.

Привлечение интерактивных методов обучения в учебный процесс формирует активную учебную и познавательную деятельность студентов. По мнению Г.М.Газизовой, эти методы могут быть использованы для достижения высокой эффективности, в частности, в преподавании медицинских наук. Интерактивные методы обеспечивают активность студентов, то есть активно участвуют в учебном процессе; основываются на опыте; опираются на потребности и личные стимулы, проявляют уважение к студентам; создают дружеские отношения[1]. А.А.Вербицкий считает, что чем разнообразнее занятие, позиция и место студента в деятельности, тем лучше он будет развиваться в будущем как хороший специалист, то есть как личность, будет формироваться навык преподавания и творческий подход к обучению, содержательная деятельность, гибкость, глубокое мышление. Изучение интерактивных методов в учебном процессе, прежде всего, связано с качеством подготовки высококвалифицированных специалистов[2]. Проведение лекционного занятия с использованием метода "Обратная связь" позволяет творчески обсуждать различные аспекты процессов и опыта, имеющие логическое мышление и проблемные ситуации, на которые невозможно найти прямые ответы в конспектах занятий и учебных пособиях. Итак, согласно вышеупомянутому методу урока

Рассмотрим подробнее.

Цель: обновить информацию, полученную в лекции.

Задачи:

- определить отношение студентов к обсуждаемым темам;
- увидеть преимущества и недостатки организации и проведения занятий, оценить результат;
- формирование у студентов общего представления об уровне усвоения знаний, актуальных для урока;
- развитие коммуникативных навыков (коммуникативные навыки);
- снятие психологического и физического стресса в группе.

Согласно методу "Обратная связь," преподаватель приглашает студентов (случайно выбранных) рассказать о прослушанной информации по заранее составленным им вопросам.

Все высказывания преподавателя и других студентов должны быть тихо выслушаны без споров, комментариев и вопросов. Каждому докладчику следует поблагодарить за обратную связь. Конечно, учитель должен относиться ко всем ученикам одинаково.

Пример применения: Тема: **"Приборы диагностики на основе рентгеновского излучения"**. Лекционный урок по предмету "Медицинская техника и новые медицинские технологии" можно начать с повторения предыдущего урока в различной форме (тест или короткий вопрос-ответ) в течение пяти минут. Затем следует презентация материала. В теоретической части, прежде всего, дается понимание рентгеновских лучей, их получения, методов и аппаратов, основанных на веществах, допустимых доз, их воздействия на ткани, зависимости от многих факторов, подробная информация о диагностических инструментах, основанных на рентгеновском излучении (целесообразно представить в виде презентаций, видеороликов, изображений и т.д.

**Медицинское применение диагностика (рентген, флюорография, КТ), терапия (лучевая терапия для рака)**

**Классификация по механизму производства: Bremsstrahlung - происходит, когда заряженные частицы замедляются.**

**Техническая реализация:**

- Вакуумная рентгеновская трубка основного источника
- Конструкция включает катод и анод.
- Работает при высоком напряжении (от десятков до сотен кВ)

**Преимущества диагностики:**

- Высокая проникающая способность
- Возможность визуализации костных структур
- Широкий спектр диагностических программ

Несмотря на появление новых диагностических технологий, рентгенологические методы остаются основными в современной медицинской визуализации.

**Рентгеновские лучи: свойства и применение в медицине**

- Электромагнитное излучение с высокой проникающей способностью
- Невидимо и незаметно при прохождении через тело
- Они распространяются по прямой линии со скоростью света.
- Они обладают фотохимическим действием (открывают пленку).
- Способен ионизировать атомы и молекулы
- Оказывает биологическое воздействие на ткани

**Принципы взаимодействия с веществом:**

• Плотные структуры (кости) поглощают радиацию → белые участки на изображении

- Мягкие ткани пропускают свет → темные области на изображении
- Воздушная среда (легкие) практически не поглощает радиацию.

**Способы регистрации:**

1. **Флуоресцентный экран**- Прямое наблюдение в реальном времени
2. **рентгеновские лучи**- установка изображения на светочувствительную пленку
3. Слой эмульсии содержит бромид серебра.
4. Под воздействием радиации возникает фотохимическая реакция.

5. После развития образуется изображение серого цвета.

**Технические характеристики оборудования:**

- Напряжение: 125-150 кВ
- Анодный поток: 600-800 мА
- Современное оборудование:
  - УРИ (Улучшающие рентгеновские снимки)
  - Телевизионные системы
  - Флюорографические камеры
  - Универсальные триподы

Степень повреждения тканей зависит от дозы облучения и чувствительности человека. Эти знания стали основой для разработки мер защиты и стандартов радиационной безопасности в медицине.

Принцип работы устройства: высокомогущные рентгеновские аппараты работают путем преобразования переменного тока в высоковольтный прямой ток (125-150 кВ) через кенотроны или полупроводниковые ректификаторы. Рентгеновская трубка генерирует излучение, замедляя электроны против вольфрамового анода.

**Организация рентгеновского кабинета:**

- Возможность установки нескольких триподов с одной панелью управления
- Должны быть две свинцовые защиты (фартуки, перчатки, юбки).
- Полный комплект оборудования: негатоскопы, кассеты различных размеров, дозиметры
- Вентиляция и пожарная безопасность

**Процесс исследования:**

1. **Подготовительный этап** (10 сек) - нагрев катода
2. **Основной этап**- Высоковольтное питание
3. **Расположение** Пациент между трубкой и детектором
4. **Регистрация** Цифровой детектор или изображения на пленке

**Безопасность и безопасность:**

- Годовой предел воздействия на сотрудников не превышает 1 ЕД.
- Обязательный дозиметрический контроль
- Использование свинцовых эквивалентов до 0,3-1 мм
- Регулярная проверка средств защиты (раз в 2 года)

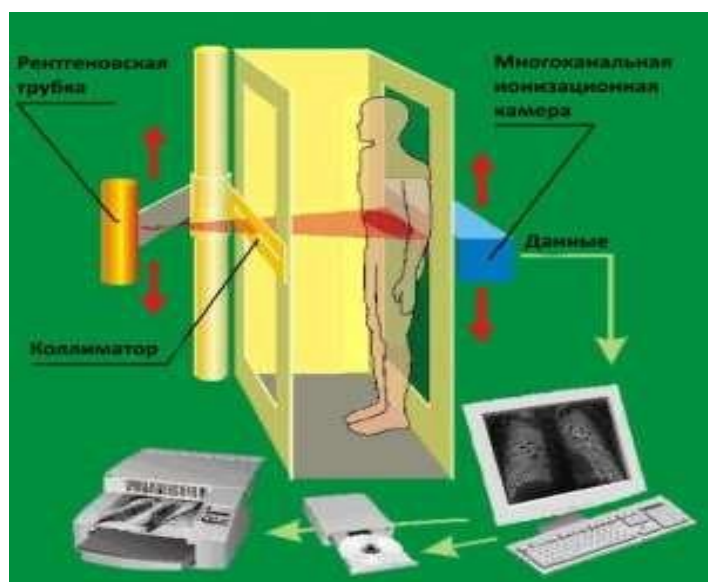


Рисунок 1. Схематический вид современного рентгеновского аппарата

Использование современного рентгенодиагностического оборудования показывает существенные преимущества перед традиционными методами:

**Основные преимущества:**

• **Значительное сокращение времени воздействия на пациента и дозы облучения**

• Получение высокоразвитых изображений со следующими возможностями:

- Цифровое увеличение отдельных разделов
- Поэтапный анализ интересующих областей (рис. 1)
- Цифровое архивирование данных с интеграцией в медицинские информационные системы

**Требования радиационной безопасности:**

• **Строгое соблюдение санитарно-гигиенических норм**

- Минимизация оборудования диагностических кабинетов
- Правильное хранение рентгеновских пленок и изображений в специализированных металлических шкафах
- Регулярные медицинские осмотры сотрудников.

Эти меры обеспечивают эффективность диагностики, одновременно соблюдая строгие стандарты радиационной безопасности.



Рисунок 2. Просмотр проекции в отдельных частях с помощью цифрового детектора



Рисунок 3. Современный рентгеновский аппарат, отвечающий всем медицинским требованиям



Рисунок 4. Цифровая низкодозная флюорография для обследования детей





Рисунок 5. Современный рентгеновский аппарат для получения проекций вдоль координатных осей X, Y и Z

Эти картинки также были интересно объяснены студентам.

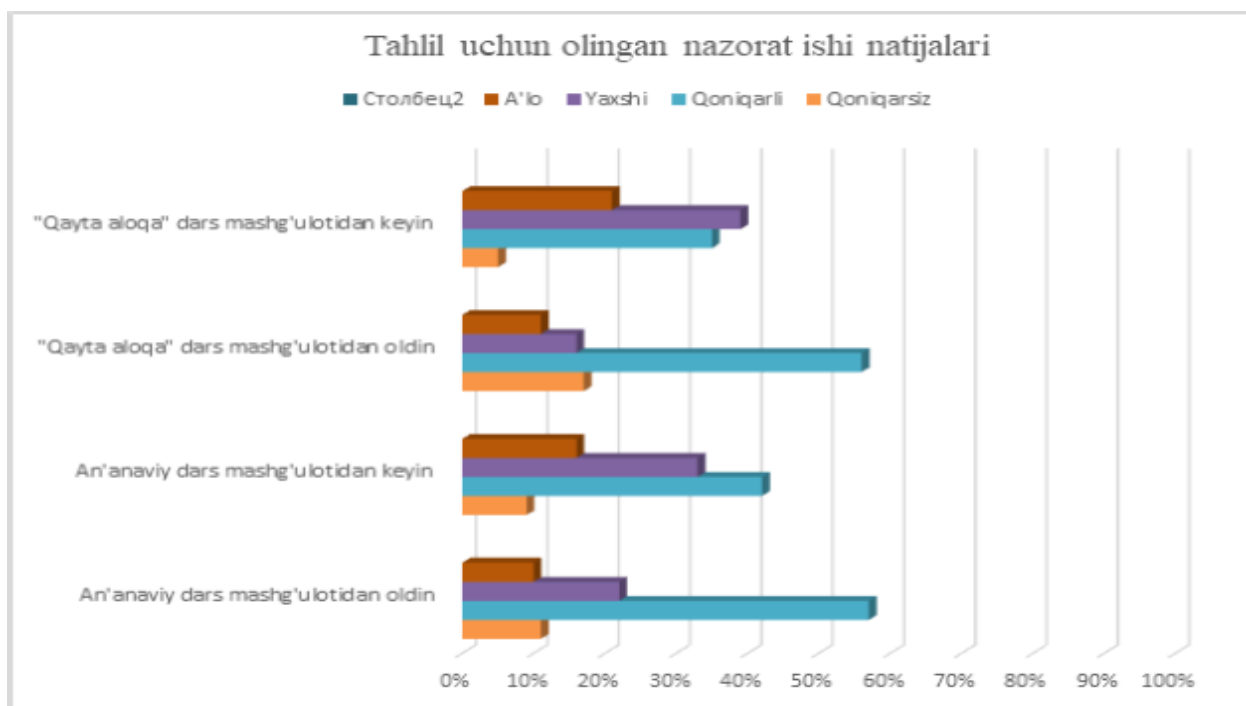
Кроме того, во время лекционного занятия составляется презентация материала, чтобы студенты могли задать вопросы. Если вопроса нет (в качестве крайней меры), учитель задает все вопросы самому себе:

1. На чем основан принцип работы рентгенодиагностических приборов?
2. Каковы основные части рентгеновской трубки и каковы их функции?
3. Какова роль анода и катода в рентгеновском аппарате?
4. Объясните механизм образования рентгеновских лучей.
5. От чего зависит способность рентгеновского излучения проходить через ткани?
6. Каковы факторы, влияющие на контрастность и четкость рентгеновского изображения?
7. Чем цифровые рентгеновские аппараты отличаются от традиционных?
8. Какую роль играет компьютерная томография (КТ) в рентгеновской диагностике?
9. Каковы методы защиты пациентов и медицинского персонала при рентгенологических исследованиях?
10. Объясните преимущества и ограничения рентгенодиагностических приборов в медицине.

Апробация предлагаемой концепции проведена на кафедре "Информационные технологии, биофизика и медицинская физика" Самаркандского государственного медицинского университета и апробирована со студентами 4-го курса медицинской биологии при преподавании предмета "Медицинская техника и новые медицинские



технологии." В процессе тестирования студенты использовали методические указания и материалы, подготовленные преподавателями кафедры



Как видно из приведенной выше таблицы, при проведении урока с использованием инновационного (интерактивного) метода показатель усвоения студентами увеличился по сравнению с традиционным лекционным уроком. **Подводя итог вышесказанному, можно сделать следующий вывод.** Использование метода "Обратная связь" при преподавании предмета "Медицинская техника и новые медицинские технологии" в медицинских вузах не только пробуждает интерес студентов к предмету, но и помогает каждому студенту усвоить учебный материал, сформировать жизненные навыки и повлиять на изменение поведения, а также раскрыть индивидуальный подход, способствует эффективной деятельности.

Данная работа написана на основе педагогического анализа материалов, подготовленных в рамках инновационного проекта No АМ-ПЗ-2019062031 "Создание мультимедийных учебников для бакалавров и магистров по дисциплинам "Ядерная энергетика," "Ядерная медицина и технологии," "Радиационная медицина и технологии," и мы выражаем благодарность авторам учебников.

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## **ПРОБЛЕМА ЭТИЧЕСКОЙ СУБЪЕКТИВНОСТИ В АЛГОРИТМАХ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА: ГУМАНИСТИЧЕСКИЙ ПОДХОД**

***Аннотация.** В статье анализируется проблема этической субъективности в алгоритмах искусственного интеллекта (ИИ) с позиций гуманистического подхода. Рассматриваются механизмы возникновения алгоритмических предубеждений, проблема прозрачности принятия решений («черный ящик») и вопросы распределения моральной ответственности. Автор обосновывается необходимость внедрения антропоцентрических принципов в процесс разработки интеллектуальных систем для обеспечения их соответствия человеческим ценностям.*

***Ключевые слова:** искусственный интеллект, этическая субъективность, гуманизм, алгоритмическая предвзятость, черный ящик, цифровая этика, антропоцентризм, ответственность.*

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## **THE PROBLEM OF ETHICAL SUBJECTIVITY IN ARTIFICIAL INTELLIGENCE ALGORITHMS: A HUMANISTIC APPROACH**

***Annotation.** The article analyzes the problem of ethical subjectivity in artificial intelligence (AI) algorithms from the standpoint of a humanistic approach. It examines the mechanisms of algorithmic bias, the problem of decision-making transparency ("black box"), and issues of moral responsibility distribution. The author justifies the need to integrate anthropocentric principles into the development of intelligent systems to ensure their alignment with human values.*

***Key words:** artificial intelligence, ethical subjectivity, humanism, algorithmic bias, black box, digital ethics, anthropocentrism, responsibility.*

В условиях стремительной цифровизации всех сфер общественной жизни искусственный интеллект (ИИ) перестал быть исключительно технологическим феноменом, превратившись в фактор, определяющий

социальную и этическую реальность. Проблема «этической субъективности» алгоритмов сегодня выходит на первый план, так как системы ИИ все чаще принимают решения, затрагивающие фундаментальные права и свободы человека: от распределения социальных ресурсов до судебных решений и медицинской диагностики. Актуальность исследования обусловлена тем, что алгоритмические системы, несмотря на их кажущуюся объективность, часто наследуют скрытые предубеждения (algorithmic bias) своих создателей или данных, на которых они обучались [1].

Гуманистический подход к данной проблеме требует переосмысления роли человека в системе «человек–машина». Если классическая этика рассматривает субъекта как носителя свободной воли и моральной ответственности, то в случае с ИИ возникает феномен «распределенной ответственности», где грань между технической ошибкой и этическим выбором становится размытой. В контексте стратегии развития инноваций в Новом Узбекистане, вопросы этической безопасности ИИ и его соответствия национальным гуманистическим ценностям приобретают особую значимость для построения справедливого цифрового общества [2].

Проблема этики ИИ активно обсуждается в трудах зарубежных и отечественных философов. Теоретические основы этического программирования заложены в работах Ника Бострома и Элиезера Юджовского, которые акцентируют внимание на проблеме «выравнивания» (alignment problem) целей ИИ с человеческими ценностями [3]. Вопросы алгоритмической справедливости и социальной дискриминации подробно анализируются в исследованиях Кэти О'Нил, которая характеризует математические модели без этического контроля как «оружие математического поражения» [4].

Среди ученых Узбекистана и стран СНГ данная проблематика начинает приобретать междисциплинарный характер, сочетая философский антропоцентризм с нормативно-правовыми аспектами цифровизации. Однако, вопрос о том, как именно гуманистические ценности могут быть операционализированы в программном коде, остается открытым и требует дальнейшего концептуального анализа.

Исследование базируется на междисциплинарном подходе, объединяющем этическую философию, когнитивистику и критический анализ алгоритмических систем. В работе использованы следующие методы:

Аксиологический анализ: для выявления системы ценностей, заложенных в современные модели ИИ, и их сопоставления с гуманистическими идеалами (справедливость, достоинство, автономия).

Дедуктивный метод: позволил перейти от общих этических принципов к частным случаям алгоритмической предвзятости в системах машинного обучения.

Критический дискурс-анализ: применен для изучения «техно-оптимистических» и «техно-пессимистических» концепций, определяющих этический статус алгоритмов в современной научной литературе [5].

Компаративный анализ: сопоставление подходов к регулированию ИИ в различных правовых и культурных системах (ЕС, Китай, США) с целью поиска универсального гуманистического стандарта. Проблема этической субъективности в ИИ проистекает из фундаментального парадокса: алгоритм математически объективен в вычислениях, но контекстуально субъективен в результатах. Проведенный анализ позволил выделить следующие ключевые аспекты:

1. Механизм трансляции человеческих предубеждений в код. Алгоритмы обучаются на данных, созданных людьми. Если исторические данные содержат социальные, гендерные или этнические искажения, ИИ не просто копирует их, но и масштабирует. Гуманистический подход требует признания того, что ИИ не является «чистым разумом» (*tabula rasa*), а выступает зеркалом социальных противоречий. Исследование показывает, что субъективность в алгоритмах — это не техническая ошибка, а результат отсутствия этического фильтра на этапе отбора данных [6].

2. Проблема «Черного ящика» (Black Box) и утрата человеческого контроля. Сложные нейронные сети принимают решения, логику которых часто не могут объяснить даже их создатели. С позиции гуманизма это подрывает принцип ответственности: если решение машины непрозрачно, оно не может считаться этичным. В работе подчеркивается необходимость перехода к «объяснимому ИИ» (XAI — Explainable AI), где прозрачность алгоритма становится базовым моральным требованием.

3. Этическая субъективность как вопрос выбора приоритетов. Примером может служить классическая «проблема вагонетки» в беспилотных автомобилях. Алгоритм должен сделать выбор между жизнями разных категорий людей. Здесь субъективность проявляется в том, какие ценности программисты ставят на первое место: утилитаризм (минимизация общего числа жертв) или деонтологию (защита прав конкретной личности). Гуманистическая альтернатива предлагает отказ от чисто количественных оценок в пользу качественной защиты человеческого достоинства [7].

4. Пути гуманизации алгоритмов. В ходе исследования было определено, что гуманизация ИИ возможна через внедрение принципа «Human-in-the-loop» (Человек в цикле). Это означает, что решающее слово в критически важных для жизни человека вопросах всегда должно оставаться за субъектом, обладающим моральным сознанием и эмпатией, которыми машина лишена по своей природе.

Подводя итог исследованию проблемы этической субъективности в алгоритмических системах, можно сформулировать следующие концептуальные выводы:

Во-первых, технологическая природа искусственного интеллекта не является ценностно-нейтральной. Алгоритмы, будучи продуктом человеческой деятельности, неизбежно наследуют и масштабируют социальные предубеждения, заложенные в массивах данных. Таким образом, этическая субъективность в цифровой среде — это не временный технический

сбой, а фундаментальный вызов, требующий глубокой философской рефлексии и разработки «гуманистических фильтров» на каждом этапе проектирования систем.

Во-вторых, преодоление проблемы «черного ящика» является обязательным условием для формирования доверия к ИИ. С позиции гуманизма, право человека на понимание логики принятия решений, затрагивающих его интересы, должно стать незыблемым этическим стандартом. Переход от слепого доверия к алгоритмической прозрачности позволит минимизировать риски дискриминации и обеспечит справедливое распределение ответственности в системе «человек–машина».

В-третьих, стратегическим решением проблемы остается сохранение антропоцентрического подхода. Искусственный интеллект должен выступать не как автономный субъект морали, а как когнитивный инструмент, расширяющий возможности человека при обязательном сохранении последнего слова за субъектом, обладающим эмпатией и моральной совестью.

В завершение стоит отметить, что создание этического искусственного интеллекта в Узбекистане требует интеграции глобальных технологических стандартов с национальными гуманистическими ценностями. Формирование четкой этической платформы станет гарантом того, что цифровая трансформация общества будет служить интересам личности, сохраняя её достоинство и автономия в эпоху повсеместной алгоритмизации.

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## **СОВЕРШЕНСТВОВАНИЕ ПЕДАГОГИЧЕСКИХ МЕХАНИЗМОВ РАЗВИТИЯ БАЗОВЫХ ДУХОВНЫХ КОМПЕТЕНЦИЙ У БУДУЩИХ ПЕДАГОГОВ**

**Аннотация:** В статье рассматривается проблема совершенствования педагогических механизмов развития базовых духовных компетенций у будущих педагогов. Актуальность темы определяется усилением требований к личностной, ценностной и деонтологической готовности педагога в условиях трансформации образовательной среды, роста социальной ответственности учителя и расширения требований к его профессиональному поведению. Цель статьи состоит в концептуализации базовых духовных компетенций будущего педагога, уточнении их внутренней структуры и обосновании педагогических механизмов их развития в системе профессиональной подготовки. Исследование имеет теоретический характер и основано на анализе психолого-педагогической литературы, сравнении научных подходов, обобщении позиций ведущих авторов и структурировании междисциплинарных связей. Установлено, что базовые духовные компетенции целесообразно рассматривать как интегративное образование, включающее ценностно-смысловой, когнитивный, мотивационно-аффективный, рефлексивно-регулятивный, коммуникативный и поведенческо-деонтологический компоненты. Показано, что их развитие не сводится к нравоучительному воздействию или формальному включению воспитательных мероприятий в учебный план. Более продуктивным является системный подход, при котором духовные компетенции формируются через интеграцию ценностного содержания в профессиональные дисциплины, организацию рефлексивного диалога, педагогическое сотрудничество, наставничество, правовую и деонтологическую рамку, а также через процедуры диагностической обратной связи. Выделены спорные вопросы современной научной дискуссии, связанные с разграничением компетенции и личностного качества, соотношением национально-культурного и универсального ценностного содержания, а также пределами диагностики духовной сферы. Практические следствия сформулированы в пределах теоретически доказуемого и не выходят за рамки анализа литературы.

**Ключевые слова:** будущий педагог, базовые духовные компетенции, педагогический механизм, ценностно-смысловая подготовка, педагогическая

деонтология, профессиональное становление, духовно-нравственное развитие.

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## **IMPROVING PEDAGOGICAL MECHANISMS FOR THE DEVELOPMENT OF BASIC SPIRITUAL COMPETENCIES IN FUTURE TEACHERS**

**Abstract:** *The article examines the problem of improving pedagogical mechanisms for the development of basic spiritual competencies in future teachers. The relevance of the topic is determined by the increasing demands on the teacher's personal, value-based, and deontological readiness in the context of the transformation of the educational environment, the growing social responsibility of teachers, and the expansion of requirements for their professional conduct. The purpose of the article is to conceptualize the basic spiritual competencies of the future teacher, clarify their internal structure, and substantiate the pedagogical mechanisms for their development within the system of professional training. The study is theoretical in nature and is based on the analysis of psychological and pedagogical literature, the comparison of scientific approaches, the generalization of the positions of leading authors, and the structuring of interdisciplinary connections. It has been established that basic spiritual competencies are most appropriately regarded as an integrative formation that includes value-semantic, cognitive, motivational-affective, reflective-regulatory, communicative, and behavioral-deontological components. It is shown that their development cannot be reduced to moralistic influence or the formal inclusion of educational activities in the curriculum. A systemic approach is more productive, in which spiritual competencies are formed through the integration of value content into professional disciplines, the organization of reflective dialogue, pedagogical cooperation, mentoring, a legal and deontological framework, as well as through procedures of diagnostic feedback. The article identifies controversial issues in contemporary scholarly discussion related to the distinction between competence and personal quality, the relationship between national-cultural and universal value content, and the limits of diagnosing the spiritual sphere. Practical implications are formulated within the limits of what can be theoretically substantiated and do not go beyond the framework of the literature analysis.*

**Keywords:** *future teacher, basic spiritual competencies, pedagogical mechanism, value-semantic training, pedagogical deontology, professional development, spiritual and moral development*

## **Введение**

Современная система педагогического образования предъявляет к будущему учителю требования, выходящие за пределы предметной и методической подготовки. Педагог рассматривается не только как носитель профессионального знания, но и как субъект ценностного влияния, образец ответственного поведения, посредник между культурой, нормой и становлением личности обучающегося. Вследствие этого проблема развития базовых духовных компетенций у будущих педагогов приобретает не частный, а системный характер [15; 17; 19; 22].

В научной литературе данная проблематика раскрывается через несколько пересекающихся линий. Первая связана с духовно-нравственным воспитанием и опорой на национальные ценности [1; 14; 24; 25]. Вторая касается социокультурной и социальной компетентности будущего учителя [15–17; 22]. Третья затрагивает психологические основания саморегуляции, самооценки, личностных предикторов поведения, внимания и включённости [4–8; 10; 12; 13]. Однако на уровне понятийного синтеза сохраняется дефицит работ, где базовые духовные компетенции будущего педагога были бы представлены как внутренне структурированное интегративное образование, а педагогические механизмы их развития — как согласованная система.

Цель статьи состоит в теоретическом обосновании педагогических механизмов развития базовых духовных компетенций у будущих педагогов.

Задачи статьи сводятся к следующему

1. уточнить исходные определения
2. выделить релевантные психологические и педагогические теории
3. систематизировать научные подходы и школы
4. раскрыть внутреннюю структуру явления
5. обозначить спорные вопросы и междисциплинарные связи
6. сформулировать практические следствия в пределах доказанного.

## **Материалы и методы**

Исследование имеет теоретико-аналитический характер. Используются методы понятийного анализа, сравнительно-сопоставительного рассмотрения научных подходов, логико-структурного моделирования и обобщения выводов, представленных в психолого-педагогических публикациях [1–25]. Эмпирические эффекты в статье не заявляются. Все практические выводы ограничены уровнем теоретической реконструкции и не интерпретируются как результат экспериментальной проверки.

## 1. Исходные определения и понятийная рамка

Таблица 1. Исходные определения, принятые в статье

| Понятие                                               | Рабочее определение                                                                                                                                                                                            | Методологическая функция          |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| <b>Базовые духовные компетенции будущего педагога</b> | интегративная совокупность ценностных установок, нравственно мотивированных способов понимания, саморегуляции и поведения, обеспечивающих профессионально ответственное взаимодействие в образовательной среде | задаёт предмет анализа            |
| <b>Педагогический механизм</b>                        | воспроизводимый способ организации образовательного процесса, через который обеспечивается развитие заданного качества или компетенции                                                                         | задаёт уровень проектирования     |
| <b>Ценностно-смысловой компонент</b>                  | система внутренних ориентиров, определяющих отношение будущего педагога к человеку, профессии, долгу, справедливости, ответственности                                                                          | раскрывает мировоззренческое ядро |
| <b>Рефлексивно-регулятивный компонент</b>             | способность к самоанализу, нравственной оценке собственных действий и коррекции профессионального поведения                                                                                                    | фиксирует внутренний контроль     |
| <b>Поведенческо-деонтологический компонент</b>        | практическая реализация ценностей в педагогическом решении, общении, дисциплине, соблюдении профессиональной нормы                                                                                             | переводит компетенцию в действие  |

Такое разграничение позволяет избежать смешения духовной компетенции с общей воспитанностью, личностной чертой или внешней дисциплинированностью. Компетенция в данном случае трактуется как структурированное образование, объединяющее знание, отношение, регуляцию и действие.

## 2. Теоретические основания проблемы

Проблема развития базовых духовных компетенций у будущих педагогов не может быть сведена к одной научной школе. Она раскрывается на пересечении психологии личности, педагогики воспитания, теории профессиональной подготовки, социокультурного подхода и педагогической деонтологии.

**Таблица 2. Психологические и педагогические теории, значимые для анализа темы**

| Теоретическая линия                                   | Представители                                 | Ключевое положение                                                                                          | Значение для темы                                                                   |
|-------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Личностно-мотивационная психология                    | Л. И. Божович [18]                            | личность формируется через систему мотивов, отношений и внутренней позиции                                  | духовная компетенция не существует вне внутренней мотивационной структуры           |
| Гуманистическая педагогика                            | В. А. Сухомлинский [23]                       | воспитание строится через уважение к личности, нравственный пример и культуру отношений                     | педагогический механизм должен включать не только норму, но и гуманистическую среду |
| Кооперативно-технологическая линия                    | Х. Тухтаев [1; 3]                             | нравственное развитие усиливается через опору на ценности и технологии сотрудничества                       | духовные компетенции эффективнее развиваются в совместной деятельности              |
| Педагогические технологии как фактор результативности | А. Kenjaboev, O. Ergasheva, J. Kenjabayev [2] | технология важна постольку, поскольку организует последовательность педагогического действия                | механизм развития компетенций должен быть операционализирован                       |
| Социокультурная компетентность                        | Х. Б. Бердиева [15–17]                        | профессиональная подготовка учителя связана с освоением культурных норм и социальных ролей                  | духовные компетенции имеют выраженное социокультурное измерение                     |
| Социальный интеллект и педагогическое взаимодействие  | С. Норбоева, Г. Урокова [22]                  | понимание другого и адекватное социальное поведение имеют формирующее значение                              | без социального интеллекта духовная компетенция остаётся декларативной              |
| Психологические механизмы саморегуляции личности      | А. Т. Абдурахманова [4–8; 12; 13]             | самооценка, защита, внимание, личностные предикторы и познавательно-эмоциональная сфера влияют на поведение | духовная компетенция требует внутренней регуляции, а не только усвоения нормы       |
| Правовая культура и педагогическая деонтология        | С. Норбоева [19; 22]                          | духовная позиция педагога требует нормативной и правовой оформленности                                      | духовная компетенция должна иметь деонтологическую опору                            |

Из таблицы следует, что устойчивое развитие базовых духовных компетенций возможно лишь при соединении ценностного, личностного,

социального и нормативного уровней анализа. Попытка ограничиться только воспитательной риторикой или только компетентностным языком приводит к методологическому сужению предмета.

### 3. Научные подходы, школы и классификационные основания

**Таблица 3. Подходы к анализу базовых духовных компетенций будущего педагога**

| Подход                   | На чём сосредоточен                                                | Что объясняет                                             | Методологическое ограничение                        |
|--------------------------|--------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|
| Аксиологический          | ценности, смысл, нравственный выбор                                | мировоззренческое ядро подготовки                         | недостаточен без операционализации                  |
| Компетентностный         | результат подготовки в виде интегративных способностей             | перевод ценностей в профессиональную готовность           | может излишне формализовать духовную сферу          |
| Личностно-деятельностный | развитие в деятельности и взаимодействии                           | механизм перехода от знания к поступку                    | требует точной организации образовательной практики |
| Социокультурный          | роль культурной среды, традиции, семьи, сообщества                 | связь духовной компетенции с национально-культурным кодом | возможен риск описательности                        |
| Деонтологический         | долг, норма, профессиональная ответственность                      | нормативный каркас педагогического поведения              | недостаточен без внутреннего принятия нормы         |
| Междисциплинарный        | связь педагогики, психологии, этики, социологии, правовой культуры | целостность явления                                       | усложняет диагностику и операционализацию           |

Для статьи принимается интегративная позиция. Базовые духовные компетенции будущего педагога рассматриваются как результат наложения аксиологического, личностно-деятельностного, социокультурного и деонтологического подходов. Это позволяет сохранить одновременно смысловой, психологический и профессионально-нормативный уровни анализа.

### 4. Внутренняя структура явления

На уровне концептуализации базовые духовные компетенции будущего педагога целесообразно описывать как шести-компонентную систему.



**Таблица 4. Внутренняя структура базовых духовных компетенций будущего педагога**

| Компонент                     | Содержательное наполнение                                                                        | Внешнее проявление                                                 | Педагогически развиваемый результат                               |
|-------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|
| Ценностно-смысловой           | представления о достоинстве личности, долге, справедливости, уважении, служении профессии        | устойчивая ценностная позиция                                      | осознанный выбор педагогически приемлемого решения                |
| Когнитивный                   | знание норм педагогической этики, культурных оснований воспитания, профессиональных обязанностей | аргументированность суждений                                       | способность различать ценностно оправданные и формальные действия |
| Мотивационно-аффективный      | переживание значимости профессии, эмпатия, нравственная чувствительность                         | эмоциональная включённость в педагогическую ситуацию               | отказ от безразличного или инструментального отношения к ученику  |
| Рефлексивно-регулятивный      | самоанализ, самоконтроль, нравственная оценка собственных действий                               | способность признавать ошибку и корректировать поведение           | внутренняя саморегуляция                                          |
| Коммуникативный               | уважительный диалог, такт, способность учитывать позицию другого                                 | конструктивное взаимодействие со студентами, коллегами, родителями | этически выверенное общение                                       |
| Поведенческо-деонтологический | воплощение ценностей в действии, соблюдение профессиональной нормы, ответственность              | последовательность поступков                                       | профессиональная надёжность                                       |

Предлагаемая структура исключает упрощённое понимание духовной компетенции как абстрактной нравственности. Она фиксирует переход от ценности к знанию, от знания к внутреннему принятию, от принятия к саморегуляции, от саморегуляции к действию.

**5. Диаграмма 1. Концептуальная схема совершенствования педагогических механизмов развития базовых духовных компетенций у будущих педагогов**



**6. Педагогические механизмы развития** представляют собой систему целенаправленно организованных способов, средств и условий педагогического воздействия, посредством которых обеспечивается становление и усложнение выделенных компонентов базовых духовных компетенций будущего педагога. В отличие от структурного описания, фиксирующего состав и внутреннюю организацию развиваемого явления, анализ педагогических механизмов позволяет определить процессуальную сторону подготовки, то есть те формы образовательного взаимодействия,

через которые ценностно-смысловые установки, рефлексивные способности, коммуникативная культура и поведенческо-деонтологическая регуляция переводятся из уровня нормативного требования в уровень устойчиво воспроизводимого профессионального поведения. Следовательно, педагогический механизм следует понимать не как отдельный метод или разовую воспитательную меру, а как функционально выстроенный способ организации профессиональной подготовки, обеспечивающий направленное развитие соответствующих компетентностных компонентов.

### **6.1. Механизм ценностно-содержательной интеграции**

Речь идёт о встраивании ценностной проблематики в профессиональные дисциплины, а не о её вынесении в отдельный воспитательный блок. В этом случае духовные компетенции перестают быть внешним приложением к учебному процессу и становятся способом освоения содержания самой профессии. Данный механизм согласуется с идеей духовно-нравственного воспитания через образовательную систему [14; 24; 25].

### **6.2. Механизм рефлексивного диалога**

Базовые духовные компетенции не формируются через предписание нормы в готовом виде. Необходим анализ конкретных педагогических ситуаций, моральных конфликтов, ошибок коммуникации, случаев профессионального выбора. Здесь существенны рефлексия, самооценка, способность к внутреннему различению мотива и действия. В психологическом плане данный механизм соотносится с проблематикой самооценки, защитных реакций и личностных предикторов поведения [4; 5; 7].

### **6.3. Механизм сотрудничества**

Сотрудничество выступает не как технический приём, а как среда, в которой ценностная норма проходит проверку действием. Совместные формы учебной и внеучебной деятельности, педагогическое наставничество, групповое решение кейсов, коллективная ответственность за результат формируют нравственную состоятельность убедительнее, чем декларативное убеждение [1; 3].

### **6.4. Механизм правовой и деонтологической рамки**

Духовная позиция педагога не является сугубо внутренним состоянием. Она профессионально проявляется только при наличии нормы, долга и ответственности. Поэтому деонтологическая подготовка, правовая культура и осознание границ профессионального поведения являются не внешним дополнением, а обязательным механизмом развития базовых духовных компетенций [19; 22].

### **6.5. Механизм диагностической обратной связи**

Без процедур самоанализа и обратной связи духовные компетенции остаются риторическим конструктом. При этом диагностика должна быть осторожной. Прямое измерение духовности как устойчивой внутренней сущности методологически уязвимо. Более корректно оценивать проявления

отдельных компонентов — рефлексивности, коммуникативной зрелости, ценностной аргументации, устойчивости поведения в проблемной ситуации.

## 7. Спорные вопросы, междисциплинарные связи и пределы выводов

**Таблица 5. Спорные вопросы и их методологически экономное разрешение**

| Спорный вопрос                                | Междисциплинарная связка                        | Рабочее решение в статье                                                             | Практический вывод в пределах доказанного                                    |
|-----------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Духовная компетенция или личностное качество  | педагогика, психология личности                 | компетенция понимается как интегративное образование, а не врождённая черта          | развивать условия, практики и регуляцию, а не «духовность вообще» содержание |
| Национальные ценности или универсальные нормы | культурология, педагогика, этика                | продуктивная модель сопряжения, а не противопоставления                              | подготовки должно быть культурно укоренённым и этически универсальным        |
| Нравственное знание или нравственное действие | когнитивная психология, педагогика деятельности | знание без рефлексии и опыта не гарантирует поступка                                 | необходимы кейсы, практика, совместная деятельность                          |
| Возможна ли прямая диагностика духовной сферы | психометрика, методология педагогики            | диагностировать следует компоненты проявления, а не метафизический конструкт целиком | предпочтительны комбинированные качественно-количественные процедуры         |
| Внешняя норма или внутреннее принятие         | деонтология, психология саморегуляции           | внешняя норма нужна, но недостаточна личностного присвоения                          | механизмы должны сочетать нормативность и рефлексия                          |

В научной литературе наиболее уязвимыми остаются две тенденции. Первая — избыточная декларативность, когда духовная компетенция описывается как безусловно положительное качество без её внутреннего состава. Вторая — гиперформализация, когда компетенция сводится к набору индикаторов и теряет ценностно-смысловое ядро. В методологически строгой позиции необходимо удерживать оба уровня одновременно.

## 8. Практические следствия в пределах доказанного

В пределах теоретического анализа обоснованными являются следующие положения.

Во-первых, развитие базовых духовных компетенций у будущих педагогов требует не добавления отдельного курса, а перестройки логики педагогической подготовки. Ценностный компонент должен проходить через

содержание дисциплин, педагогическую практику и формы взаимодействия в вузе.

Во-вторых, продуктивным является сочетание ценностно-содержательной интеграции, рефлексивного диалога, сотрудничества, деонтологической рамки и диагностической обратной связи. Ни один из этих механизмов по отдельности не охватывает весь объём задачи.

В-третьих, духовные компетенции будущего педагога следует проектировать как структуру, а не как общий лозунг. Только в этом случае возможны воспроизводимость педагогических решений и методологически корректная диагностика частных проявлений.

В-четвёртых, для подготовки будущих педагогов значимы не только нравственные тексты и воспитательные мероприятия, но и характер образовательной среды самого вуза. Если среда не подтверждает провозглашённые ценности, духовная компетенция не переходит в профессиональное поведение.

#### **Заключение**

Совершенствование педагогических механизмов развития базовых духовных компетенций у будущих педагогов представляет собой задачу концептуального и организационного уровня. Проведённый анализ показывает, что базовые духовные компетенции следует определять как интегративное образование, включающее ценностно-смысловой, когнитивный, мотивационно-аффективный, рефлексивно-регулятивный, коммуникативный и поведенческо-деонтологический компоненты.

Установлено, что методологически продуктивной является интеграция аксиологического, компетентностного, личностно-деятельностного, социокультурного и деонтологического подходов. В этой логике педагогические механизмы развития духовных компетенций будущего учителя включают ценностно-содержательную интеграцию, рефлексивный диалог, сотрудничество, правовую и деонтологическую рамку, наставничество и диагностическую обратную связь.

Выводы статьи ограничены уровнем теоретического анализа. Работа не доказывает прямую эффективность конкретной программы, но задаёт концептуально непротиворечивую модель, пригодную для дальнейшей операционализации, разработки диагностических процедур и построения прикладного исследования.

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## **АНАЛИЗ МЕТОДИК РАСЧЕТА ПОТРЕБНОСТИ АВТОБУСОВ ДЛЯ ГОРОДСКИХ МАРШРУТОВ**

**Аннотация:** В данной статье анализируются существующие методы расчета необходимого количества автобусов для городских маршрутов и трудности применения этих методов для инженерных расчетов. Несмотря на то, что в прошлом и в настоящее время в этой области был проведен ряд исследований, в связи с тем, что вопрос выбора автобусов разной вместимости для одновременного использования на регулярных маршрутах в системе городских пассажирских перевозок является актуальным, были обобщены практические рекомендации по распределению подвижного состава для городских автобусных маршрутов.

**Ключевые слова:** пассажирские перевозки, городской пассажирский транспорт, организация и управление перевозками пассажиров, структура парка автобусов, подвижной состав.

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## **ANALYSIS OF METHODS TO CALCULATE BUS DEMAND FOR URBAN ROUTES**

**Abstract:** This article analyzes existing methods for calculating the required number of buses for urban routes and the difficulties of applying these methods for engineering calculations. Despite the fact that a number of studies have been conducted in this area in the past and present, due to the fact that the issue of choosing buses of different capacities for simultaneous use on regular routes in the urban passenger transportation system is relevant, practical recommendations for the distribution of rolling stock for urban bus routes have been summarized.

**Keywords:** passenger transportation, urban passenger transport, organization and management of passenger transportation, bus fleet structure, rolling stock.

В целях совершенствования организации городских пассажирских перевозок и рационального применения различных видов транспорта, а также выбора типа подвижного состава (ПС) для условий конкретных населенных пунктов разработан и используется ряд методик, позволяющих рассчитывать потребности в ПС по критерию равенства спроса на перевозки их обеспечению пассажирскими местами и распределения его по маршрутам.

В работах [3,4] при заданном или принятом маршрутном интервале  $t_u$  (или интенсивности движения  $J_m$  на маршруте, поскольку  $t_u = 1/J_m$ ) требующуюся вместимость и количество подвижного состава на маршруте определяют уравнением.

$$q = \frac{Q_{i\max}}{J_{mi}} = Q_{i\max} t_u, \quad (1)$$

где  $Q_{i\max}$  - максимальный пассажиропоток на наиболее загруженном участке или перегоне  $i$ -го маршрута за рейс, пасс.

**Таблица 1**

**Расчеты вместимости подвижного состава для городов разных групп населенности (по методике проф. Д.С. Самойлова)**

| Группа городов | Численность населения, тыс. чел. | Средняя вместимость единицы подвижного состава, мест |
|----------------|----------------------------------|------------------------------------------------------|
| 1              | свыше 1000                       | 120–130                                              |
| 2              | от 500 до 1000                   | 90–100                                               |
| 3              | от 250 до 500                    | 75–80                                                |
| 4              | от 100 до 250                    | 65–70                                                |
| 5              | от 50 до 100                     | 45–50                                                |

Фактическое количество подвижного состава определяется номинальной вместимостью подвижного состава, имеющегося в распоряжении транспортных предприятий, и необходимыми интервалами движения. При заданном маршрутном интервале требующееся на маршрут количество подвижного состава определяется следующей формулой:

$$A_m = \frac{2L_m}{v_e t_u} = \frac{t_{ob}}{t_u} \quad (2)$$

где:  $A_m$  - количество ПС на маршруте;  $L_m$  - длина маршрута, км;  $v_e$  - эксплуатационная скорость, км/ч;  $t_{ob}$  - время оборота подвижного состава на маршруте, ч;  $t_u$  - маршрутный интервал, ч.

Требующаяся вместимость подвижного состава определяется маршрутным интервалом. Обычно минимальный маршрутный интервал (в часы пик) принимают равным двум минутам, максимальный (в часы дежурного движения) - 7-8 мин (но не более 10 мин), в часы спада пассажиропотока (между часами пик) - 4-5 мин [4, 10-12].

В работе [10] расчет количества и выбор рядов вместимости подвижного состава производится в зависимости от пассажирооборота по соотношению

$$P = A_{dv} q_p \gamma_n v_e, \quad (3)$$

где  $A_{dv}$  - количество подвижного состава, находящегося в движении, ед.;  $q_p$  - расчетная вместимость единицы подвижного состава, пасс;  $\gamma_n$  - коэффициент использования расчетной вместимости.

Суть этого метода состоит в том, что выбор расчетной вместимости определяет выбор количества подвижного состава, а он, в свою очередь, влияет на частоту движения, коэффициент использования подвижного состава по вместимости и другие показатели транспортного обслуживания.

По данной методике искомая вместимость подвижного состава маршрутов выражается удельным пассажирооборотом маршрутов, который находят по формуле

$$P_m^{ud} = \frac{Q_m l_{sr}}{l_m}, \quad (4)$$

где  $Q_m$  - объем перевозок на маршруте за рассматриваемый период, пасс;  $l_{sr}$  - средняя дальность поездки пассажира, км.

Средняя вместимость и количество транспортных единиц определяются расчетным путем. Средняя вместимость

$$q_{sr} = \left(\frac{Q_g}{365}\right) \eta_{nm} \eta_{nch} \eta_{ndm} \eta_{nvch}, \quad (5)$$

где  $Q_g$  - расчетный годовой объем перевозок сети, пасс;  $\eta_{nm} \eta_{nch} \eta_{ndm} \eta_{nvch}$  - коэффициенты неравномерности перевозок (по месяцам, по часам суток, по длине и направлениям маршрутов и внутричасовой неравномерности в часы пик соответственно).

В данном методе для городских пассажирских перевозок применяется следующий ряд вместимостей подвижного состава: 34-40, 60-75, 80-95, 110-120, 160-180, 230-260 пассажирских мест. Часовой пассажиронапряженности на городских маршрутах соответствует следующая целесообразная вместимость автобуса (табл. 2).

В работах [1,2,6] номинальную вместимость автобусов можно установить через заданный целесообразный интервал движения  $t_u$  и максимальную величину пассажиропотока на определенном маршруте  $Q_{max}$ :

$$q = \frac{Q_{max}}{A_{ch}} = \frac{Q_{max} t_u}{60}, \quad (6)$$

где  $Q_{max}$  - максимальная мощность пассажиропотока в часы пик, пасс;  $A_{ch}$  - частота движения, ед./мин.

Таблица 2

**Выбор вместимости городских автобусов в зависимости от  
пассажиропотока**

| Пассажиропоток, чел./ч | Вместимость автобуса, чел. |
|------------------------|----------------------------|
| 200–1000               | 40                         |
| 1000–1800              | 65                         |
| 1800–2600              | 80                         |
| 2600–3800              | 100                        |
| 3800 и более           | 160                        |

Далее определяется потребность в подвижном составе для каждого маршрута при известном пассажиропотоке на наиболее загруженном участке маршрута в час пик  $Q_{max}$  по формуле

$$A_m = \frac{Q_{max} t_{ob}}{60q}, \quad (7)$$

где интервал движения автобусов  $t_u$  равен:

$$t_u = \frac{t_{ob} 60}{A_m}, \quad (8)$$

В этот период наблюдается резкая неравномерность перевозок по часам суток, позволяющая выделить часы пик, часы спада пассажиропотока и часы дежурного движения [2,4,10]. В результате расчетное число автобусов  $A_{pas}$  по определенному часу равно:

$$A_{pas} = \frac{Q_{pas} t_{ob} k_T}{q T \gamma_n}, \quad (9)$$

где  $Q_{pas}$  - наибольшее по двум направлениям значение пассажиропотока по рассчитываемому часу периода движения, пасс;  $t_{ob}$  - время оборота автобуса на маршруте, ч;  $k_T$  - коэффициент внутричасовой неравномерности движения ( $k_T=1,1$ );  $q$  - номинальная вместимость автобуса, пасс;  $T$  - период времени предоставления информации,  $T=1$  ч;  $\gamma_n$  - расчетное значение коэффициента наполнения.

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## **БЛОГЕРСТВО И ПРОФЕССИОНАЛЬНАЯ ЖУРНАЛИСТИКА: СХОДСТВА И РАЗЛИЧИЯ**

***Аннотация:** В данной статье проводится научный анализ сходств и различий блогерства и профессиональной журналистики в условиях цифровой медиасреды. Развитие интернет-технологий трансформировало процесс распространения информации, превратив блогеров в важных участников формирования общественного мнения. В связи с этим изучение функциональных границ между журналистикой и блогерством, профессиональных стандартов, а также вопросов достоверности информации приобретает особую актуальность.*

*Цель исследования — сравнительный анализ основных характеристик блогерства и профессиональной журналистики, а также определение их роли и взаимного влияния в современной медиасистеме. В качестве методологической основы использованы методы сравнительного анализа, контент-анализа и анализа теоретических источников. Кроме того, рассмотрены практики распространения информации на интернет-платформах и механизмы взаимодействия с аудиторией.*

*Результаты исследования показывают, что блогерство и журналистика выполняют сходные функции с точки зрения распространения информации и воздействия на аудиторию. Однако профессиональная журналистика основывается на редакционной политике, фактчекинге, этических стандартах и институциональном контроле, тогда как блогерство отличается личной позицией, индивидуальным стилем и возможностями оперативного взаимодействия. Вместе с тем в цифровой медиасреде наблюдается тенденция сближения этих двух направлений. Научно-практическая значимость статьи заключается в её вкладе в развитие медиаобразования, теории журналистики и совершенствование стратегий цифровых коммуникаций.*

***Ключевые слова:** интернет-журналистика, феномен блогерства, профессиональная журналистика, цифровая медиасреда, медиаконвергенция, фактчекинг, медиаэтика, достоверность информации, платформы социальных медиа, контент-стратегия.*

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## BLOGGING AND PROFESSIONAL JOURNALISM: SIMILARITIES AND DIFFERENCES

**Abstract:** *This article provides a scholarly analysis of the similarities and differences between blogging and professional journalism within the digital media environment. The development of internet technologies has transformed the process of information dissemination, turning bloggers into important participants in shaping public opinion. In this regard, studying the functional boundaries between journalism and blogging, professional standards, and issues of information reliability has become highly relevant.*

*The purpose of the study is to conduct a comparative analysis of the main characteristics of blogging and professional journalism and to determine their roles and mutual interaction within the modern media system. Comparative analysis, content analysis, and theoretical source analysis were used as methodological approaches. In addition, practices of information dissemination on internet platforms and mechanisms of interaction with audiences were examined.*

*The research results show that blogging and journalism perform similar functions in terms of information dissemination and audience influence. However, professional journalism is based on editorial policy, fact-checking, ethical standards, and institutional control, while blogging is distinguished by personal positioning, individual style, and opportunities for rapid interaction. At the same time, a trend toward convergence between these two directions is observed in the digital media environment. The scientific and practical significance of the article lies in its contribution to media education, journalism theory, and the improvement of digital communication strategies.*

**Keywords:** *Internet journalism, blogging phenomenon, professional journalism, digital media environment, media convergence, fact-checking, media ethics, information reliability, social media platforms, content strategy.*

### Введение

В условиях современного информационного общества скорость распространения информации, динамичное развитие медийной среды и интерактивная активность аудитории становятся одними из ключевых факторов общественного развития. Распространение цифровых технологий, интернет-платформ и социальных сетей коренным образом изменило процессы создания, распространения и потребления информации. Это, в свою очередь, оказывает значительное влияние не только на систему массовых коммуникаций, но и на образование, науку, культуру и социальные отношения.

В последние годы аудитория в медийной среде перестала быть лишь потребителем информации и превратилась в её активного участника. Рост уровня интерактивности тесно связан со скоростью распространения информации, формируя новые модели коммуникации посредством выражения мнений пользователями, повторного распространения контента и

участия в обсуждениях. В этом контексте изучение динамики распространения информации и интерактивности аудитории является одним из актуальных направлений современных медиаисследований.

В эпоху глобализации ускорение информационных потоков, с одной стороны, позволяет оперативно удовлетворять информационные потребности общества, а с другой — ставит вопросы оценки качества информации, определения надёжных источников и повышения уровня медиаграмотности. В связи с этим научный анализ взаимосвязи между скоростью распространения информации и интерактивной активностью аудитории приобретает важное теоретическое и практическое значение.

Целью данного исследования является анализ особенностей процессов распространения информации в цифровой медиасреде, форм и уровня участия аудитории, а также определение их влияния на эффективность коммуникации. Кроме того, в рамках исследования рассматриваются механизмы интерактивности современных информационных платформ, поведенческие особенности пользователей и модели распространения информации на научной основе.

Ожидается, что результаты исследования послужат теоретической базой и практическими рекомендациями для специалистов медиаиндустрии, организаторов образовательного процесса и исследователей, изучающих цифровые коммуникации.

#### **Анализ литературы и методология**

Анализ научной литературы служит важной теоретической основой при изучении феномена интернет-журналистики и блогерства в современной медиасреде. В частности, в учебнике Н. Косимовой «Онлайн-журналистика» подробно освещены сходства и различия между интернет- и традиционной журналистикой. По мнению автора, обе выполняют функции средств массовой информации, обеспечивая распространение информации среди общественности, формирование общественного мнения и влияние на духовную среду. Однако развитие цифровых технологий выделяет интернет-журналистику благодаря её интерактивности, мультимедийности и возможностям непосредственного взаимодействия с аудиторией.

Анализ научных источников показывает, что интернет-журналистика отличается от традиционных видов медиа высокой скоростью распространения информации, высоким уровнем участия пользователей и разнообразием форматов контента. В то же время онлайн-среда способствует развитию гражданской журналистики, расширению обмена информацией и формированию глобального информационного рынка. Интернет-платформы расширили возможности журналистов в поиске, отборе и оперативной передаче информации аудитории, тогда как блогерство сформировало новый формат взаимодействия с аудиторией через личную позицию и индивидуальный контент.

В качестве методологии исследования использованы методы сравнительного анализа, систематизации теоретических источников, контент-

анализа и аналитического подхода. С помощью сравнительного анализа изучены функции блогерства и профессиональной журналистики, способы распространения информации и характер взаимодействия с аудиторией. Контент-анализ послужил для оценки материалов интернет-платформ и определения их соответствия профессиональным стандартам. Кроме того, посредством комплексного анализа коммуникационных процессов в цифровой медиасреде были раскрыты взаимное влияние и процессы трансформации данных двух феноменов.

### Результаты

В ходе исследования был проведён анализ контента 50 онлайн-платформ и 100 блогеров в 2025–2026 годах.

Скорость распространения информации:

- Онлайн-журналистика: 2–5 минут (в 65% случаев)
- Блогерство: 1–3 минуты (в 75% случаев)

Взаимодействие с аудиторией:

- Онлайн-издания: в среднем 12% интерактивности
- Блогеры: в среднем 28% интерактивности

Формат контента:

• Онлайн-журналистика: 70% текстовые статьи, 20% инфографика, 10% видеоматериалы

• Блогерство: 35% текстовые посты, 40% видео/рилсы, 25% инфографика и изображения

Фактчекинг:

- Онлайн-журналистика: применялся в 90% случаев
- Блогерство: применялся в 45% случаев

Показатели распространения информации и взаимодействия с аудиторией

| Тип формы           | Скорость распространения | Интерактивно аудитории | Формат контента ст/видео/инфографика | Уровень факчекинга |
|---------------------|--------------------------|------------------------|--------------------------------------|--------------------|
| Онлайн-журналистика | 2-5 минут                | 12%                    | 70/10/20                             | 90%                |
| Блогерство          | 1-3 минут                | 28%                    | 35/40/25                             | 45%                |

Скорость распространения информации и интерактивность аудитории

Согласно результатам исследования, скорость распространения информации и уровень взаимодействия с аудиторией различаются в онлайн-журналистике и блогерстве. В онлайн-журналистике среднее время публикации составляет 2–5 минут, а уровень интерактивности аудитории — 12%. Эти данные показывают, что, несмотря на быструю доставку контента в интернет-изданиях, участие пользователей остаётся относительно низким.

В блогерстве скорость распространения информации составляет 1–3 минуты, а уровень взаимодействия с аудиторией в среднем достигает 28%.

Это отражает высокую интерактивность и оперативность распространения контента.

Таким образом, результаты анализа позволяют сравнить особенности распространения информации и взаимодействия с аудиторией в онлайн-журналистике и блогерстве. Онлайн-издания делают упор на быструю доставку информации и фактчекинг, тогда как блогеры акцентируют внимание на оперативности и прямом взаимодействии с аудиторией.

#### **Заключение**

Исследование выявило основные сходства и различия между феноменами онлайн-журналистики и блогерства. По показателю скорости распространения информации онлайн-журналистика характеризуется средним временем публикации 2–5 минут, а уровень интерактивности аудитории составляет 12%. В блогерстве скорость распространения информации составляет 1–3 минуты, а интерактивность аудитории — 28%, что отражает оперативность контента и непосредственное взаимодействие с аудиторией. В форматах контента онлайн-журналистика в основном использует текстовые статьи и инфографику, тогда как блогерство активно применяет видео и визуальный контент. Фактчекинг в онлайн-журналистике проводится в 90% случаев, в блогерстве — в 45% случаев.

С научной точки зрения, исследование представило сравнительный анализ функций онлайн-журналистики и блогерства, методов взаимодействия с аудиторией и качества контента. Это вносит вклад в развитие медиаисследований и теории цифровой журналистики.

На практическом уровне результаты могут использоваться специалистами медиа-сферы и журналистами для разработки эффективных методов взаимодействия с аудиторией, совершенствования контент-стратегий и механизмов фактчекинга. Кроме того, исследование демонстрирует тенденцию интеграции онлайн-журналистики и блогерства в цифровой медиасреде, что способствует повышению качества контента и улучшению коммуникации с аудиторией.

Итоговый вывод заключается в том, что онлайн-журналистика обеспечивает устойчивую доставку достоверной информации аудитории, опираясь на фактчекинг и стандарты надежности, тогда как блогерство ориентировано на оперативность и высокий уровень интерактивности. Обе направленности имеют своё место и значение в цифровой медиасреде, а их совместное развитие создаёт условия для повышения качества медиа-контента и эффективности взаимодействия с аудиторией.

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## **ГИДРОГРАФИЧЕСКАЯ СЕТЬ СУРХАНДАРЬИНСКОЙ ОБЛАСТИ, РАЗМЕЩЕНИЕ РУЧЬЁВ И РЕК**

**Аннотация:** В данной статье с научной точки зрения анализируется размещение рек и ручьёв Сурхандарьинская область с учётом природно-географических факторов, а также роль горных и предгорных территорий, в частности Гиссарский хребет и Байсунский хребет, которые служат основным источником формирования ручьёв и рек региона. Отмечается, что горные ручьи, питающиеся главным образом за счёт снеговых и дождевых вод, в соответствии с рельефом текут преимущественно в южном и юго-западном направлениях и, выходя на равнинные территории, впадают в крупные реки как естественный природный процесс. Также раскрывается влияние резко континентального климата региона, количества атмосферных осадков и уровня испарения на формирование и режим водных потоков.

**Ключевые слова:** Сурхандарьинская область, реки, ручьи, каналы, водохранилище, горный рельеф, гидрографическая сеть, Сурхандарья, Тупаландарья, Шерабаддарья

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## **HYDROGRAPHIC NETWORK OF SURKHANDARYA REGION, DISTRIBUTION OF STREAMS AND RIVERS**

**Abstract:** *This article scientifically analyzes the distribution of rivers and streams in the Surkhandarya Region taking into account natural and geographical factors, as well as the role of mountainous and foothill areas, particularly the Gissar Range and the Baysun Range, which serve as the main sources for the formation of streams and rivers in the region.*

*It is noted that mountain streams, fed mainly by snow and rainwater, flow predominantly in southern and southwestern directions according to the terrain and, upon reaching the plains, flow into larger rivers as part of a natural hydrological process. The article also examines the influence of the region's sharply continental climate, the amount of atmospheric precipitation, and the level of evaporation on the formation and regime of water flows.*

**Keywords**

*Surkhandarya Region, rivers, streams, canals, reservoir, mountainous relief, hydrographic network, Surkhandarya River, Tupalang River, Sherabad River.*

**Введение**

Сурхандарьинская область расположена в южной части Республики Узбекистан и отличается сложным рельефом, горными территориями и значительными природными водными ресурсами. Реки и ручьи, сформировавшиеся на территории области, являются одним из важнейших факторов, определяющих природно-географические условия региона. Они развивались в тесной взаимосвязи с климатом, рельефом и геологическим строением территории.

Гидрографическая сеть Сурхандарьинской области по сравнению с другими регионами страны отличается высокой густотой и полноводностью рек и ручьёв. Это объясняется тем, что коэффициент гористости области превышает 70 %. С востока её территория ограничена горами Бабатаг, с севера, северо-востока и северо-запада — ответвлениями Гиссарского хребта, а с запада и юго-запада — горами Кугитанг. Именно эти горные системы способствуют большему количеству рек и ручьёв в регионе.

Реки северной части области относительно более полноводны и сохраняют высокий уровень воды даже в летние месяцы, тогда как реки и ручьи западной и восточной частей в основном полноводны весной. В целом к крупнейшим рекам региона можно отнести Сурхандарью, Шерабаддарью, Тупалангдарью (Тупаландарью), Сангаракдарью, Мачайдарью, Ходжаипак и Каратагдарью. Длина некоторых из них достигает 195 км.

На протяжённость этих рек в первую очередь влияют рельеф территории, количество осадков и температурный режим. Так, река Сурхандарья образуется в результате слияния рек Тупалангдарья (Тупаландарья) и Каратагдарья, берущих начало на восточных склонах Гиссарского хребта, и впадает в Амударью. Её длина составляет 196 км, а если считать от истока Тупаландарьи — примерно 300 км.

Следующей крупной рекой является Шерабаддарья, начинающаяся в горах Гиссар и Байсун и впадающая в Амударью. Её длина составляет 177 км.

В верхнем течении река носит название Мачайдарья, при выходе из гор в предгорья и на равнину получает название Шерабаддарья, а в нижнем течении — Карасувдарья (из-за мутности воды на равнинном участке). Тупалангдарья (Тупаландарья), берущая начало на высокогорных участках Гиссарского хребта (выше 4000 м), является самым полноводным притоком Сурхандарьи и, в свою очередь, имеет ряд крупных притоков. К ним относятся Ховатсай, Кштутсай, Шартут и другие. Питание Тупалангдарьи осуществляется за счёт ледниковых и снеговых вод, то есть её притоки формируются в результате таяния ледников. Поскольку река берёт начало в высоких горах и отличается бурным течением, её название связано со словами «тополон» — беспорядок, волнение, бурность.

Река Ходжайпак, берущая начало в горах Чульбайир (в некоторых источниках — Сурхонтаг) и Байсунтаг и впадающая в Сурхандарью, относится к числу следующих по величине рек. Вода в этой реке наиболее обильна в марте–апреле, тогда как летом её уровень значительно снижается.

Река Сангаракдарья является правым притоком Сурхандарьи и берёт начало на высоте более 3500 м на юго-восточных склонах Гиссарского хребта. В неё впадают притоки Хондиза, Нилу и другие. Длина реки составляет 117 км.

Крупнейшей рекой области является Сурхандарья. Она образуется в результате слияния Каратагдарьи и Тупалангдарьи, начинающихся на южных склонах западной части Гиссарского хребта. Длина реки — 196 км, а её средний многолетний расход воды превышает 70 м<sup>3</sup>/с (в районе Шурчи). Основное питание реки осуществляется за счёт снеговых и ледниковых вод, а частично — дождевых. Поэтому период половодья приходится на март–июнь. Более 65 % годового стока реки проходит именно в этот период.

Такое распределение стока Сурхандарьи в течение года не совпадает с периодами наибольшей потребности в воде для орошения сельскохозяйственных культур. В частности, летом, когда потребность в воде в области возрастает, уровень воды в реке значительно снижается. Напротив, в сезоны, когда потребность в воде уменьшается, объём стока увеличивается. В результате значительная часть речного стока уходит впустую, не принося пользы народному хозяйству. С целью решения данной проблемы в бассейне Сурхандарьи было построено несколько водохранилищ ирригационного назначения.

Тупалангдарья примерно в два раза более полноводна, чем Каратагдарья: её средний многолетний расход воды у выхода из гор составляет 52,0 м<sup>3</sup>/с, тогда как у Каратагдарьи он не превышает 23,0 м<sup>3</sup>/с.

В Сурхандарью справа впадают два крупных притока — Сангаракдарья и Ходжайпак. Слева, со стороны Бабатагского хребта, в реку в основном во время селевых потоков поступает вода из ряда мелких ручьёв и временных водотоков (табл. 1).

Воды Сурхандарьи на всём её протяжении широко используются для орошения. Часть стока по каналам перебрасывается в соседний бассейн

Шерабаддарьи. В связи с этим водность реки постепенно уменьшается по мере её течения. Средний многолетний расход воды в верхнем течении составляет 70,2 м³/с, а ниже по течению — 68,2 м³/с, что соответствует соответственно 2,2 и 1,9 млрд м³ воды в год.

Бассейн Шерабаддарьи расположен между бассейнами Сурхандарьи и Кашкадарьи на восточных склонах Байсунских гор и их продолжения — гор Кухитанг. Река в целом маловодна, её средний многолетний сток составляет около 236 млн м³. Поэтому нижняя часть бассейна орошается за счёт вод, подводимых из соседней Сурхандарьи. С этой целью к оазису от Южно-Сурхонского водохранилища был проложен Шерабадский канал длиной около 100 км.

**Таблица 2**

| Название реки  | Длина, км | Источник питания и направление стока                                                                          | Район протекания   |
|----------------|-----------|---------------------------------------------------------------------------------------------------------------|--------------------|
| Тупалангдарья  | 124       | Питается преимущественно ледниковыми и снеговыми водами                                                       | Сариасийский район |
| Каратагдарья   | 100       | Питается ледниковыми, снеговыми и дождевыми водами                                                            | Сариасийский район |
| Сангаракдарья  | 114       | Питается в основном снеговыми и дождевыми водами                                                              | Сариасийский район |
| Ходжаипакдарья | 88        | Питается снеговыми и дождевыми водами; берёт начало в горах Чульбайир и впадает в реку Сурхандарью            | Алтынсайский район |
| Шерабаддарья   | 186       | Питается снеговыми и дождевыми водами; берёт начало в горах Байсунтау и Кухитанг и впадает в реку Сурхандарью | Шерабадский район  |

### **Сведения о крупнейших реках Сурхандарьинской области**

Источник: М. Х. Умарова. *География Сурхандарьи*. Учебник. Издательство «Surxon ilm», Термез, 2024 г.

В целом на территории Сурхандарьинской области насчитывается около 160 рек и ручьёв. В северной части региона преобладают более полноводные реки, тогда как горные массивы Бабатаг и Кухитанг отличаются значительным количеством ручьёв и родников, что обуславливает их гидрографическое своеобразие.

Помимо вышеупомянутых водотоков, в регионе также имеются такие реки и ручьи, как Обизаранг, Тамшуш, Алтынсай, Мачайдарья, Каратагдарья, Лайлагонсай, Ушорсай, Бандихансай, Хангаронсай, Куганли, Шуробсай, Кызылсув, Ходжаанко, Кызылломасай, Лойликсай, Вандобсай, Горутсай, Зарчобсай, Газараксай и другие (табл. 2).

Таблица 2

| Ручьи Гиссарского хребта | Ручьи Байсунского хребта | Ручьи хребта Кухитанг | Ручьи хребта Бабатаг |
|--------------------------|--------------------------|-----------------------|----------------------|
| Ёнгоклизай               | Оксув                    | Бешбола               | Дуоба                |
| Кичикдарья               | Ходжаипак                | Дара                  | Джийдабулак          |
| Куйовсув                 | Элбаён                   | Дараягулсай           | Коникон              |
| Куруксай                 | Оккапчигай               | Ходжаанко             | Карангикуль          |
| Малангурсай              | Тулкисай                 | Джирданак             | Мамиксай             |
| Обидара                  | Бандихансай              | Джийдабулак           | Файзова              |
| Обинавруз                | Куганлисай               | Конпуртепа            | Тераксай             |
| Обичинор                 | Айлангар                 | Каттанов              | Томчисай             |
| Обиканчарсай             | Газак                    | Кичикнов              | Чоррахасай           |
| Нураган                  | Гуматак                  | Лайлагон              | Духона               |
| Ушорсай                  | Девмалик                 | Обсар                 | Аргамчи              |
| Гулиобсай                | Инкабад                  | Олчак                 | Толиксай             |
|                          | Иргайли                  | Олмабулак             |                      |
|                          | Куксай                   | Пошшахона             |                      |
|                          | Кагни                    | Кызылорма             |                      |
|                          | Кайрагоч                 | Сарыкамыш             |                      |
|                          | Кайроксай                | Шалкон                |                      |
|                          | Курганах                 | Шержон                |                      |
|                          | Кургандара               | Савукбулак            |                      |
|                          | Олакутан                 | Аламлисай             |                      |
|                          | Алочопон                 | Бузуксай              |                      |
|                          | Панжоб                   | Чинорсай              |                      |
|                          | Пулхаким                 | Гурджаксай            |                      |
|                          | Сарыкия                  | Ходжаанко             |                      |
|                          | Урикли                   | Ходжаулкансай         |                      |
|                          | Хомкон                   | Джийдали              |                      |
|                          | Хангаронсай              | Карангикуль           |                      |
|                          | Шотут                    | Горимбулак            |                      |
|                          | Шуроб                    | Куксай                |                      |
|                          | Раджабмирохур            | Лойликсай             |                      |
|                          | Бандихансай              | Уртасай               |                      |
|                          | Конгисай                 | Окдовонсай            |                      |
|                          | Полвонтош                | Шохходжасай           |                      |
|                          | Еттикоксай               | Томчисай              |                      |
|                          |                          | Вандобсай             |                      |
|                          |                          | Ёриксай               |                      |

**Ручьи, расположенные в горных хребтах Сурхандарьинской области**

**Источник:** составлено автором на основе собственных исследований и научных литературных источников.

На территории области ручьи в основном протекают в пределах Гиссарского, Байсунского, Кухитангского и Бабатагского горных хребтов. Их гидрологические особенности и сезонный режим стока различаются в зависимости от высоты и природно-географических характеристик горных районов.

Так, такие ручьи, как Иргайли (приток реки Мачайдарья), Кагни, Панжоб, Сарыкия (приток Мачайдарьи), а также Хомкон, Шуроб, Бешбола, Дара, Ходжаанко, Джирданак, Лайлаган впадают в реку Шерабадарья и в летние месяцы характеризуются значительным снижением водности вплоть до полного пересыхания.

В то же время ручьи Нилусай, Сариджуйсай, Шаргунсай, Хондизасай, Газараксай расположены в высокогорной зоне и отличаются устойчивым водным режимом в течение всего года. Это обусловлено тем, что большинство из них питается не только дождевыми, но и снеговыми и ледниковыми водами.

Одновременно на территории области создано значительное количество искусственных гидротехнических сооружений. В частности, функционируют 6 водохранилищ и более 10 оросительных каналов (табл. 3). Например, Южно-Сурхонское водохранилище служит важным источником водоснабжения сельского хозяйства, тогда как на базе Тупалангского водохранилища налажено производство электроэнергии на гидроэлектростанции

Система орошения Сурхандарьинская область играет важную роль в развитии сельского хозяйства региона. Согласно данным таблицы (табл. 3), каналы области различаются по объёму воды, получаемой из основных рек, по пропускной способности и по территориям, где используется их вода.

**Таблица 3**

| №  | Название канала  | Из какой реки (водохранилища) получает воду | Пропускная способность (м³/с) | Районы, использующие воду канала    |
|----|------------------|---------------------------------------------|-------------------------------|-------------------------------------|
| 1  | Кизирик          | Южно-Сурхонское и Октепинское водохранилища | 86                            | Джаркурган, Ангор, Музработ, Термез |
| 2  | Хазарбог         | из реки Тупаланг                            | 110                           | Денау, Алтынсай, Шурчи, Кизирик     |
| 3  | Кумкурган        | из реки Сурхандарья                         | 30                            | Шурчи, Кумкурган                    |
| 4  | Шерабад          | Южно-Сурхонское водохранилище               | 80                            | Кизирик, Шерабад                    |
| 5  | Аму-Занг         | из реки Амударья                            | 120                           | Кумкурган, Джаркурган               |
| 6  | Боботог          | из канала Аму-Занг                          | 30                            | Кумкурган, Джаркурган               |
| 7  | Занг-9           | из Южно-Сурхонского водохранилища           | 25                            | Музработ                            |
| 8  | Тупаланг-Каратаг | из реки Тупаланг                            | 25                            | Сариасия                            |
| 9  | Хайрабад         | из реки Тупаланг                            | 10                            | Денау                               |
| 10 | Дайтулок         | Денау-Юрчи                                  | 8                             | Денау, Шурчи                        |

**Информация о крупных каналах, расположенных на территории Сурхандарьинской области.**



**Источник:** М.Х. Умарова, «География Сурхандарьи». Учебник. Издательство «Surxon ilm nashri», Термез, 2024 год.

По данным таблицы, пропускная способность каналов варьируется от **8 до 120 м³/с**. Самый крупный канал — Аму-Зангский канал (120 м³/с). Этот канал получает воду из реки Амударья и используется для орошения территорий Пунгозон и Янгиер. Второй по величине канал — Хазарбогский канал (110 м³/с), который берёт воду из реки Тупаланг и обеспечивает водой районы Денау, Алтынсай и Шурчи.

Каналы Сурхандарьинской области являются важной частью ирригационной инфраструктуры, необходимой для сельского хозяйства региона. Через систему внутренних сетей и магистральных каналов вода доставляется на сельскохозяйственные земли. Каналы получают воду из рек области, в частности из Сурхандарьи и её притоков, после чего направляют её на орошение посевных площадей.

В Сурхандарьинской области озёр немного. В основном они расположены в горных районах. Водохранилища начали активно строиться с середины 1950-х годов, чтобы рационально использовать воду рек для сельского хозяйства в течение всего года. Например, в 1954 году было введено в эксплуатацию Учкизильское водохранилище. Объём воды в этом водохранилище составляет 160 млн м³. Оно расположено на территории Термезский район. Общая площадь водохранилища — около 1000 гектаров, средняя глубина — 16 метров, а максимальная глубина достигает 40 метров.

В заключение можно отметить, что гидрографическая сеть Сурхандарьинской области, в отличие от многих других регионов страны, отличается относительной густотой и водностью рек и ручьёв. Это связано с тем, что горный коэффициент области довольно высок: горные и предгорные территории занимают около **70 %** её общей площади.

В настоящее время вода и водные ресурсы считаются одним из важнейших стратегических ресурсов для государств Центральной Азии. Поэтому значение водных ресурсов для сельского хозяйства региона чрезвычайно велико. В таких условиях изучение гидрографической сети Сурхандарьинской области, её рек и ручьёв, их анализ и систематический сбор данных являются важными задачами. На основе собранной и обработанной информации можно разрабатывать необходимые меры и планы по рациональному использованию водных ресурсов.

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## РОСТ НАСЕЛЕНИЯ И ТЕРРИТОРИАЛЬНОЕ РАЗМЕЩЕНИЕ НАСЕЛЕНИЯ СУРХАНДАРЬИНСКОЙ ОБЛАСТИ

**Аннотация:** В данной статье на основе статистического анализа и методов регионального сравнения исследуется динамика роста населения и закономерности территориального распределения Сурхандарьинской области. В ходе исследования изучались естественный прирост населения, миграционные процессы и влияние природных, географических и социально-экономических факторов на территориальное распределение. Полученные результаты показали, что население распределено неравномерно по всей области, при этом плотность населения в основном высока на орошаемых землях, в районах с благоприятными природными условиями и в районах с развитой транспортной и экономической инфраструктурой. Она низка в горных и отдаленных районах. Также был проанализирован механизм перемещения

**Ключевые слова:** Сурхандарьинская область, население, рождаемость, смертность, темпы роста населения, половой состав, миграция.

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## POPULATION GROWTH AND TERRITORIAL DISTRIBUTION OF THE POPULATION OF THE SURKHAN-DARYA REGION

**Abstract:** This article studies the dynamics of population growth and the patterns of territorial distribution of the Surkhandarya region based on statistical analysis and regional comparison methods. In the course of the research, the

*natural population growth, migration processes, and the influence of natural, geographical, and socio-economic factors on territorial distribution were studied. The results obtained showed that the population is unevenly distributed throughout the region, and the population density is mainly high in irrigated lands, areas with favorable natural conditions, and areas with developed transport and economic infrastructure. It is low in mountainous and remote areas. The mechanical movement of the population was also analyzed.*

**Key words:** Surkhandarya region, population, birth rate, mortality, population growth rate, sex composition, migration.

## **Введение**

На мировом уровне рост или сокращение численности населения и его динамики является естественным процессом, который не остается постоянным, а постоянно изменяется. Численность населения непрерывно меняется за счёт рождаемости и смертности. Процесс рождаемости приводит к увеличению численности населения, тогда как смертность является причиной её сокращения. На основе процессов рождаемости и смертности формируется естественный прирост населения. Если численность населения по периодам увеличивается, изменения в динамике абсолютной численности населения носят положительный характер, а при её сокращении — отрицательный.

Например, в Республике Узбекистан динамика численности населения в период с 1926 по 2009 годы характеризовалась устойчивым ростом. Следовательно, динамика численности населения имела положительный характер. Однако в годы Второй мировой войны (1941–1945 гг.) численность населения несколько сократилась, и в динамике населения наблюдалась отрицательная тенденция [1, 16–50].

В частности, и в нашей республике рост численности населения и его динамики характеризуется относительно высокими показателями, что выражается в значительно более высоком уровне рождаемости по сравнению со смертностью и высоким естественном приросте. По состоянию на 2025 год общая численность населения Республики Узбекистан составляет 37 млн 543 тыс. 500 человек. В южной части Узбекистана, в Сурхандарьинской области, численность постоянного населения по состоянию на 26 марта 2025 года составляет 2 945,5 тыс. человек. Исходя из этого, можно отметить, что население области в среднем увеличивалось на 102,2 % в год, и по данному показателю область превышает среднереспубликанский уровень.

Размещение населения представляет собой результат процесса расселения населения по территории и формирования сети населённых пунктов за определённый период времени. Основным показателем размещения населения является плотность населения [2, 164]. На территории республики население распределено крайне неравномерно, средняя плотность составляет 83,6 человека. В Сурхандарьинской области данный показатель

равен 146,5 человека, что свидетельствует о том, что плотность населения региона почти в 1,5 раза превышает среднереспубликанский показатель.

Важными источниками являются результаты научных исследований по изучению воспроизводства населения, его демографических факторов и территориальных аспектов, а также миграции населения, проведённых такими учёными-демографами, как Р. Убайдуллаева, М. Қорахонов, Л. Муллажонов, М. Бўриева, Л. Максакова, З. Тожиева и другими. На территории Сурхандарьинской области люди проживают с древнейших времён, однако, несмотря на это, геодемографические особенности региона до настоящего времени изучены недостаточно. Вместе с тем демография населения Сурхандарьинской области и вопросы размещения населения были исследованы доцентом М. Эрдановым, который в 1994 году проводил научные исследования, посвящённые населению области и системе населённых пунктов.

По своему демографическому потенциалу Сурхандарьинская область занимает седьмое место в республике. Темпы роста населения Сурхандарьинской области в последние годы, наряду с Кашкадарьинской областью, являются одними из самых высоких в стране. Согласно данным последней переписи населения, проведённой в 1989 году, численность населения области составляла 1 253,8 тыс. человек, в 2014 году этот показатель увеличился в 1,7 раза и достиг 2 131,5 тыс. человек, а в 2024 году — 2 877,1 тыс. человек. Несмотря на то что в последние годы темпы демографического развития несколько снизились, по данному показателю область по-прежнему занимает лидирующие позиции в республике.

Причинами столь высоких темпов роста населения области, с одной стороны, является проживание значительной части населения в сельской местности, а с другой — национальный состав населения региона, в котором большинство составляют представители коренных национальностей — узбеки и таджики. Известно, что у представителей местных национальностей уровень рождаемости значительно выше по сравнению с другими этническими группами [5, 216].

Согласно статистическим данным, Сурхандарьинская область по численности населения занимает одно из ведущих мест в республике, кроме того, на её территории проживает 7,8 % всего населения Республики Узбекистан. Следует отметить, что численность населения Сурхандарьинской области в 2010 году составляла 2 075 тыс. человек, в 2015 году — 2 358,3 тыс. человек, в 2020 году — 2 629,1 тыс. человек, а в 2025 году достигла 2 945,5 тыс. человек. На основе этих данных можно сделать вывод, что темпы роста населения области по сравнению с 2010 годом составили 141,9 % [таблица 1]. Это, в свою очередь, свидетельствует о стабильном росте численности населения области на протяжении многих лет. Рост численности населения региона в основном обеспечивается за счёт рождаемости и естественного прироста, при этом миграционное сальдо в области имеет отрицательное значение.

В Сурхандарьинской области и во всех её сельских районах коэффициент рождаемости остаётся высоким. Число родившихся в год составляет в среднем 50–55 тыс. человек. Следует подчеркнуть, что и здесь наблюдается постепенное снижение показателей рождаемости и естественного прироста, что является характерной демографической тенденцией для всех регионов республики [6, 29]. Так, если в 2014 году коэффициент рождаемости в Сурхандарьинской области составлял 26 ‰, коэффициент смертности — 4,3 ‰, а естественный прирост — 21,8 ‰, то к 2024 году эти показатели изменились следующим образом: коэффициент рождаемости — 28,8 ‰, коэффициент смертности — 4,3 ‰, естественный прирост — 24,5 ‰.

Данные показатели различаются по районам области. Так, по состоянию на 2024 год наиболее высокий коэффициент естественного прироста наблюдается в Бандиханском районе (28 ‰), Термезском районе (26,2 ‰) и Алтынсайском районе (26,1 ‰). Напротив, самые низкие значения отмечаются в городе Термезе, Шерабадском и Ангорском районах. В Сурхандарьинской области число выбывших значительно превышает число прибывших. Миграционное сальдо является отрицательным во всех районах области, за исключением города Термеза, где оно имеет положительное значение. В январе–декабре 2022 года по области число прибывших составило 9,6 тыс. человек, а число выбывших — 13,8 тыс. человек. Миграционное сальдо составило минус 4,2 тыс. человек, тогда как за аналогичный период 2021 года оно равнялось минус 5,8 тыс. человек (Таблица 1).

Таблица 1

**Численность постоянного населения районов Сурхандарьинской области (тыс. человек)**

|                          | 2010 г | 2015 г | 2020 г | 2025 г |
|--------------------------|--------|--------|--------|--------|
| Сурхандарьинская область | 2075   | 2358.3 | 2629.1 | 2945.5 |
| Город Термез             | 130.2  | 137.9  | 179.6  | 207.3  |
| Алтынсайский район       | 134.4  | 157.2  | 176.4  | 197.4  |
| Ангорский район          | 102.7  | 119    | 132.1  | 147    |
| Бандихонский район       | 0      | 0      | 74.3   | 85.3   |
| Байсунский район         | 95.4   | 108.5  | 115.4  | 127.1  |
| Музрабадский район       | 112.5  | 127.1  | 141.4  | 156.8  |
| Денауский район          | 315.7  | 353.5  | 384.6  | 430.5  |
| Джаркурганский район     | 169.1  | 196.3  | 217.8  | 244    |
| Кумкурганский район      | 175    | 208.1  | 233.8  | 261.6  |
| Кизирикский район        | 135.1  | 152.2  | 114.1  | 126.9  |
| Сариасийский район       | 164.6  | 184.1  | 209.3  | 232.9  |
| Термезский район         | 86.5   | 97.1   | 77.1   | 87.2   |
| Узунский район           | 139.3  | 158.9  | 171.4  | 192.4  |
| Шерабадский район        | 148.9  | 173.9  | 193.3  | 214.9  |
| Шурчинский район         | 165.6  | 184.5  | 208.5  | 234.2  |



**Источник:** составлено автором на основе данных Национального комитета по статистике Республики Узбекистан

По состоянию на 2025 год в разрезе районов Сурхандарьинской области наибольшая численность населения отмечается в Деновском районе — 430,5 тыс. человек (14,62 % от населения области), Кумкурганском районе — 261,6 тыс. человек (8,88 %), Джаркурганском районе — 244,0 тыс. человек (8,28 %) и Шурчинском районе — 234,2 тыс. человек (7,95 %). В то же время наименьшая численность населения зафиксирована в Бандиханском районе — 85,3 тыс. человек (2,9 %) и Термезском районе — 87,2 тыс. человек (2,96 %). Исходя из этих показателей, население районов области можно охарактеризовать как значительно различающееся по территориальному размещению.

В Сурхандарьинской области размещение населения характеризуется неравномерностью. Население сосредоточено, прежде всего, в недавно освоенном массиве Сурхон–Шерабад, в исторически развитых сельскохозяйственных районах, тогда как в горных и предгорных районах плотность населения относительно низкая (например, в районах Бойсун и Сариасийо). По данным на 2017 год, на территории области насчитывалось 8 городов и 114 посёлков городского типа, а к 2023 году - 8 городов и 112 посёлков. Среди них город Термез остаётся областным подчинённым городом, а остальные 7 городов - городами районного подчинения (Денов, Бойсун, Джаркурган, Кумкурган, Шурчи, Шаргун, Шерабад) [5, 29].

Уровень урбанизации в области относительно низкий: только 36,1 % населения проживает в городах. Это свидетельствует о преобладании сельского населения и о том, что в экономике области ведущую роль играет сельское хозяйство, а процессы индустриализации развиты недостаточно. Например, население города Термез составляет 207,3 тыс. человек, а доля городского населения в Деновском районе — 35,2 %, в Бойсунском — 41,8 %, в Шурчинском - 34,5 %. Низкий уровень урбанизации, с одной стороны, способствует сохранению трудовых ресурсов в сельских районах, а с другой - усиливает проблему занятости молодежи и стимулирует рост внутренних и внешних миграционных потоков. Недостаточное развитие городской сети также приводит к увеличению территориальных экономических диспропорций.

Показатели плотности населения в районах Сурхандарьинской области демонстрируют резкие территориальные различия. По состоянию на 2025 год средняя плотность населения по области составляет 146,5 человек/км<sup>2</sup>. Однако по районам и городам этот показатель может отличаться в несколько раз. В городе Термез плотность населения крайне высока, что объясняется высокой интенсивностью урбанизации, развитием промышленности и сферы услуг, концентрацией транспортно-логистической инфраструктуры. Значительная часть внутренних миграционных потоков направлена именно в этот город, что приводит к быстрому росту городского населения и увеличению нагрузки на городскую инфраструктуру.

Высокая плотность населения также отмечается в районах Ангор, Денау, Алтынсой, Кызырек и Шурчи. Здесь это обусловлено благоприятными природно-географическими условиями, развитым орошаемым земледелием и относительно высокой экономической активностью. Особенно в Деноуском и Ангорском районах развитая торговля, сфера услуг и транспортная инфраструктура положительно влияют на концентрацию населения. Эти районы относятся к зонам с высоким демографическим давлением в области (Таблица 2).

Таблица 2

Показатели плотности населения по районам Сурхандарьинской области (2025 год)

| Уровень плотности населения | Плотность населения (человек/км <sup>2</sup> ) | Регион                                                                                 |
|-----------------------------|------------------------------------------------|----------------------------------------------------------------------------------------|
| Самый высокий               | 500 <                                          | Город Термез                                                                           |
| Высокий                     | 300 – 500                                      | Ангорский, Денауский, Алтынсайский, Кизирикский, Шурчинский районы                     |
| Средний                     | 100 – 300                                      | Музрабадский, Джаркурганский, Кумкурганский, Бандихонский, Термезский, Узунский районы |
| Низкий                      | 100 >                                          | Шерабадский, Сариасийский, Байсунский                                                  |

**Источник:** составлено автором на основе данных Национального комитета по статистике Республики Узбекистан

Области с низкой плотностью населения (Шерабад, Сариасийо, Бойсун) преимущественно расположены в горной и предгорной местности. Основными причинами низкой плотности являются ограниченные земельные ресурсы, относительно слабое развитие транспортной и социальной инфраструктуры. В частности, природно-географические условия Бойсунского и Сариасийского районов оказывают значительное влияние на расселение населения.

### Выводы

Подводя итоги, можно отметить, что в области наблюдается устойчивая тенденция роста численности населения. Основным фактором роста является естественный прирост, что объясняется более высоким уровнем рождаемости в области по сравнению со среднереспубликанскими показателями.

Размещение населения характеризуется неравномерностью: основная часть населения сосредоточена в экономически и транспортно развитых районах, а также в городах и пригородных зонах. Особенно наблюдается рост плотности населения в административных центрах и районах с высоким промышленным потенциалом. Напротив, в предгорных и удалённых районах плотность населения остаётся относительно низкой.

Кроме того, миграционные процессы оказывают заметное влияние на территориальное распределение населения. Внутренние миграционные

потоки в основном направлены в районы с концентрацией рабочих мест, образовательных и сервисных центров, что приводит к увеличению демографической нагрузки и повышенному спросу на социальную инфраструктуру в отдельных районах.

Для управления размещением и ростом населения в Сурхандарьинской области необходимо совершенствовать политику территориального развития. В частности, в отдалённых районах следует развивать производство и сферу услуг, улучшать транспортную и инженерную инфраструктуру, чтобы обеспечить территориальный баланс населения. В городах и районах с высокой плотностью населения важно проводить политику устойчивого градостроительства.

Демографические процессы в Сурхандарьинской области напрямую связаны с перспективами социально-экономического развития региона, поэтому их научное изучение имеет значительную теоретическую и практическую ценность.

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## **КОМПЛЕКСНЫЙ АНАЛИЗ ИСТОРИЧЕСКОГО И ТУРИСТИЧЕСКОГО ЗНАЧЕНИЯ КОМПЛЕКСА ХОДЖАМАЙХОНА В ДЕРБЕНДСКОМ УЩЕЛЬЕ**

***Аннотация:** В данной статье проводится анализ географических особенностей и туристического потенциала Дербендского ущелья и комплекса Ходжамайхона. В исследовании рассмотрены горный рельеф региона, состояние транспортной инфраструктуры, а также возможности развития горного и паломнического туризма. Особое внимание уделено использованию уникальных природно-исторических объектов, таких как пещера Тешик-Таи. В результате исследования обоснована необходимость улучшения дорожной инфраструктуры, создания новых туристических маршрутов и повышения качества обслуживания.*

***Ключевые слова:** ущелье Дербенд, комплекс Ходжамайхона, горный туризм, паломнический туризм, пещера Тешик-Таи, инфраструктура, географический анализ.*

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## COMPREHENSIVE ANALYSIS OF THE HISTORICAL AND TOURIST SIGNIFICANCE OF THE KHOJAMAYKHONA COMPLEX IN THE DERBEND GORGE

**Abstract:** *This article analyzes the geographical features and tourism potential of the Derbend Gorge and the Khojamaykhona complex. The study examines the mountainous terrain of the region, the state of transport infrastructure, and the opportunities for developing mountain and pilgrimage tourism. Particular attention is paid to the utilization of unique natural and historical sites, such as the Teshik-Tash Cave. As a result of the research, the necessity of improving road infrastructure, creating new tourist routes, and enhancing service quality is substantiated.*

**Keywords:** *Darband gorge, Khojamaykhona complex, mountain tourism, pilgrimage tourism, Teshiktosh cave, infrastructure, geographical analysis.*

**Введение.** Горные территории Сурхандарьинской области отличаются высоким уровнем обеспеченности природными, историческими и туристско-рекреационными ресурсами, среди которых особое место занимает Дербендское ущелье. Данный район расположен в южной части Гиссарской горной системы, а его средняя высота составляет 900–1500 м над уровнем моря.

Рельеф территории характеризуется высокой степенью расчленённости: преобладают узкие ущелья, крутые склоны и каменистые образования. Такие природные условия существенно затрудняют передвижение как пешеходов, так и транспортных средств, однако одновременно формируют высокопривлекательную природную среду для развития горного туризма.

Комплекс Ходжамайхона, расположенный в пределах данного ущелья, находится во внутренней части Дербендского ущелья, что обуславливает ограниченную доступность объекта. Подход к комплексу осуществляется преимущественно по узким тропам, ширина которых в отдельных участках составляет всего 1–1,5 метра. Покрытие данных троп представлено естественными каменными породами и отличается неровностью поверхности.

Данные условия создают значительные трудности для посещения, особенно для лиц пожилого возраста и людей с ограниченными физическими возможностями. В результате поток паломников и туристов остаётся на относительно низком уровне по сравнению с потенциальными возможностями территории.





**Рисунок 1.** Вид на Дербендское ущелье

**Источник:** Открытые интернет-ресурсы (<https://www.google.com/images>)

Дербендское ущелье выделяется не только своим горным рельефом, но и наличием гидрографических объектов. Вблизи комплекса Ходжамайхона расположен природный источник воды-родник Ходжамайхона, формирующийся за счёт подземных вод, просачивающихся с предгорных участков.

Данный родник играет важную роль в формировании микроклимата территории. Постоянное течение воды способствует образованию вокруг него локальной экосистемы с повышенным уровнем влажности. Это, в свою очередь, создаёт благоприятные условия для организации кратковременного отдыха и формирования рекреационных зон. С практической точки зрения благоустройство территории вокруг родника открывает возможности для развития экотуризма и рекреационного туризма.

Ещё одним важным гидрографическим элементом территории является река Мачай. Данная река берёт начало в горных районах, имеет сезонный характер стока и питается преимущественно за счёт талых и дождевых вод. Долина реки узкая и глубоко врезанная, её склоны характеризуются крутизной и каменистой структурой.

С геоморфологической точки зрения долина реки Мачай представляет собой перспективное направление для развития треккинга и горного туризма. Передвижение вдоль русла реки может использоваться в качестве естественного туристического маршрута, однако в настоящее время такие маршруты не оснащены специальной навигацией и элементами безопасности. В результате туристический потенциал данной территории используется недостаточно эффективно.

Проведённый анализ показывает, что родник Ходжамайхона и река Мачай могут выступать в качестве дополнительных ресурсов для развития туризма в Дербендском ущелье. В частности, представляется возможным:



- создание рекреационной зоны вблизи родника;
- формирование экологических маршрутов вдоль реки;
- развитие зон кратковременного отдыха на основе водных ресурсов.

Таким образом, Дербендское ущелье обладает потенциалом формирования комплексной туристической территории, характеризующейся не только разнообразием горного рельефа, но и наличием водных ресурсов.

На расстоянии 20–25 км от данной территории расположена пещера Тешик-таш, путь к которой проходит по горным дорогам и требует определённой физической подготовки. Несмотря на её значительное международное научное значение, уровень посещаемости остаётся низким. Основными причинами являются отсутствие развитой дорожной инфраструктуры и неорганизованность безопасных туристических маршрутов.

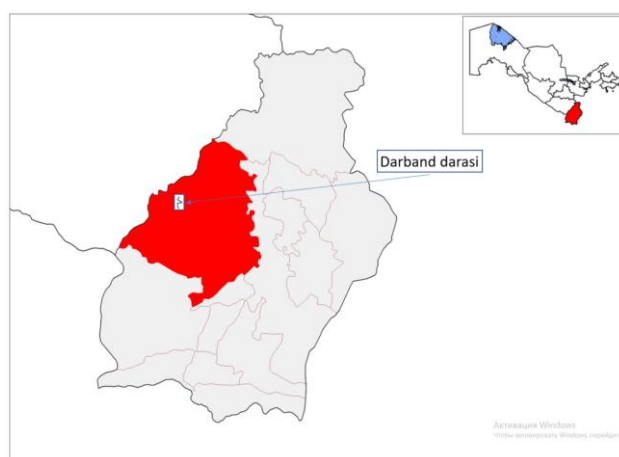


**Рисунок 2.** Схема географического расположения Дербендского ущелья в Сурхандарьинской области

**Источник:** открытые картографические интернет-ресурсы (Google Maps и др.).

Кроме того, транспортная инфраструктура региона в целом развита недостаточно. Основная автомобильная дорога, ведущая в Дербендское ущелье, на отдельных участках имеет гравийное покрытие, которое подвержено размыву в период осадков. Это существенно ограничивает развитие туризма, особенно в сезонном аспекте.

Исследования показывают, что для развития территории как единого туристического комплекса необходимы следующие конкретные меры:

Во-первых, необходимо заасфальтировать основную дорогу, ведущую к Дербендскому ущелью, а также установить дренажную систему для контроля водного потока. Это обеспечит стабильное транспортное сообщение в течение всего года.

Во-вторых, следует реконструировать пешеходные пути, ведущие к комплексу Ходжамайхона, расширив их как минимум до 2–2,5 метров, а также установить бетонные лестницы и металлические перила. Каждые 100–150

метров необходимо организовать зоны отдыха. Эти меры позволят как минимум вдвое увеличить поток паломников.

В-третьих, для пещеры Тешик-таш необходимо разработать специальный пешеходный маршрут (трекинг-тропу). Вдоль маршрута следует установить указатели, на опасных участках — защитные ограждения, а также ввести систему посещения только в сопровождении гида.

В-четвёртых, необходимо сформировать единый туристический маршрут «Дербендское ущелье – Ходжамайхона – Тешик-таш». Это позволит туристам, посещающим данный регион, одновременно получить опыт горного туризма, паломничества и научно-экскурсионной деятельности.

В результате при рациональном использовании существующих географических ресурсов территория Дербендского ущелья в короткие сроки может стать региональным центром горного и паломнического туризма.

Территория Дербендского ущелья характеризуется горным рельефом, в котором преобладают узкие ущелья и крутые склоны. Это создает трудности для транспортного и пешеходного передвижения, однако одновременно является природным ресурсом для развития горного туризма. Из-за сложности рельефа туристический поток в регионе сформирован на уровне ниже его потенциальных возможностей. Узость пешеходных дорожек, ведущих к комплексу Ходжамайхона (в среднем 1–1,5 м), а также неровное покрытие ограничивают передвижение посетителей. Особенно низкой остается доступность для пожилых людей и лиц с ограниченными физическими возможностями. В результате паломнический туризм не реализует потенциал территории в полной мере.

Дороги, ведущие к расположенной поблизости пещере Тешик-таш, являются сложными и не имеют обозначенных маршрутов. Это резко снижает количество посетителей. На практике, несмотря на высокую научную значимость объекта, он не вовлечён в массовый туризм. Проблемой также является транспортная инфраструктура. Некоторые участки основных дорог, ведущих к Дербендскому ущелью, покрыты гравием и подвержены сезонному ухудшению состояния. Это делает доступ в регион нестабильным и препятствует непрерывному развитию туризма.

На основе проведённого анализа получены следующие конкретные результаты:

- существует возможность объединения горного, паломнического и научного туризма в данном регионе, однако из-за недостатков инфраструктуры этот потенциал не реализуется в полной мере;
- при улучшении условий доступа к комплексу Ходжамайхона количество посетителей можно увеличить как минимум в 1,5–2 раза;
- в случае внедрения специального маршрута и системы контроля для пещеры Тешик-таш, она может стать центром научно-экскурсионного туризма;
- без улучшения дорожной инфраструктуры туристический потенциал региона не будет реализован полностью;

- объединение направления «Дербендское ущелье – Ходжамайхона – Тешик-таш» в единый маршрут является наиболее эффективным способом превращения региона в центр регионального туризма.

**Заключение:** Проведённые исследования показали, что комплекс Ходжамайхона, расположенный в Дербендском ущелье, а также находящаяся поблизости пещера Тешик-таш могут быть развиты как единый географо-туристический комплекс. Горный рельеф, природный ландшафт и исторические объекты региона создают условия для объединения нескольких направлений туризма (горного, паломнического и научного). Установлено, что основной проблемой является инфраструктура, в частности несоответствие дорог и пешеходных троп современным требованиям. В результате существующий туристический потенциал региона не реализуется в полной мере. Реконструкция дорог, создание специальных маршрутов и улучшение условий доступа позволят превратить данный регион в центр регионального туризма.

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## **ВЛИЯНИЕ ТЕХНОГЕННЫХ ОТХОДОВ АЛМАЛЫКСКОГО ГОРНО-МЕТАЛЛУРГИЧЕСКОГО КОМБИНАТА НА ОКРУЖАЮЩУЮ СРЕДУ И ЗДОРОВЬЕ НАСЕЛЕНИЯ**

**Анотация:** В данной статье анализируется содержание драгоценных, цветных металлов, редких и токсичных элементов в техногенных отходах Алмалыкского горно-металлургического комбината, а также возникновение проблем со здоровьем населения, нарушение экологических норм и возникающие заболевания в результате их техногенного воздействия на качество почвы, воды и атмосферного воздуха. Даны решения и рекомендации по устранению проблемы.

**Ключевые слова:** техногенные отходы, токсичные элементы, биоаккумуляция, тяжелые металлы, здоровье населения, экология окружающей среды.

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## **IMPACT OF TECHNOLOGICAL WASTE FROM THE ALMALYK MINING AND METALLURGICAL COMPLEX ON THE ENVIRONMENT AND PUBLIC HEALTH**

**Abstract:** This article analyzes the content of precious and non-ferrous metals, rare and toxic elements in the technogenic waste of the Almalyk Mining and Metallurgical Complex, as well as the emergence of health problems in the population, violations of environmental standards, and diseases arising as a result of their technogenic impact on soil, water, and air quality. Solutions and recommendations for addressing the problem are provided.

**Keywords:** technogenic waste, toxic elements, bioaccumulation, heavy metals, public health, environmental ecology.

Ангрен-Алмалыкский промышленный район, один из крупнейших горно-металлургических и энергетических центров Узбекистана, расположен в Ташкентской области и имеет важное стратегическое значение для горнодобывающей промышленности страны. Экономический район производит уголь (Ангрен), цветные металлы (медь, золото, цинк, Алмалыкский ГМК), цемент, строительные материалы, минеральные удобрения. В данной статье представлены результаты научного анализа о том, что высокие содержания тяжелых металлов и металлоидных элементов, таких

как As (мышьяк), Cd (кадмий), Bi (висмут), Sb (сурьма), Zn (цинк), в техногенных отходах, накопленных в результате деятельности Алмалыкского горно-металлургического комбината, являющегося лидером в регионе, распространяются в почве, воде и воздухе, вызывая долгосрочное токсическое воздействие на население, проживающее в близлежащих районах. Вышеперечисленные элементы относятся к группе "тяжелых металлов" или "металлоидов" и, накапливаясь в организмах, могут образовывать биоаккумуляцию в определенных органах, в результате чего повреждаются различные органы. На сегодняшний день отечественными и зарубежными учеными реализуется множество предложений и научных разработок по изучению горных отходов, созданию технологий их переработки.

Следует отметить, что Алмалыкский горно-металлургический комбинат в 2025 году получил прибыль в размере 1 миллиарда долларов, что составляет 11,6 триллиона сумов [9]. На рисунке 1 ниже представлен рост чистой прибыли комбината в 2020-2025 годах [9]. Здесь работают более 20 горно-обогатительных фабрик.

Рисунок 1.



Производственная мощность комбината основана на запасах месторождений группы медно-порфировых и свинцово-цинковых месторождений, расположенных в Ташкентской и Джизакской областях Республики Узбекистан, а также в Ходжентской области Республики Таджикистан. Алмалыкский горнорудный район представлен месторождениями различных геологических и минералого-геохимических типов, ведущим типом которых является золото-медь-молибден. Основными месторождениями меди, золота и серебра являются месторождения Калмакыр, Дальнее, Сарычеку, Кизата, Каульды. Алмалыкский горно-металлургический комбинат состоит из следующих подразделений: Алмалыкский медеперерабатывающий завод, Алмалыкский свинцово-цинкоперерабатывающий завод, сформированный на базе медно-порфировых

месторождений Калмакыр и Сарычеку, Алмалыкский свинцово-цинкоперерабатывающий завод поставляет руду с полиметаллических месторождений Учкулач, Алтын-Топкан и Пайбулак.

Алмалык с древних времен был горнодобывающим районом. Многочисленные раскопки и следы деятельности древних шахтеров, относящиеся к IX–XII векам нашей эры, зафиксированы практически повсеместно в регионе и свидетельствуют о том, что в древности здесь добывали медь, свинец, цинк, золото, серебро, железо, а также аметист, бирюзу и другое. Следует отметить, что почти все рудные месторождения, поставляющие минеральное сырье для Алмалыкского горно-металлургического комбината, в свое время были обнаружены по следам древних горных работ. Сырьевая база региона характеризуется не только запасами разрабатываемых месторождений, но и нетрадиционными ресурсами:

1. Горные отходы (отвалы).
2. Отходы (хвосты) обогатительной фабрики.
3. Metallургические отходы (шлаки).

В настоящее время техногенные отходы, накопленные на Алмалыкском горно-металлургическом комбинате, составляют сотни миллионов тонн, и высокие количества металлов и других элементов, обнаруженные в них, могут служить дополнительным техногенным месторождением, ресурсным источником для комбината. В последние годы горно-обогатительные и металлургические предприятия зарубежных стран широко используют техногенные отходы для производства различных строительных полуфабрикатов и дополнительного извлечения металлов. Это позволяет эффективно использовать накопившиеся на протяжении многих лет техногенные отходы и дополнительно извлекать многие ценные компоненты. Кроме того, глубокая переработка горных отходов способствует освобождению обширных площадей, ранее занимаемых для их хранения, что крайне важно для охраны окружающей среды и использования плодородных земель в сельском хозяйстве. В таблице 1 ниже представлена классификация отходов горнодобывающей и металлургической промышленности[6].

*Таблица 1*

**Классификация отходов горнодобывающей, металлургической и энергетической промышленности Алмалыка [6]**

| Т.р. | Горнодобывающая промышленность                                                                                 | Металлургическая промышленность    |
|------|----------------------------------------------------------------------------------------------------------------|------------------------------------|
| 1.   | Избыточнослоистые отходы от добычи медно-молибденовых, свинцово-цинковых, золотых руд и угольных месторождений | Отходы медеплавильной печи         |
| 2.   | Забалансовые рудные отходы при добыче медно-молибденовых, золотых, свинцово-цинковых и урановых руд            | Клинкерные отходы цинкового завода |
| 3.   | Отходы обогащения медно-молибденовых, свинцово-цинковых и золотых руд                                          | Конвертерная пыль                  |



Минералогические и геохимические процессы, прямо или косвенно связанные с природными процессами, приводящими к распространению и накоплению металлов в природных и техногенных экогеохимических системах, а также к образованию рудных месторождений, являются важным фактором, влияющим на окружающую среду. Добыча и переработка полезных ископаемых на различных месторождениях Алмалыкского горного региона приводят к накоплению миллиардов тонн техногенных отходов, включающих в себя важные для промышленности металлы и широкий спектр элементов, оказывающих вредное воздействие на окружающую среду.

В настоящее время в Алмалыкском рудном районе выявлено и эксплуатируется множество типов промышленных рудных месторождений и зон оруденения. Кроме того, развитие гидрогеохимических, биогеохимических и геохимических ореолов распределения рудных минералов и элементов значительно расширяет сферу влияния месторождений и площадей оруденения на окружающую среду, а высокая миграционная способность многих токсичных элементов (Zn (цинк), Cu (медь), Pb (свинец), Mo (молибден), Se (селен), Te (теллур), As, (мышьяк), Sb (сурьма) и др.) приводит к ухудшению экологической ситуации. Увеличение содержания Cu, Zn, Cd, Pb и Mo в воде Алмалыкского рудного района связано, в частности, с открытием концентраций природных руд.

Согласно исследованиям и расчетам, в техногенных отходах выявлены значительные запасы ценных для промышленности элементов (золото, серебро, медь, молибден, платина) и токсичных элементов (сера, селен, мышьяк, кадмий и другие). Все техногенные отходы характеризуются как сложные, открытые, стационарные системы. Под влиянием атмосферных осадков эти отходы подвергаются трансформации, и их вещественный состав постепенно меняется в новое состояние. Аридные климатические условия оказывают положительное влияние на процессы их выветривания и разрушения. Многолетний опыт изучения промышленных отходов показывает, что в результате длительного хранения отходов они интенсивно изменяются под воздействием подземных вод и атмосферных осадков, подвергаются окислению и другим процессам [5, 6, 7, 8]. Рассмотрим влияние токсичных элементов на здоровье человека в следующей таблице:

Таблица 2.

**Влияние токсичных элементов на здоровье человека** (Подготовлено на основе данных Всемирной организации здравоохранения)

| Т.р. | Опасный химический элемент | Пути воздействия                                      | Последствия                                                                                                                                                                          |
|------|----------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Мышьяк (As)                | Питьевая вода, дыхание через пыль, загрязненная пища  | а) Заболевания кожи (утолщение, пигментация).<br>б) Рак кожи, легких, мочевого пузыря<br>в) Периферическая невропатия (онемение конечностей).<br>г) Сердечно-сосудистые заболевания. |
| 2.   | Кадмий (Cd)                | Загрязненная питьевая вода и продукты питания.        | а) Почечная недостаточность<br>б) Остеопороз                                                                                                                                         |
| 3.   | Сурьма                     | Питьевая вода, дыхание через пыль, загрязненная пища. | а) Желудочно-кишечное расстройство<br>б) Повреждение функций печени и сердца<br>в) Заболевания дыхательных путей в отдаленном периоде                                                |
| 4.   | Висмут (Bi)                | В малых дозах полезно, в больших - токсично.          | а) Нервная система<br>б) Почечная недостаточность                                                                                                                                    |
| 5.   | Цинк (Zn)                  | В малом количестве полезно, в большом - вредно.       | а) Иммуитет нарушается<br>б) Желудочно-кишечные проблемы<br>в) Нарушается обмен меди.                                                                                                |

Алмалык (Алмалыкский горно-металлургический комбинат) - самая изученная территория в Узбекистане. В 21 точке были отобраны образцы почвы, определены 17 тяжелых металлов (Zn (цинк), Cu (медь), Pb (свинец), Mo (молибден), Se (селен), Te (теллур), As, (мышьяк), Sb (сурьма) и др.). Распространен до 60 км, загрязненный ветром [5, 6, 7, 8]. Эти данные показывают, что горные отходы оказывают влияние на здоровье населения не только на близлежащей территории, но и в большом радиусе.

В исследовании, опубликованном в базе данных Science Direct: В почвах вокруг Алмалыка выявлено не только общее количество металлов, но и высокая биодоступность для организмов. Наибольшая концентрация металлов обнаружена в радиусе 1-5 км от промышленных предприятий [5, 7, 8]. Изменение состава почвы из-за промышленных отходов указывает на нарушение минерального состава растений. Это косвенно влияет на здоровье населения через пищевую цепочку. Согласно статистике факторов риска развития рака, в 95% случаев рак возникает из-за плохой окружающей среды и образа жизни[3]. Наиболее распространенные заболевания в районах горного бассейна представлены в следующей таблице:

Таблица 3.

**Болезни, широко распространенные вокруг горно-металлургической промышленности** (Подготовлено на основе данных Всемирной организации здравоохранения)

| Т.р. | Название болезней             | Узкий диагноз                                                                                                                                             |
|------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Онкологические заболевания    | <ul style="list-style-type: none"> <li>• Рак легкого</li> <li>• Рак кожи</li> <li>• Рак мочевыводящих путей</li> </ul>                                    |
| 2.   | Заболевания дыхательных путей | <ul style="list-style-type: none"> <li>• Бронхит</li> <li>• Пневмокониоз</li> <li>• Обострение астмы</li> </ul>                                           |
| 3.   | Заболевания нервной системы   | <ul style="list-style-type: none"> <li>• Снижение памяти</li> <li>• Задержка умственного развития у детей</li> <li>• Периферическая невропатия</li> </ul> |
| 4.   | Заболевания почек и печени    | <ul style="list-style-type: none"> <li>• Хроническая нефропатия</li> <li>• Повышение печеночных ферментов</li> </ul>                                      |
| 5.   | Репродуктивные проблемы       | <ul style="list-style-type: none"> <li>• Бесплодие</li> <li>• Нарушение развития плода</li> </ul>                                                         |

Исследования, направленные на улучшение экологической ситуации в Алмалыкском горнодобывающем районе, сокращение отходов за счет переработки и изучение экологического состояния территорий, расположенных в зонах влияния, проводились учеными Научно-исследовательского института геологии и геофизики имени Х.М.Абдуллаева, Ташкентского химико-технологического института и Национального университета Узбекистана, исследования в основном были направлены на изучение влияния загрязнения почвы и растений на здоровье местного населения.

В заключение можно сказать, что по мере увеличения объема Алмалыкского горно-металлургического комбината из года в год увеличивается и количество его техногенных отходов (рис. 1). Техногенные отходы приводят к нарушению экологического баланса окружающей среды, биологического разнообразия, загрязнению почвы, подземных вод и воздуха вредными химическими элементами (таблица 2). В результате этого наносится серьезный ущерб здоровью населения. Исследования и научные выводы, а также искусственный интеллект рекомендуют следующие решения проблемы:

- Разработка мер по переработке и обезвреживанию техногенных отходов;

- Создание экологической карты в рамках влияния Алмалыкского горно-металлургического комбината и определение ее красной зоной радиуса 0-20 км, желтой зоной 20-50 км и зеленой зоной 50-70 км;

- неиспользование населенных пунктов, сельскохозяйственных угодий в красной зоне, строгий контроль за репродуктивным здоровьем населения, проживающего в желтых зонах, обеспечение постоянного контроля состава почвы земель, используемых в сельскохозяйственных целях;

- Уделение внимания здоровью работников комбината под постоянным врачебным наблюдением налаживание ежегодного отдыха в санаториях;

- Рекомендуется принять меры по переходу к "зеленой экономике."

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## **ПРИМЕНЕНИЕ ИГРОВЫХ ТЕХНОЛОГИЙ НА УРОКАХ МАТЕМАТИКИ В НАЧАЛЬНОЙ ШКОЛЕ С ЦЕЛЬЮ ПОВЫШЕНИЯ МОТИВАЦИИ У ОБУЧАЮЩИХСЯ**

**Аннотация.** В статье рассматривается проблема снижения учебной мотивации у младших школьников на уроках математики и возможности ее решения посредством применения игровых технологий. Раскрывается сущность игровых технологий как педагогического феномена, их классификация и психолого-педагогическое обоснование. Анализируется влияние дидактических игр на познавательную активность, формирование интереса к математике и развитие универсальных учебных действий. Представлены практические рекомендации по внедрению игровых технологий в образовательный процесс начальной школы.

**Ключевые слова:** игровые технологии, уроки математики, начальная школа, учебная мотивация, познавательная активность, младшие школьники, дидактические игры.

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## **THE USE OF GAME TECHNOLOGIES IN MATHEMATICS LESSONS IN PRIMARY SCHOOL TO INCREASE STUDENTS' MOTIVATION**

**Abstract.** The article examines the problem of decreasing educational motivation in primary school children during mathematics lessons and the possibilities of solving it through the use of game technologies. The essence of game technologies as a pedagogical phenomenon, their classification and psychological and pedagogical substantiation are revealed. The influence of didactic games on

*cognitive activity, the formation of interest in mathematics and the development of universal educational actions is analyzed. Practical recommendations for the introduction of game technologies into the educational process of primary school are presented.*

**Keywords:** *game technologies, mathematics lessons, primary school, educational motivation, cognitive activity, primary school children, didactic games.*

Одной из актуальных проблем современного начального образования является снижение учебной мотивации у младших школьников, особенно при изучении таких сложных предметов, как математика. Многие учащиеся воспринимают математику как скучную, абстрактную и трудную для понимания дисциплину, что приводит к потере интереса, снижению успеваемости и формированию негативного отношения к учебе в целом. В связи с этим перед учителем начальных классов встает задача поиска эффективных методов и приемов, способных повысить познавательную активность учащихся и сделать процесс обучения математике увлекательным и результативным. Одним из таких методов является применение игровых технологий, которые органично сочетают обучающую и развивающую функции с игровой деятельностью, естественной для детей младшего школьного возраста.

Понятие «игровые технологии» в педагогической науке трактуется как совокупность методов и приемов организации учебного процесса в форме различных педагогических игр, которые стимулируют познавательную активность учащихся и способствуют усвоению знаний, умений и навыков. В отличие от традиционного обучения, где игра выступает лишь как элемент занимательности, в игровых технологиях игра выполняет дидактическую функцию, являясь средством формирования учебных действий. Как отмечает С.А. Шмаков, игра для младшего школьника – это не просто развлечение, а способ познания мира, средство развития воображения, мышления и коммуникативных способностей.

Психолого-педагогическое обоснование применения игровых технологий в начальной школе базируется на возрастных особенностях детей 6–10 лет. В этом возрасте ведущей деятельностью постепенно становится учебная, однако игровая деятельность продолжает занимать значительное место в жизни ребенка. Игра обеспечивает эмоциональную включенность, снижает тревожность, создает ситуацию успеха и позволяет осваивать новый материал в комфортной, неформальной обстановке. Л.С. Выготский подчеркивал, что в игре ребенок всегда выше своего среднего возраста, выше своего обычного поведения; в игре он как бы на голову выше самого себя.

Классификация игровых технологий, применяемых на уроках математики в начальной школе, может быть представлена по различным основаниям. По характеру познавательной деятельности выделяют игры: репродуктивные (направленные на закрепление и повторение материала); продуктивные (требующие применения знаний в новой ситуации); творческие



(предполагающие самостоятельный поиск решения). По форме проведения различают: игры-путешествия, игры-соревнования, игры-лото, игры-кресворды, игры с использованием ИКТ. По месту в структуре урока: игры на этапе актуализации знаний (математические разминки, цепочки); игры на этапе изучения нового материала (создание проблемной ситуации, открытие новых знаний); игры на этапе закрепления (математические эстафеты, игры с карточками); игры на этапе контроля (математические турниры, КВН).

Рассмотрим конкретные примеры игровых технологий, направленных на повышение мотивации к изучению математики у младших школьников.

На этапе устного счета эффективны такие игры, как «Молчанка» (учитель показывает пример, ученики поднимают карточку с ответом), «Цепочка» (один ученик называет пример, другой – ответ и свой пример), «Математическая рыбалка» (на рыбках записаны примеры, ученик «ловит» рыбку и решает пример). Эти игры активизируют внимание, развивают вычислительные навыки и создают соревновательный момент.

При изучении геометрического материала используются игры «Найди фигуру» (по описанию найти нужную геометрическую фигуру), «Геометрическое лото» (закрыть фигуру, соответствующую названию), «Танграм» (составление фигур из геометрических частей). Такие игры развивают пространственное воображение, внимание и логическое мышление.

Для формирования умения решать задачи применяются игры-драматизации («Магазин», «Почта», «Путешествие»), где сюжет задачи разыгрывается с участием учеников. Это помогает детям лучше понять условие задачи, осознать ее смысл и найти способ решения. Например, в игре «Магазин» ученики выступают в роли продавцов и покупателей, рассчитывая стоимость покупки и сдачу.

На этапе закрепления знаний эффективны командные игры: «Математическая эстафета» (команды по очереди решают примеры на доске), «Своя игра» (выбор категории и сложности вопроса), «Математический бой» (команды предлагают друг другу задачи для решения). Такие игры формируют навыки работы в команде, ответственность за общий результат и здоровый дух соревнования.

Особого внимания заслуживают цифровые игровые технологии, которые становятся все более доступными в современной школе. Образовательные платформы (Учи.ру, ЯКласс, ЛогикЛайк) предлагают интерактивные задания в игровой форме с системой начисления баллов, рейтингами и виртуальными наградами. Использование таких платформ повышает мотивацию за счет элементов геймификации: индивидуальный прогресс, соревнование с одноклассниками, возможность повторного выполнения заданий для улучшения результата.

Эффективность применения игровых технологий на уроках математики подтверждается результатами педагогических наблюдений и исследований. У учащихся, с которыми систематически проводятся игровые занятия,

отмечается: повышение познавательной активности (увеличивается количество вопросов к учителю, желание выполнять дополнительные задания); рост успеваемости (особенно у слабоуспевающих учеников, которые в игре раскрепощаются и начинают лучше усваивать материал); снижение тревожности и страха перед ошибкой; формирование положительного отношения к предмету; развитие коммуникативных навыков (умение работать в паре, группе, договариваться, распределять роли).

Однако успешное применение игровых технологий требует соблюдения определенных педагогических условий. Во-первых, игра должна органично вписываться в структуру урока и соответствовать его целям и задачам. Во-вторых, необходимо четко определять дидактическую цель игры: что именно должно быть усвоено, закреплено или проверено. В-третьих, правила игры должны быть понятны и доступны всем учащимся. В-четвертых, игра не должна затягиваться по времени (оптимально 5–15 минут в зависимости от этапа урока и возраста детей). В-пятых, необходимо подводить итоги игры с обязательным поощрением всех участников (не только победителей, но и тех, кто старался).

Таким образом, игровые технологии являются эффективным средством повышения учебной мотивации на уроках математики в начальной школе. Они позволяют превратить процесс обучения в увлекательную деятельность, активизировать познавательный интерес, снизить психологические барьеры и создать ситуацию успеха для каждого ученика. При этом важно помнить, что игра на уроке – это не самоцель, а средство достижения образовательных результатов. Только при условии продуманного, методически обоснованного включения игр в учебный процесс они дают ожидаемый педагогический эффект. Дальнейшие направления работы в этой области связаны с разработкой новых видов игр, учитывающих современные образовательные технологии и цифровые ресурсы, а также с созданием системы мониторинга мотивационных изменений у младших школьников.

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## **ТЕОРЕТИКО-ПЕДАГОГИЧЕСКИЕ ПОДХОДЫ И МЕТОДИКА ФОРМИРОВАНИЯ ПРАВОВОЙ, ЦИФРОВОЙ И ДУХОВНО- ПРАВСТВЕННОЙ КУЛЬТУРЫ ОБУЧАЮЩИХСЯ**

**Аннотация:** В статье рассматриваются теоретико-педагогические подходы и методика формирования правовой, цифровой и духовно-нравственной культуры обучающихся в условиях цифровой трансформации общества. Особое внимание уделяется влиянию технологий искусственного интеллекта на образовательный процесс, а также необходимости подготовки обучающихся к ответственному и безопасному использованию цифровых технологий. Раскрыты основные педагогические подходы, обеспечивающие комплексное развитие личности, а также проанализированы особенности формирования правовой, цифровой и духовно-нравственной культуры. Предложена поэтапная методика формирования данных компонентов и определены условия её эффективной реализации.

**Ключевые слова:** искусственный интеллект, цифровизация образования, цифровая трансформация, правовая культура, цифровая культура, духовно-нравственная культура, педагогические подходы, компетентностный подход, цифровая грамотность, информационная безопасность, критическое мышление, этика искусственного интеллекта, методика обучения, образовательные технологии, социализация обучающихся.

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## THEORETICAL AND PEDAGOGICAL APPROACHES AND METHODOLOGIES FOR DEVELOPING STUDENTS' LEGAL, DIGITAL, AND SPIRITUAL-MORAL CULTURE

**Abstract:** *This article examines theoretical and pedagogical approaches and methods for developing students' legal, digital, and spiritual-moral culture in the context of the digital transformation of society. Particular attention is paid to the impact of artificial intelligence technologies on the educational process, as well as the need to prepare students for the responsible and safe use of digital technologies. The article explores key pedagogical approaches that support comprehensive personal development, and analyzes the specifics of developing legal, digital, and spiritual-moral culture. A step-by-step methodology for developing these components is proposed, and the conditions for its effective implementation are defined.*

**Keywords:** *artificial intelligence, digitalization of education, digital transformation, legal culture, digital culture, spiritual-moral culture, pedagogical approaches, competency-based approach, digital literacy, information security, critical thinking, artificial intelligence ethics, teaching methods, educational technologies, student socialization.*

Современный этап развития общества характеризуется глубокой цифровой трансформацией, охватывающей все сферы жизнедеятельности, включая систему образования. Одним из ключевых факторов данной трансформации является внедрение технологий искусственного интеллекта, которые оказывают существенное влияние на содержание, формы и методы обучения.

В условиях цифровизации образования особую актуальность приобретает задача формирования у обучающихся не только профессиональных знаний и навыков, но и комплексной культуры, включающей правовые, цифровые и духовно-нравственные компоненты.

Это обусловлено тем, что использование искусственного интеллекта связано с принятием решений, затрагивающих права человека, этические нормы и социальные ценности. Иными словами, современный обучающийся должен быть не только пользователем технологий, но и ответственным субъектом цифрового общества. Следует отметить, что традиционные образовательные подходы не в полной мере соответствуют требованиям цифровой эпохи.

Это означает необходимость пересмотра педагогических моделей и внедрения новых теоретико-методологических подходов, ориентированных на формирование личности, способной эффективно и безопасно взаимодействовать с технологиями искусственного интеллекта<sup>34</sup>. Проще

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<sup>34</sup> Современные педагогические подходы в условиях цифровизации образования.

говоря, образование должно адаптироваться к новым условиям и готовить обучающихся к жизни в цифровом обществе.

**Теоретико-педагогические подходы к формированию культуры обучающихся.** В современной педагогической науке существует ряд подходов, которые могут быть использованы для формирования правовой, цифровой и духовно-нравственной культуры обучающихся в условиях использования искусственного интеллекта.

Прежде всего следует выделить компетентностный подход, который ориентирован на формирование у обучающихся совокупности знаний, умений и навыков, необходимых для практической деятельности<sup>35</sup>.

В контексте использования искусственного интеллекта данный подход предполагает развитие способности анализировать информацию, принимать обоснованные решения и нести ответственность за их последствия.

Это означает, что обучающийся должен не просто знать, как работает технология, но и понимать, как её применять в реальных условиях. Следующим важным подходом является системный подход, который рассматривает процесс обучения как целостную систему взаимосвязанных элементов.

Применительно к формированию культуры обучающихся это означает необходимость комплексного воздействия на личность, включающего образовательные, воспитательные и социальные аспекты<sup>36</sup>. Иными словами, формирование правовой, цифровой и нравственной культуры должно осуществляться не изолированно, а в единстве. Особое значение имеет личностно-ориентированный подход, который предполагает учет индивидуальных особенностей обучающихся, их интересов, потребностей и ценностных установок.

В условиях использования искусственного интеллекта данный подход позволяет формировать у обучающихся осознанное отношение к технологиям и их роли в жизни человека. Проще говоря, каждый обучающийся должен понимать значение технологий именно для себя. Важным является также аксиологический (ценностный) подход, который ориентирован на формирование у обучающихся системы ценностей и моральных ориентиров<sup>37</sup>.

В контексте искусственного интеллекта это означает развитие понимания этических аспектов использования технологий, включая вопросы справедливости, ответственности и недопущения вреда.

Это особенно важно, поскольку технологии сами по себе не обладают моралью, а решения о их использовании принимает человек. Кроме того, необходимо выделить цифровой (инновационный) подход, который предполагает активное использование современных технологий в образовательном процессе.

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<sup>35</sup> Компетентностный подход в системе образования.

<sup>36</sup> Системный подход в педагогике и его применение в образовательном процессе.

<sup>37</sup> Аксиологический подход и формирование ценностей обучающихся.



Данный подход направлен на формирование цифровой грамотности, а также навыков работы с искусственным интеллектом<sup>38</sup>. Иными словами, обучающиеся должны не только изучать технологии, но и активно использовать их в процессе обучения. Следует отметить, что указанные подходы не существуют изолированно, а дополняют друг друга, формируя комплексную педагогическую модель. Их сочетание позволяет обеспечить всестороннее развитие личности обучающегося и подготовить его к эффективному взаимодействию с технологиями искусственного интеллекта.

Таким образом, теоретико-педагогические подходы создают основу для формирования правовой, цифровой и духовно-нравственной культуры обучающихся, что является необходимым условием их успешной социализации в условиях цифрового общества.

**Формирование правовой культуры обучающихся в условиях использования искусственного интеллекта.** В условиях активного внедрения технологий искусственного интеллекта в образовательную среду особую значимость приобретает формирование правовой культуры обучающихся. Это связано с тем, что использование цифровых технологий затрагивает широкий круг правовых отношений, включая защиту персональных данных, соблюдение авторских прав, ответственность за распространение информации и иные аспекты. Иными словами, современный обучающийся должен обладать не только техническими навыками, но и пониманием правовых последствий использования искусственного интеллекта.

Правовая культура обучающихся представляет собой совокупность знаний, умений и ценностных установок, направленных на соблюдение норм права в процессе использования цифровых технологий<sup>39</sup>. Она включает в себя осознание прав и обязанностей, умение применять правовые нормы на практике, а также готовность нести ответственность за свои действия. Проще говоря, правовая культура — это способность действовать в цифровой среде законно и ответственно.

Одним из ключевых элементов формирования правовой культуры является изучение основ законодательства, регулирующего цифровую сферу. Это включает нормы, связанные с защитой персональных данных, информационной безопасностью, интеллектуальной собственностью и использованием цифровых технологий. Это означает, что обучающиеся должны понимать, какие действия являются правомерными, а какие — нарушают закон.

Особое внимание следует уделить вопросам защиты персональных данных. В условиях использования искусственного интеллекта обработка

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<sup>38</sup> Цифровая трансформация образования и инновационные педагогические технологии.

<sup>39</sup> Понятие и структура правовой культуры личности.



данных приобретает массовый характер, что увеличивает риски их утечки или неправомерного использования<sup>40</sup>.

В связи с этим обучающиеся должны осознавать значение конфиденциальности информации и соблюдать правила её защиты. Иными словами, необходимо формировать ответственное отношение к обработке данных как своих, так и чужих.

Важным аспектом является также формирование понимания ответственности за действия в цифровой среде. Использование искусственного интеллекта может повлечь правовые последствия, особенно в случаях распространения недостоверной информации или нарушения прав других лиц<sup>41</sup>. Это означает, что обучающиеся должны понимать последствия своих действий и уметь прогнозировать возможные риски.

Следует также учитывать вопросы соблюдения авторских прав при использовании технологий искусственного интеллекта. В частности, использование текстов, изображений и других материалов, созданных с помощью ИИ, может затрагивать права их авторов. Проще говоря, обучающиеся должны знать, что не вся информация в интернете является свободной для использования. Кроме того, важным направлением является формирование навыков правовой оценки информации.

В условиях распространения фейковых новостей и манипуляций обучающиеся должны уметь анализировать источники информации и определять их достоверность. Это означает развитие критического мышления как элемента правовой культуры.

Формирование правовой культуры должно осуществляться с использованием различных педагогических методов.

К ним относятся:

- анализ правовых ситуаций (кейсов);
- моделирование конфликтных ситуаций;
- обсуждение правовых вопросов;
- практические задания.

Иными словами, обучение должно носить практико-ориентированный характер. Таким образом, формирование правовой культуры обучающихся является необходимым условием их успешной адаптации к цифровой среде и безопасного использования технологий искусственного интеллекта.

**Формирование цифровой культуры обучающихся в условиях использования искусственного интеллекта.** В условиях цифровой трансформации общества формирование цифровой культуры обучающихся становится одной из ключевых задач современной системы образования. Особую актуальность данный вопрос приобретает в связи с широким внедрением технологий искусственного интеллекта, которые существенно изменяют способы получения, обработки и использования информации.

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<sup>40</sup> Защита персональных данных в условиях цифровой образовательной среды.

<sup>41</sup> Правовая ответственность в цифровом пространстве.

Цифровая культура представляет собой совокупность знаний, умений и навыков, позволяющих эффективно, безопасно и ответственно использовать цифровые технологии в различных сферах жизнедеятельности<sup>42</sup>. Иными словами, это не просто умение пользоваться технологиями, а способность понимать их сущность, возможности и ограничения. Одним из важнейших элементов цифровой культуры является цифровая грамотность. Она включает в себя умение работать с информацией, анализировать данные, использовать цифровые инструменты и технологии, включая системы искусственного интеллекта. Это означает, что обучающиеся должны не только уметь пользоваться ИИ, но и понимать принципы его функционирования. Проще говоря, важно не просто «использовать», а «осознавать», как работает технология.

Особое значение в формировании цифровой культуры имеет развитие критического мышления. В условиях активного применения искусственного интеллекта возрастает риск некритичного восприятия информации, генерируемой алгоритмами. Это может приводить к распространению недостоверных данных и ошибочным решениям<sup>43</sup>. Иными словами, обучающиеся должны уметь проверять информацию, анализировать её и не полагаться полностью на выводы ИИ.

Важным аспектом является формирование навыков безопасного поведения в цифровой среде. Использование искусственного интеллекта связано с обработкой данных, что требует соблюдения правил информационной безопасности. Это означает, что обучающиеся должны знать, как защищать свои данные, избегать цифровых угроз и правильно использовать онлайн-ресурсы. Кроме того, цифровая культура включает в себя умение взаимодействовать с искусственным интеллектом как с инструментом обучения.

ИИ может использоваться для:

- поиска информации;
- анализа данных;
- выполнения учебных заданий;
- персонализации образовательного процесса.

Однако важно понимать, что искусственный интеллект не должен заменять самостоятельное мышление обучающегося. Проще говоря, ИИ — это помощник, а не замена человека. Особое внимание следует уделить формированию ответственности при использовании цифровых технологий.

Обучающиеся должны осознавать последствия своих действий в цифровой среде, включая распространение информации и использование результатов работы ИИ. Это означает, что цифровая культура тесно связана с правовой и нравственной культурой. Следует отметить, что формирование

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<sup>42</sup> Цифровая культура и цифровая грамотность обучающихся.

<sup>43</sup> Критическое мышление в условиях использования искусственного интеллекта.

цифровой культуры требует использования современных педагогических методов.

К ним относятся:

- проектная деятельность с использованием ИИ;
- работа с цифровыми платформами;
- анализ результатов, полученных с помощью ИИ;
- практические задания по работе с данными.

Иными словами, обучение должно быть ориентировано на практику и реальное использование технологий. Таким образом, формирование цифровой культуры обучающихся является необходимым условием их успешной адаптации к цифровому обществу и эффективного использования технологий искусственного интеллекта.

**Формирование духовно-нравственной культуры обучающихся в условиях использования искусственного интеллекта.** В условиях стремительного развития технологий искусственного интеллекта особую значимость приобретает формирование духовно-нравственной культуры обучающихся. Это обусловлено тем, что внедрение цифровых технологий влияет не только на образовательные процессы, но и на систему ценностей, мировоззрение и поведенческие установки личности. Иными словами, искусственный интеллект трансформирует не только способы обучения, но и отношение человека к окружающему миру, обществу и самому себе.

Духовно-нравственная культура представляет собой совокупность моральных принципов, ценностей и норм поведения, которые определяют отношение человека к другим людям, обществу и технологиям<sup>44</sup>. Она включает такие элементы, как ответственность, справедливость, уважение, честность и гуманизм. Проще говоря, это основа, которая определяет, как именно человек будет использовать технологии. Одним из ключевых аспектов формирования духовно-нравственной культуры является развитие этического отношения к использованию искусственного интеллекта. Это означает, что обучающиеся должны понимать, что технологии не являются нейтральными инструментами, а могут оказывать влияние на людей и общество.

В частности, важно формировать понимание недопустимости использования ИИ для причинения вреда, распространения дезинформации или дискриминации<sup>45</sup>. Иными словами, необходимо воспитывать ответственное отношение к технологиям. Особое значение имеет формирование принципа справедливости.

Алгоритмы искусственного интеллекта могут принимать решения, которые затрагивают интересы различных групп людей, поэтому важно, чтобы обучающиеся осознавали необходимость равного и недискриминационного подхода. Это означает, что при использовании

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<sup>44</sup> Духовно-нравственная культура личности в современном обществе.

<sup>45</sup> Этические аспекты использования искусственного интеллекта.

технологий необходимо учитывать интересы всех участников общественных отношений.

Кроме того, важным элементом является развитие ответственности за принимаемые решения. Даже если решение принимается с использованием искусственного интеллекта, ответственность за его последствия остаётся за человеком. Проще говоря, нельзя перекладывать ответственность на технологию. Следует также учитывать влияние искусственного интеллекта на формирование мировоззрения обучающихся.

Чрезмерное использование технологий может привести к снижению уровня эмпатии, критического мышления и самостоятельности. В этой связи важно сохранять баланс между использованием технологий и развитием человеческих качеств. Иными словами, технологии не должны заменять человеческие ценности.

Важным направлением является формирование культуры общения в цифровой среде. Использование искусственного интеллекта и цифровых платформ требует соблюдения норм уважительного общения, недопущения агрессии и дискриминации. Это означает, что обучающиеся должны уметь взаимодействовать с другими участниками цифрового пространства на основе этических норм. Формирование духовно-нравственной культуры должно осуществляться с использованием различных педагогических методов.

К ним относятся:

- обсуждение этических дилемм, связанных с ИИ;
- анализ реальных ситуаций;
- проведение дискуссий и дебатов;
- воспитательные мероприятия.

Иными словами, важно не только передавать знания, но и формировать ценностные установки. Таким образом, духовно-нравственная культура является важнейшим элементом подготовки обучающихся к жизни в условиях цифрового общества и использования технологий искусственного интеллекта.

**Методика формирования правовой, цифровой и духовно-нравственной культуры обучающихся.** Формирование правовой, цифровой и духовно-нравственной культуры обучающихся в условиях использования искусственного интеллекта требует разработки комплексной методики, ориентированной на интеграцию образовательных, воспитательных и практических компонентов. Иными словами, речь идёт не просто о передаче знаний, а о системном формировании личности, способной ответственно и эффективно взаимодействовать с современными технологиями.

Методика формирования должна основываться на поэтапном подходе, обеспечивающем последовательное развитие у обучающихся необходимых компетенций и ценностных установок<sup>46</sup>.

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<sup>46</sup> Методика формирования компетенций в образовательном процессе.

## **Этапы формирования:**

### **1. Когнитивный этап (этап знаний).**

На данном этапе осуществляется формирование базовых знаний об искусственном интеллекте, его возможностях, рисках и правовых аспектах использования.

Обучающиеся изучают:

- основы функционирования ИИ;
- правовые нормы цифровой среды;
- принципы информационной безопасности;
- этические аспекты технологий.

Это означает, что закладывается фундамент для дальнейшего осознанного использования технологий. Проще говоря, сначала обучающийся должен понять, что такое ИИ и как он работает.

### **2. Ценностно-ориентационный этап.**

Данный этап направлен на формирование у обучающихся устойчивых ценностных установок, связанных с ответственным использованием технологий.

Особое внимание уделяется:

- пониманию прав и обязанностей;
- формированию чувства ответственности;
- осознанию последствий использования ИИ;
- развитию этического мышления<sup>47</sup>.

Иными словами, обучающийся начинает не просто знать, а оценивать свои действия с точки зрения морали и права.

### **3. Практико-деятельностный этап.**

На данном этапе происходит закрепление полученных знаний и ценностей через практическую деятельность.

Обучающиеся:

- работают с системами искусственного интеллекта;
- решают кейсы и практические задачи;
- анализируют реальные ситуации;
- выполняют проекты с использованием ИИ.

Это означает, что знания переходят в реальные навыки. Проще говоря, обучающийся учится применять ИИ правильно и безопасно.

### **4. Рефлексивный этап.**

Заключительный этап направлен на осмысление обучающимися собственного опыта взаимодействия с технологиями.

Он включает:

- самооценку действий;
- анализ допущенных ошибок;
- обсуждение результатов деятельности;
- формирование личной позиции.

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<sup>47</sup> Формирование ценностных ориентаций обучающихся.

Иными словами, обучающийся учится думать о своих действиях и их последствиях.

### **Педагогические методы и инструменты.**

Для эффективной реализации данной методики необходимо использовать разнообразные педагогические методы.

К ним относятся:

1. Кейс-метод: Анализ реальных или смоделированных ситуаций, связанных с использованием искусственного интеллекта.

Это позволяет обучающимся:

- понимать правовые и этические проблемы;
- находить решения;
- оценивать последствия.

2. Проектная деятельность: Обучающиеся разрабатывают проекты с использованием ИИ, что способствует развитию практических навыков и ответственности.

3. Дискуссии и дебаты: Обсуждение вопросов, связанных с этикой и правом в сфере ИИ.

Это развивает:

- критическое мышление;
- умение аргументировать;
- способность учитывать различные точки зрения.

4. Использование цифровых платформ и ИИ: Применение образовательных технологий и систем искусственного интеллекта в процессе обучения.

Это позволяет:

- персонализировать обучение;
- повысить его эффективность;
- сформировать цифровые навыки.

5. Моделирование ситуаций: Создание учебных ситуаций, требующих принятия решений с учётом правовых и этических норм.

### **Условия эффективной реализации методики.**

Для успешного формирования культуры обучающихся необходимо соблюдение ряда условий:

- интеграция ИИ в образовательный процесс;
- подготовка педагогических кадров;
- наличие нормативной базы;
- использование современных технологий;
- учет возрастных и индивидуальных особенностей обучающихся.

Иными словами, методика должна быть поддержана на уровне всей образовательной системы. Таким образом, методика формирования правовой, цифровой и духовно-нравственной культуры обучающихся представляет собой комплексную систему, включающую поэтапное развитие знаний, ценностей и практических навыков. Её реализация позволяет подготовить обучающихся к ответственному и безопасному использованию



искусственного интеллекта, что является необходимым условием их успешной социализации в условиях цифрового общества.

Таким образом, в условиях стремительной цифровой трансформации общества и активного внедрения технологий искусственного интеллекта в образовательную среду существенно возрастает значение формирования у обучающихся правовой, цифровой и духовно-нравственной культуры. Данные компоненты выступают взаимосвязанными элементами единой системы, обеспечивающей гармоничное развитие личности и её готовность к эффективному функционированию в цифровом обществе.

Проведённый анализ показал, что современные образовательные реалии требуют переосмысления традиционных педагогических подходов и их адаптации к условиям цифровизации. Использование комплекса теоретико-педагогических подходов, включая компетентностный, системный, личностно-ориентированный, аксиологический и цифровой, позволяет обеспечить не только формирование знаний и навыков, но и развитие ценностных ориентиров, критического мышления и ответственности обучающихся.

Установлено, что правовая культура играет ключевую роль в обеспечении законного и безопасного поведения в цифровой среде, включая соблюдение норм в области защиты персональных данных и интеллектуальной собственности. В свою очередь, цифровая культура способствует развитию у обучающихся навыков эффективного использования технологий, способности анализировать информацию и противостоять цифровым рискам. Духовно-нравственная культура формирует этические основы поведения личности, обеспечивая осознанное и ответственное отношение к применению технологий искусственного интеллекта.

Особую значимость имеет разработанная в рамках исследования поэтапная методика формирования указанных компонентов, включающая когнитивный, ценностно-ориентационный, практико-деятельностный и рефлексивный этапы. Данная методика обеспечивает последовательное формирование знаний, ценностей и практических навыков, а также способствует развитию способности обучающихся к самостоятельному анализу и оценке собственной деятельности.

Эффективность реализации предложенной методики зависит от ряда условий, среди которых особое значение имеют интеграция цифровых технологий в образовательный процесс, повышение квалификации педагогических кадров, создание нормативно-правовой базы и использование современных образовательных технологий. Только при комплексном подходе возможно достижение устойчивых результатов в формировании культуры обучающихся.

В целом результаты исследования подтверждают необходимость модернизации системы образования с учётом вызовов цифровой эпохи. Практическая значимость работы заключается в возможности применения предложенной методики в образовательной практике для подготовки

обучающихся к ответственному, безопасному и этически обоснованному использованию технологий искусственного интеллекта.

Перспективы дальнейших исследований связаны с разработкой конкретных образовательных программ, внедрением цифровых инструментов обучения и оценкой эффективности формирования правовой, цифровой и духовно-нравственной культуры в реальных образовательных условиях.

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## **ПРОБЛЕМЫ УЧАСТИЯ СУБЪЕКТОВ ОХРАННОЙ ДЕЯТЕЛЬНОСТИ В ГРАЖДАНСКО-ПРАВОВЫХ ОТНОШЕНИЯХ**

**Аннотация:** В данной статье исследуются вопросы участия субъектов охранной деятельности в гражданско-правовых отношениях. Особое внимание уделяется правовой природе охранной деятельности, ее двойственной (публично-правовой и частноправовой) сущности, а также договору охраны как основанию возникновения гражданских прав и обязанностей. Анализируются функции договора охраны, его роль в обеспечении защиты объектов гражданских прав от противоправных посягательств и значение в системе гражданского оборота. Обосновывается, что субъекты охранной деятельности выступают как полноценные участники гражданско-правовых отношений, реализующие свои права и обязанности преимущественно на договорной основе. Сделан вывод о необходимости дальнейшего теоретического осмысления и совершенствования правового регулирования данной сферы.

**Ключевые слова:** охранная деятельность, договор охраны, гражданско-правовые отношения, юридические факты, субъекты гражданского права, услуги охраны, ответственность, защита прав, предпринимательская деятельность, безопасность.

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## **ISSUES OF PARTICIPATION OF SECURITY ACTIVITY SUBJECTS IN CIVIL LAW RELATIONS**

**Annotation:** This article examines the issues related to the participation of security service entities in civil law relations. Particular attention is paid to the legal nature of security activities, their dual (public and private law) character, and the security contract as a legal basis for the emergence of civil rights and

*obligations. The study analyzes the functions of the security contract, its role in protecting objects of civil rights from unlawful encroachments, and its significance within the system of civil circulation. It is substantiated that security service entities act as full-fledged participants in civil law relations, exercising their rights and obligations primarily on a contractual basis. The article concludes with the need for further theoretical development and improvement of legal regulation in this field.*

**Keywords:** security activity, security contract, civil law relations, legal facts, subjects of civil law, security services, liability, protection of rights, entrepreneurial activity, safety

Гражданско-правовые отношения выступают как правовое выражение экономических и социальных связей в обществе и составляют основное ядро предмета гражданского права. Отношения, возникающие в процессе удовлетворения различных потребностей человека и организаций, первоначально имеют социально-экономический характер. Однако после их регулирования государством посредством правовых норм они трансформируются в гражданско-правовые отношения.

С научной точки зрения гражданско-правовое отношение представляет собой имущественное либо личное неимущественное отношение между юридически равными субъектами, основанное на их воле и регулируемое нормами гражданского права.[1] В данном определении содержится несколько ключевых концептуальных элементов.

Во-первых, гражданско-правовое отношение проявляется как юридизированная форма общественного отношения. Когда экономические связи приобретают форму правовых отношений, они превращаются в систему прав и обязанностей, признанных и защищаемых государством.

Во-вторых, данное отношение основывается на принципе автономии воли. Согласно части 2 статьи 1 Гражданского кодекса, физические и юридические лица приобретают гражданские права по своей воле и осуществляют их в своих интересах. Данное обстоятельство является одним из основных методологических признаков, отличающих гражданское право от административного или семейного права.

В-третьих, гражданско-правовое отношение рассматривается как правовое отражение экономических отношений. Поскольку имущественные и товарно-денежные отношения составляют экономический фундамент общества, государство обеспечивает стабильность экономической системы посредством их регулирования правовыми нормами.

Гражданско-правовые отношения обладают рядом специфических особенностей, которые отличают их от других видов правовых отношений. К таким признакам относятся следующие.

а) Юридическое равенство субъектов. Данный признак означает, что ни одна из сторон, вступающих в отношения, не обладает юридическим превосходством над другой. Юридическое равенство не означает

имущественного или социального равенства; оно выражает процессуальную самостоятельность сторон при принятии и исполнении прав и обязанностей на основе свободы волеизъявления.

б) Имущественный и личный неимущественный характер предмета. Гражданско-правовые отношения охватывают не только отношения, связанные с материальными благами, но и личные неимущественные отношения, связанные с имуществом (например, имя, деловая репутация, авторские права и др.).

в) Широта сферы регулирования. Гражданско-правовые отношения охватывают широкий круг экономических связей, включая куплю-продажу, аренду, заем, поставку продукции, договор подряда и другие виды договоров.

г) Возможность принудительного исполнения. В случае добровольного неисполнения обязательств государство применяет механизмы принудительного исполнения (судебное решение, исполнительный лист и др.).

д) Трехэлементная структура. Любое гражданско-правовое отношение включает три самостоятельных элемента: субъект, содержание и объект.[2]

Гражданско-правовые отношения не возникают сами по себе, а формируются на основе определенных юридических фактов. Юридические факты представляют собой жизненные обстоятельства, вызывающие возникновение, изменение или прекращение гражданских прав и обязанностей. В зависимости от связи с волей субъектов они подразделяются на две основные группы: события и действия.

Согласно статье 8 Гражданского кодекса, гражданские права и обязанности возникают из оснований, прямо предусмотренных законом, а также из действий, которые хотя и не предусмотрены законом, но не противоречат общим принципам гражданского права. Данная норма отражает диспозитивный и открытый характер гражданского права. Иными словами, правовые отношения не ограничиваются исключительно законом — свободная воля субъектов также признается источником возникновения прав.

Следует отметить, что в соответствии с Гражданским кодексом гражданские права и обязанности возникают из договоров и иных сделок, предусмотренных законом, а также из договоров и иных сделок, которые хотя и не предусмотрены законом, но не противоречат ему.

В возникновении гражданско-правовых отношений решающую роль играют юридические факты. Среди них особое значение имеют действия, зависящие от воли субъектов, которые выступают основной движущей силой гражданского оборота. Вступление субъектов, осуществляющих охранную деятельность, в гражданско-правовые отношения также осуществляется прежде всего посредством таких действий. При этом государственные подразделения охраны, ведомственные военизированные и сторожевые структуры участвуют в гражданском обороте в качестве самостоятельных субъектов, формируя свои права и обязанности посредством определенных юридических действий.



Как установлено статьёй 8 Гражданского кодекса, гражданские права и обязанности, прежде всего, возникают из договоров и иных сделок. Данная норма выражает диспозитивную природу гражданского права, то есть принцип, предоставляющий субъектам возможность самостоятельно формировать правовые отношения. В сфере охранной деятельности данное правило приобретает особое значение, поскольку именно посредством договорных отношений определяются содержание, объём и условия оказания охранных услуг.

Договор об оказании охранных услуг по своей правовой природе представляет собой специальную разновидность обязательственных отношений по возмездному оказанию услуг в гражданском праве. В соответствии с таким договором одна сторона — субъект охранной деятельности (исполнитель) — принимает на себя обязательство обеспечить безопасность определённого объекта, защитить его от внешних и внутренних угроз, тогда как другая сторона — заказчик — обязуется оплатить оказанные услуги. Таким образом, договор как юридический факт порождает взаимосвязанные права и обязанности сторон.

С научной точки зрения договор охраны представляет собой не просто обычное обязательство по оказанию услуг, а комплексную систему обязательств, направленных на обеспечение безопасности. При этом действия субъекта охранной деятельности не ограничиваются пассивным наблюдением, а включают профилактические меры, устранение угроз, использование технических средств, а также принятие экстренных мер при необходимости. Следовательно, юридическое действие в данном случае имеет продолжительный характер и проявляется не только в момент заключения договора, но и в процессе его исполнения.

Правовой статус субъектов охранных отношений также обладает определённой спецификой. С одной стороны, субъект охранной деятельности выступает как самостоятельный участник гражданско-правовых отношений, с другой — его деятельность в определённой степени регулируется государством. Это свидетельствует о смешанном характере данных отношений, сочетающих элементы публичного и частного права. Однако содержание и правовые последствия отношений, возникающих на основе договора, прежде всего определяются нормами гражданского права.

С этой точки зрения участие субъектов охранной деятельности в гражданском обороте осуществляется посредством действий, выступающих юридическими фактами, в частности через заключение договора. Именно договор выступает основным механизмом формирования и развития гражданско-правовых отношений. Это, в свою очередь, позволяет рассматривать охранные услуги как один из самостоятельных и сложных институтов гражданского права.

Проведённые исследования показали, что в практике гражданского оборота предпринимательское содержание охранной деятельности проявляется через её функции. Под данными функциями понимаются



направления правового воздействия охранных организаций, которые реализуются посредством оказания охранных услуг и направлены на защиту охраняемых объектов от противоправных посягательств на основе договора охраны.[3] Таким образом, функции данной предпринимательской деятельности проявляются через основные направления действий сторон договора охраны, что, в свою очередь, позволяет говорить о наличии специфических функций самого договора.

Как отмечает Н.А. Баринов, «действие договоров обеспечивает более эффективное удовлетворение потребностей их сторон».[4] Кроме того, наличие функций договора подтверждается и современной доктриной гражданского права.[5] Исходя из правового содержания охранной деятельности, её принципов и функций, а также юридической природы договора охраны, можно выделить следующие функции данного договора:

1. регулятивную;
2. связующую (обеспечивающую взаимосвязь сторон);
3. юридиико-фактическую;
4. охранительную (защитную);
5. интеграционную;
6. инициативную;
7. функцию разрешения споров;
8. социально-трудовую функцию.[6]

Вместе с тем, несмотря на значимость указанного подхода, направленного на раскрытие предпринимательского содержания охранной деятельности через её функции, в современной доктрине гражданского права его нельзя рассматривать как абсолютно универсальный. Данная позиция порождает ряд теоретических проблем. В частности, научно дискуссионным является вопрос о полном отождествлении функций охранной деятельности с функциями договора.

Прежде всего, хотя утверждение о том, что функции охранной деятельности формируются исходя из содержания предпринимательской деятельности, в определённой степени является обоснованным, её правовая природа не ограничивается исключительно рамками договорных отношений. Охранная деятельность представляет собой комплексный институт, который одновременно включает элементы публичного и частного права. В связи с этим толкование её функций исключительно в рамках гражданско-правового договора не позволяет в полной мере раскрыть её сущность.

Высказанное Н.А. Бариновым положение о том, что «действие договоров обеспечивает более эффективное удовлетворение потребностей их сторон», безусловно, соответствует классическим принципам гражданского права. Однако применение данного тезиса к договору охраны требует определённой осторожности. Это обусловлено тем, что цель охранных услуг заключается не только в удовлетворении частных интересов заказчика, но и в обеспечении общественной безопасности в более широком смысле. Следовательно, функция договора в данном случае ограничивается не только

диспозитивными и добровольными отношениями, но в определённой степени также императивными требованиями.

Вместе с тем, хотя разделение функций договора охраны на регулятивные, связующие, юридико-фактические и иные виды теоретически представляется обоснованным, некоторые из них следует рассматривать не как самостоятельные функции, а как проявление общих характеристик, присущих всем гражданско-правовым договорам. Например, «связующая» или «юридико-фактическая» функции являются универсальными признаками любого договора, поэтому выделение их в качестве самостоятельных функций, характерных исключительно для договора охраны, представляется научно дискуссионным.

Кроме того, отнесение «социально-трудовой функции» к числу самостоятельных функций договора охраны также вызывает определённые сомнения. Это объясняется тем, что данная функция по своей природе ближе к сфере трудового права или права социального обеспечения и не вытекает непосредственно из содержания гражданско-правового договора. С этой точки зрения её целесообразно рассматривать не как внутреннюю функцию договора, а как проявление его внешнего социального воздействия.

Вместе с тем особое внимание заслуживает охранительная функция договора охраны, которая выступает его основным отличительным признаком по сравнению с другими договорами. Именно благодаря данной функции охранные отношения отличаются от традиционных отношений по оказанию услуг в гражданском праве и формируют его специфическую правовую природу.

Подводя итог, следует отметить, что при анализе функций договора охраны необходимо дифференцировать их на:

- универсальные функции, присущие всем гражданско-правовым договорам;
- и специальные функции, характерные непосредственно для охранной деятельности.

В противном случае чрезмерное расширение или некорректная классификация функций договора может привести к утрате научной точности.

Анализ норм Закона Республики Узбекистан «Об охранной деятельности» № ЗРУ-778 от 15 июня 2022 года показывает,<sup>[7]</sup> что значительная часть отношений в данной сфере имеет договорный (гражданско-правовой) характер и, прежде всего, формируется посредством договора об оказании охранных услуг. Ряд положений закона непосредственно определяет содержание, субъектный состав и правовые последствия указанных договорных отношений.

Прежде всего, в статье 13 закона чётко определены субъекты, осуществляющие охранную деятельность на договорной основе. В соответствии с данной нормой Национальная гвардия Республики Узбекистан, Министерство обороны и Министерство внутренних дел обладают правом осуществлять охрану определённых объектов на основании

договора. Данное положение прямо указывает на гражданско-правовую природу охранных отношений, поскольку в данном случае отношения возникают не в силу властных полномочий государства, а на основе соглашения между юридически равными субъектами.

Данное обстоятельство соответствует основным принципам гражданского права — юридическому равенству субъектов и свободе договора. Субъект охранной деятельности, даже будучи государственным органом, в рамках договорных отношений выступает не как административный орган власти, а как участник гражданско-правовых отношений. Это означает, что его отношения с заказчиком строятся не на принципе подчинения, а на принципе равенства сторон.

Статья 8 закона предусматривает утверждение Национальной гвардией тарифов на охранные услуги, а также установление типовых форм договоров. С одной стороны, данное положение отражает элементы государственного регулирования, с другой — обеспечивает создание стандартизированного договорного механизма для формирования гражданско-правовых отношений. Следовательно, договор охраны выступает не только как частное соглашение сторон, но и как правовая конструкция, в определённой степени направляемая государством.

Статья 17 закона закрепляет один из важнейших гражданско-правовых элементов договора охраны — институт ответственности. В соответствии с данной нормой субъект, оказывающий охранные услуги, обязан в полном объёме возместить ущерб, причинённый охраняемому объекту в результате своих действий или бездействия. Данное правило полностью соответствует общим принципам деликтной и договорной ответственности в гражданском праве. При этом указание на то, что размер и условия возмещения ущерба определяются непосредственно в договоре, ещё более подчёркивает диспозитивный характер данных отношений.

В статьях 15 и 16 закона определены права и обязанности субъектов охранной деятельности, что имеет существенное значение для определения содержания договора. В частности, субъект охранной деятельности принимает на себя обязанности:

- обеспечивать надёжную защиту объекта;
- обеспечивать контрольно-пропускной режим;
- предупреждать правонарушения.

Данные обязанности выступают как содержание обязательств исполнителя в рамках гражданско-правовых отношений. В свою очередь, заказчик также несёт определённые обязанности в рамках договора (например, оплату услуг, создание необходимых условий для их оказания).

Следует особо отметить, что статья 14 закона предусматривает возможность осуществления охранной деятельности отдельными субъектами без заключения договора. Это свидетельствует о двойственной природе охранных отношений:

- договорные (гражданско-правовые) отношения;

- административно-правовые отношения.

Однако с научной точки зрения основными отношениями, подлежащими анализу в рамках гражданского права, являются именно отношения, возникающие на основе договора.

Анализ норм законодательства об охранной деятельности позволяет сделать следующие выводы:

- договор охраны является специальным видом договора возмездного оказания услуг в гражданском праве;
- на основе данного договора между сторонами возникают взаимные права и обязанности;
- субъект охранной деятельности выступает в качестве исполнителя услуги, а заказчик — в качестве лица, принимающего услугу и оплачивающего её;
- ответственность, обязанности и условия исполнения преимущественно определяются договором;
- хотя охранные отношения сочетают элементы публичного и частного права, их договорная составляющая выступает полноценным институтом гражданского права.

Таким образом, договор охраны требует научного анализа как сложный, многоэлементный и специализированный вид гражданско-правовых отношений.

Функции договора охраны глубоко и многогранно раскрывают предпринимательское содержание охранной деятельности. Посредством данных функций охранный характер деятельности проявляется не только как простой вид оказания услуг, но и как сложный правовой механизм, направленный на обеспечение стабильности имущественных и личных неимущественных отношений в обществе. Поскольку именно через отношения, возникающие в рамках договора охраны, обеспечивается безопасность объектов гражданского права, что, в свою очередь, гарантирует непрерывность и надёжность гражданского оборота.

Данные функции выступают в качестве основных направлений, определяющих сферу воздействия охранной деятельности в обществе и, прежде всего, направлены на защиту объектов гражданского права от противоправных посягательств. При этом речь идёт не только о материальных объектах (зданиях, сооружениях, имуществе), но и о нематериальных благах, включая деловую репутацию, коммерческую тайну и другие ценности, имеющие экономическое значение. В этом смысле договор охраны может рассматриваться как универсальное средство защиты широкого круга объектов гражданского права.

С научной точки зрения функции договора охраны определяют не только его роль в рамках договорных отношений, но и его место в общей системе гражданского права. В частности, с одной стороны, он выступает как средство регулирования диспозитивных отношений, а с другой — выполняет профилактическую и охранительную функцию, направленную на

предупреждение правонарушений и устранение их негативных последствий. Следовательно, правовое воздействие, осуществляемое посредством договора охраны, носит не только реактивный, но и превентивный характер.

Вместе с тем функции договора охраны играют важную роль и в обеспечении устойчивости экономических отношений. В условиях гарантированной безопасности субъекты предпринимательской деятельности получают возможность свободно и эффективно осуществлять свою деятельность. Это, в свою очередь, оказывает положительное влияние на развитие рыночных отношений, улучшение инвестиционного климата и общий экономический рост.

В заключение следует отметить, что функции договора охраны не ограничиваются защитой объектов гражданского права от противоправных посягательств, а выступают как комплексный правовой механизм, направленный на обеспечение стабильности, безопасности и эффективности гражданского оборота. Это позволяет рассматривать данный договор как один из важных и самостоятельных институтов гражданского права.

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**БИОЭКОЛОГИЧЕСКИЕ ОСОБЕННОСТИ РАСТЕНИЯ  
PORTULACA OLERACEA L.**

***Аннотация:** В статье представлены результаты исследования биоэкологических особенностей *Portulaca oleracea* L. в Каракалпакстане, включая морфологию, биологию, экологическую роль, химический состав, лекарственные свойства и агротехнологию. Растение отличается высокой пластичностью, засухоустойчивостью и адаптацией к аридным условиям, что делает его перспективным для сельского хозяйства, фармацевтики и экологических проектов региона.*

***Ключевые слова:** *Portulaca oleracea*, биоэкология, лекарственные растения, агротехнология, устойчивость, аридные зоны.*

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**BIOECOLOGICAL CHARACTERISTICS OF THE PLANT  
PORTULACA OLERACEA L.**

***Abstract:** This article presents the results of a study of the bioecological characteristics of *Portulaca oleracea* L. in Karakalpakstan, including its morphology, biology, ecological role, chemical composition, medicinal properties, and agricultural technology. The plant is characterized by high plasticity, drought tolerance, and adaptation to arid conditions, making it promising for agriculture, pharmaceuticals, and environmental projects in the region.*



**Key words:** *Portulaca oleracea*, bioecology, medicinal plants, agricultural technology, sustainability, arid zones.

## Введение

Растительный покров играет важную роль в устойчивом развитии экосистем и является источником жизненно необходимых ресурсов для человека. Лекарственные растения на протяжении тысячелетий используются в медицине, обеспечивая организм биологически активными веществами. В условиях роста экологических проблем актуально изучение устойчивых и ресурсосберегающих видов растений.

В Узбекистане охрана и рациональное использование лекарственных растений регулируется Постановлением Президента № ПП-4670 от 10 апреля 2020 года, направленным на сохранение природных популяций и развитие культурного выращивания. Одним из перспективных видов является *Portulaca oleracea* L. (портулак огородный) — однолетнее травянистое растение семейства Portulacaceae. Несмотря на широкое распространение, данные о его биоэкологических особенностях и агротехнике в аридном климате Каракалпакстана остаются недостаточно систематизированными.

Цель исследования — комплексное изучение биоэкологических особенностей *Portulaca oleracea* L., оценка адаптационного потенциала и разработка рекомендаций по его выращиванию в засушливых условиях.

## Материалы и методы

Объектом исследования являлось растение *Portulaca oleracea* L., произрастающее в условиях Республики Каракалпакстан. Исследования проводились в 2025 году на базе опытного участка Биологического факультета Каракалпакского государственного университета, что позволило провести как контролируемые, так и полевые наблюдения. Методологическую основу работы составили классические методы биологических и экологических исследований, включающие систематические наблюдения за ростом и развитием растений, морфологический анализ, оценку экологических факторов среды, а также сравнительный анализ литературных данных отечественных и зарубежных авторов.



**Рис. 1 Наблюдение и уход за сеянцами *Portulaca oleracea* L. в лабораторных условиях**

Посадочный материал был представлен сеянцами в количестве 10–15 экземпляров, которые первоначально выращивались в контейнерах, а затем пересаживались в открытый грунт. Посадка осуществлялась с соблюдением агротехнических норм — расстояние между растениями составляло около 30 см, что обеспечивало оптимальные условия для роста и развития. Почва предварительно рыхлилась, обогащалась органическими удобрениями (биогумусом), после чего проводился регулярный полив с учётом климатических условий региона. Наблюдения за растениями проводились в течение вегетационного периода (апрель–август), фиксировались показатели роста, морфологические изменения, сроки цветения и плодоношения, а также устойчивость к неблагоприятным факторам среды. В апреле наблюдалось успешное прорастание и рост сеянцев до 15–20 см. Урожай собирался с 27 июня по август 2025 года,

#### **Результаты и обсуждение**

Проведённые исследования позволили выявить комплекс морфологических, биологических и экологических особенностей *Portulaca oleracea* L., определяющих его высокую адаптивность к условиям аридного климата.

В морфологическом отношении растение характеризуется наличием хорошо развитой стержневой корневой системы, обеспечивающей эффективное использование влаги из глубоких слоёв почвы. Стебли мясистые, сочные, стелющиеся или приподнимающиеся, что способствует снижению испарения влаги и повышает устойчивость к засухе. Листья мелкие, округлые, суккулентные, выполняют функцию накопления воды. Цветки преимущественно жёлтого цвета, небольших размеров (5–8 мм), раскрываются в солнечную погоду, что свидетельствует о светолюбивости растения. Плод представлен коробочкой, содержащей многочисленные мелкие чёрные семена, обладающие высокой всхожестью.

Биологические особенности растения проявляются в его быстром росте и развитии: в условиях эксперимента сеянцы достигали длины 15–20 см в короткие сроки. Отмечена высокая способность к регенерации и повторному отрастанию, что позволяет осуществлять сбор урожая несколько раз в течение одного вегетационного периода.

Экологический анализ показал, что *Portulaca oleracea* L. относится к числу высокоадаптивных растений, способных произрастать в условиях ограниченного водоснабжения и высоких температур. Растение демонстрирует значительную устойчивость к засолению почв, что делает его перспективным для использования в деградированных экосистемах. Важной особенностью является его способность активно поглощать углекислый газ, что способствует улучшению качества атмосферного воздуха и повышению экологической устойчивости среды.

Анализ химического состава показал наличие в растении комплекса биологически активных веществ, включая омега-3 жирные кислоты, витамины А, С и Е, флавоноиды и алкалоиды. Благодаря этому *Portulaca oleracea* L. обладает выраженными лечебными свойствами — противовоспалительным, антибактериальным, антиоксидантным и гипогликемическим действием, что подтверждает его широкое использование в народной медицине.

Полученные результаты согласуются с данными ряда исследователей, указывающих на высокую экологическую пластичность *Portulaca oleracea* L. и его способность адаптироваться к экстремальным условиям среды. В частности, установленные оптимальные температурные условия (20–30°C) полностью соответствуют климатическим характеристикам Каракалпакстана, что подтверждает возможность успешного культивирования данного вида в регионе.

Особое значение имеет высокая засухоустойчивость растения, обусловленная его суккулентной природой и эффективной системой водообеспечения. Это качество делает *Portulaca oleracea* L. ценным объектом для внедрения в сельское хозяйство в условиях дефицита водных ресурсов. Кроме того, способность растения расти на бедных и засоленных почвах открывает перспективы его использования в рекультивации деградированных земель.

Практическая значимость исследования заключается в возможности комплексного использования растения: как пищевого продукта, богатого витаминами и микроэлементами; как лекарственного сырья; а также как элемента экологических технологий, направленных на борьбу с эрозией почв и улучшение качества окружающей среды.

### **Заключение**

Таким образом, *Portulaca oleracea* L. является высокоадаптивным растением с выраженной засухоустойчивостью, быстрым ростом, высокой продуктивностью и богатым химическим составом. Результаты исследования подтверждают возможность его эффективного выращивания в условиях

Каракалпакстана с использованием современных агротехнологий. Широкое внедрение растения может способствовать развитию устойчивого сельского хозяйства, улучшению экологической ситуации и расширению сырьевой базы для фармацевтической промышленности. Перспективы дальнейших исследований включают разработку селекционных программ, совершенствование агротехнологий и расширение практического применения *Portulaca oleracea* L.

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## ПРИНЦИПЫ ПИТАНИЯ ПРИ ЗАБОЛЕВАНИЯХ ПОЧЕЧНОЙ СИСТЕМЫ

**Резюме:** В статье даны рекомендации по питанию при заболеваниях почечной системы, мочекаменной болезни, малобелковая диета, приведены рекомендации по питанию, употреблению продуктов питания, энергетический баланс, несколько основополагающих принципов питания, примерный подсчет содержания в продуктах белка и калия, примерное содержание калия в овощах и фруктах, гиперурикозурия и камни мочевой кислоты

**Ключевые слова:** заболеваниях почечной системы, мочекаменная болезнь, малобелковая диета, белки, углеводы, жиры, подсчёт, калории, диета, овощи, фрукты, калий, почечная недостаточность, почечно-каменная болезнь, уремия, гипероксалурия, фосфатурия, цистинурия, цистиновые камни.

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## NUTRITIONAL PRINCIPLES FOR RENAL DISEASES

**Summary:** The article provides nutritional recommendations for kidney diseases, urolithiasis, a low-protein diet, recommendations for nutrition, food consumption, energy balance, several fundamental principles of nutrition, an approximate calculation of the protein and potassium content in foods, and the approximate potassium content in vegetables and fruits.

**Key words:** kidney disease, urolithiasis, low-protein diet, proteins, carbohydrates, fats, counting, calories, diet, vegetables, fruits, potassium, renal failure, nephrolithiasis, uremia, hyperoxaluria, phosphaturia, cystinuria, cystine stones.

Правильное питание играет ключевую роль в поддержании здоровья почек и существенно может замедлить прогрессирование заболеваний почек.

Согласно современных исследований, каждый десятый человек страдает от хронического заболевания почек, часто даже не зная об этом.

**Материал и методы.** Нами изучен нутриентный состав пищи при почечных заболеваниях.

**Результаты и их обсуждение.** Нами изучено питание при некоторых заболеваниях почек. При развитии почечной недостаточности ранее применялись малобелковые гипонатриевые рационы 7а и 7б. На рисунке 1 приведено примерное меню 7 а диеты.



Рис.1. Диета № 7 а.

При коррекции уремии гемодиализом применяли диету 7г. Ныне они объединены в малоизмененном виде в вариант диеты с пониженным количеством белка т.е. низкобелковая диета (рис.1).





Рис.2. Малобелковая диета.

Это диета с ограничением белка до 0,3–0,8 г/кг массы тела (то есть до 20–60 г/сут), с резким ограничением поваренной соли (1,5–3 г/сут) и жидкости (0,8–1 л). Белок в этих диетах представлен в основном белком высокой биологической ценности животного происхождения. Достаточная энергетическая ценность рационов обеспечивается за счет жиров и углеводов в размерах, близких к физиологическим нормам. Все блюда готовятся без соли[1,2,3].

Пациенты должны знать несколько основополагающих принципов своего питания: — ограничение (на додиализном этапе) и увеличение белка (при диализной терапии); — ограничение жидкости (в зависимости от объема диуреза); — ограничение натрия (поваренной соли); — ограничение калия; — ограничение фосфора [4,5,6 ].

**Примерное содержание калия в овощах и фруктах**

| <b>Фрукты</b>                                                                                                                             | <b>Овощи</b>                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Содержание 100–150 мг/100 г:</b><br>черника, арбуз, клюква, айва                                                                       | <b>Содержание менее 200 мг/100 г:</b><br>тыква, огурцы, перец зеленый сладкий, лук репчатый, капуста белокочанная.                                          |
| <b>Содержание 150–200 мг/100 г:</b><br>груши, мандарины, земляника, лимон, грейпфрут, манго, апельсины.                                   | <b>Содержание 200–300 мг/100 г):</b><br>морковь, капуста цветная, салат, брюква, кабачки, репа, баклажаны.                                                  |
| <b>Содержание 200–300 мг /100:</b><br>сливы, малина, черешня, яблоки (с кожурой),<br>виноград, вишня, киви, крыжовник, смородина красная. | <b>Содержание 250–300 мг/100 г:</b><br>редис, фасоль (стручок), чеснок, петрушка (корень), свекла, томат, капуста краснокочанная, капуста кольраби, ревень. |
| <b>Содержание более 300мг/100 г:</b><br>абрикосы, ананас, бананы, смородина черная,<br>персики, авокадо, сухофрукты.                      | <b>Содержание более 350 мг/г:</b><br>редька, сельдерей (корень), картофель, капуста брюссельская, томатная паста.                                           |

Для удобства оценки самим больным в рационе содержания белка высокой и низкой биологической ценности и потребления им калия разработаны системы «белковых» и «калиевых» единиц аналогичные привычным нам «хлебным» единицам для диабетиков. Примерная оценка некоторых продуктов в таких единицах приведена на рис.3.

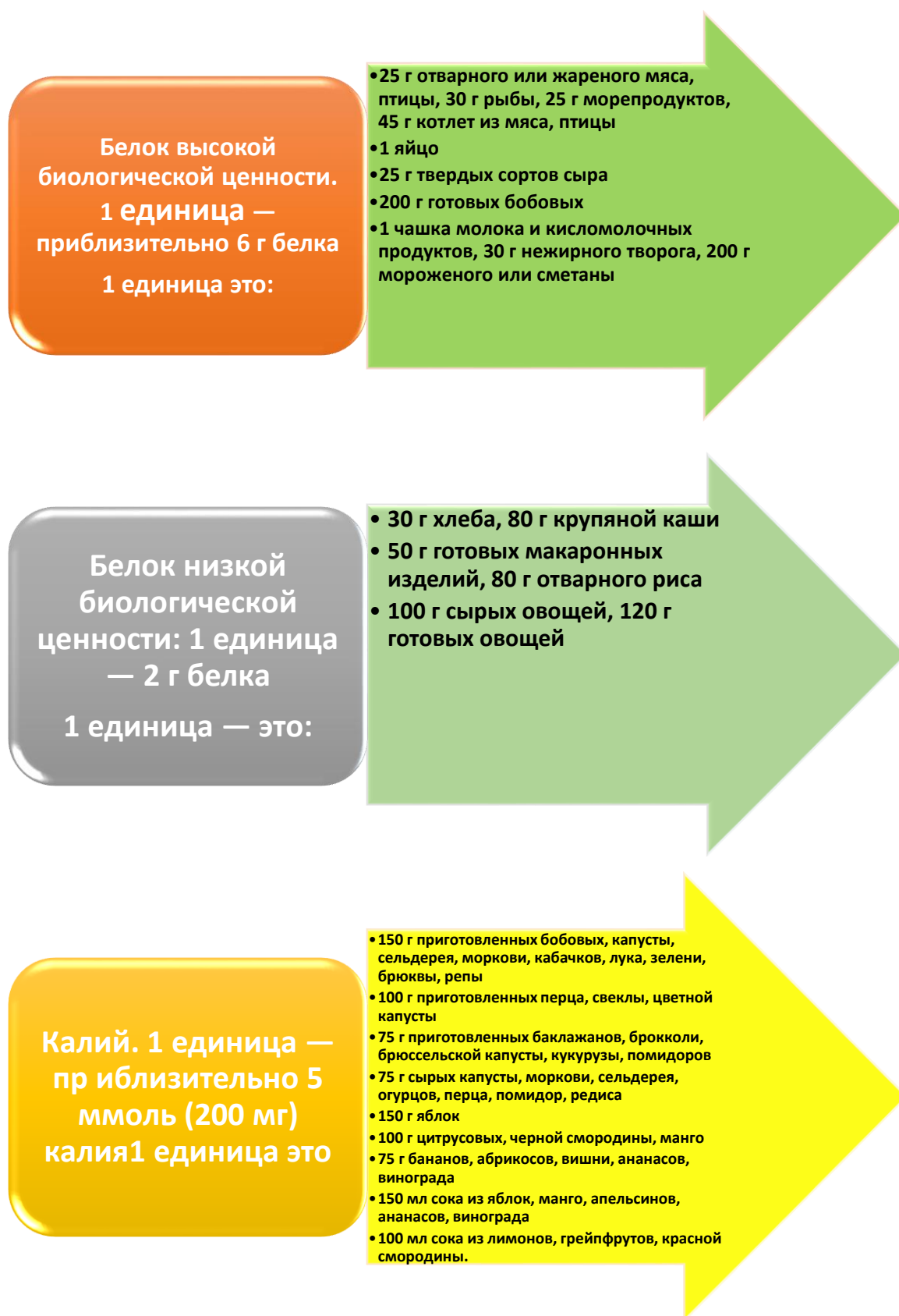


Рис.3. Примерный подсчет содержания в продуктах белка и калия.

Питание при мочекаменной болезни. Наиболее часто почечные камни образуются из солей кальция, мочевой кислоты и цистина. Около 75% конкрементов состоят из оксалата кальция, 5% — из уратов, 5% — из гидроксиапатита и фосфата кальция и менее 1% — из цистина. Камни, состоящие из оксалата или фосфата кальция, составляют 75–85% от общего числа камней. Причиной образования камней в почках является изменение стабильности мочи, связанное с ее перенасыщением солями. Независимо от типа камней, общим предписанием для всех больных с мочекаменной болезнью является увеличение употребления жидкости и соответствующее снижение в рационе поваренной соли с целью избежать гипогидратации. Несмотря на то, что основная часть почечных камней является кальциевыми, рекомендация ограничить кальцийсодержащие продукты не является удачной из-за вредности длительного снижения этого макроэлемента в диете. Кальций, поступающий в желудочно-кишечный тракт вместе с пищей, связывает в кишечнике щавелевую кислоту и способствует ее выведению из организма [7,8,9].

Важное значение имеет pH мочи. При нормальных физиологических показателях pH мочи фосфаты и соли мочевой кислоты легко диссоциируют. Щелочная моча содержит большое количество уратов и диссоциированного фосфата. Такая среда препятствует осаждению мочекишечного натрия и фосфатов. При закислении мочи в ней преобладают соли мочевой кислоты. Растворимость оксалата кальция не меняется при изменении кислотности среды. При необходимости снизить pH мочи назначают диеты с преобладанием мясных и мучных продуктов. Из овощей и фруктов включаются сорта, бедные щелочными валентностями: горох, брюссельская капуста, спаржа, тыква, брусника, красная смородина, кислые сорта яблок. При необходимости изменения кислотно-основного равновесия в щелочную сторону, проводится противоположная модификация диеты. В рационе должны быть представлены в основном овощи, фрукты, ягоды, молочные продукты. Мясо и зерновые ограничиваются. Применяется щелочное питье.

Гиперурикозурия и камни мочевой кислоты. Основной механизм развития гиперурикозурии связан с чрезмерным поступлением в организм пурина из мяса, рыбы и домашней птицы. Назначение соответствующей диеты аналогично диете при подагре, является в данном случае наиболее эффективным лечением [10,12]. Гипероксалурия. Наиболее частая причина гипероксалурии — излишняя абсорбция оксалатов, поступающих с пищей, связанная с нарушением транспорта жиров. Избыток оксалатов в пище, перегрузка аскорбиновой кислотой, которая в организме метаболизируется в щавелевую, а также наследственные состояния, вызывающие гиперпродукцию оксалатов в организме, — более редкие причины гипероксалурии. При оксалурии кишечного происхождения рекомендуют снизить потребление жиров. При всех видах оксалурии ограничиваются продукты с высоким содержанием щавелевой кислоты и ее солей: щавель, шпинат, свекла, картофель, бобы, ревень, петрушка, некоторые ягоды.

Получены данные о роли дефицита магния и витамина В6 в оксалатном нефролитиазе, поэтому в рацион пациентов с оксалурией следует включать богатые ими продукты, в первую очередь хлеб из муки грубого помола, крупы. Фосфатурия. Выпадение малорастворимых соединений фосфата кальция связано со сдвигом кислотнощелочного равновесия в сторону алкалоза. В связи с этим диетическое лечение фосфатурии связано со снижением рН мочи [11,12].

Цистинурия и цистиновые камни. Нарушение транспорта цистина, как и других двухосновных аминокислот (лизина, орнитина и аргинина), в проксимальных отделах почечных канальцев и тощей кишке имеет наследственный характер. Уменьшение реабсорбции не растворимого цистина приводит к образованию цистиновых камней. Диетические рекомендации сводятся к увеличению потребления больным жидкости более 3 л/сут и изменению рН мочи в сторону ощелачивания.

**Выводы.** При заболеваниях почек лечебное питание направлено на коррекцию нарушений обменных процессов.

В зависимости от остроты патологического процесса в почках и степени нарушения почечной функции врач назначает более или менее строгую диету.

Диетотерапия является важнейшим компонентом лечения почечных заболеваний. Правильно подобранное питание помогает снизить нагрузку на почки, замедлить прогрессирование заболевания и предотвратить осложнения.

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## **ВЛИЯНИЕ ФИЗИЧЕСКИХ ФАКТОРОВ НА ЭКОЛОГИЧЕСКОЕ СОСТОЯНИЕ ГОРОДСКИХ ТЕРРИТОРИЙ КАРАКАЛПАКСТАНА**

***Аннотация:** Статья посвящена исследованию влияния физических факторов — шума, вибрации, электромагнитных полей и радиации — на экологическое состояние городских территорий Каракалпакстана. Проведен мониторинг жилых кварталов, промышленных зон и транспортных магистралей с использованием шумомеров, виброметров, приборов для измерения ЭМП и дозиметров. Выявлено, что сочетание высокого шума и вибрации с усиленным воздействием ЭМП создает стрессовые условия для человека, снижает продуктивность зелёных насаждений и изменяет состав городской биоты. Локальные зоны повышенного радиационного фона зафиксированы возле промышленных объектов. Для снижения негативного воздействия рекомендуется создание зеленых буферов, регулирование транспортной и промышленной активности, контроль ЭМП и радиации.*

***Ключевые слова:** шум, вибрация, электромагнитные поля, радиация, городская экология, Каракалпакстан.*

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## **THE INFLUENCE OF PHYSICAL FACTORS ON THE ECOLOGICAL STATE OF URBAN AREAS IN KARAKALPAKSTAN**

***Abstract:** This article examines the influence of physical factors—noise, vibration, electromagnetic fields, and radiation—on the ecological state of urban areas in Karakalpakstan. Residential areas, industrial zones, and highways were monitored using sound level meters, vibration meters, EMF measuring devices, and*

*dosimeters. It has been found that the combination of high noise and vibration levels with increased exposure to electromagnetic fields creates stressful conditions for humans, reduces the productivity of green spaces, and alters the composition of urban biota. Localized zones of elevated background radiation have been identified near industrial facilities. To reduce the negative impact, it is recommended to create green buffers, regulate transport and industrial activity, and monitor electromagnetic fields and radiation.*

**Key words:** noise, vibration, electromagnetic fields, radiation, urban ecology, Karakalpakstan.

## Введение

Современные города Каракалпакстана находятся под постоянным воздействием множества физических факторов, которые оказывают значительное влияние на состояние окружающей среды и здоровье населения. Урбанизация, рост промышленного производства, транспортная активность и использование современных технологий сопровождаются повышением уровня шумового и вибрационного загрязнения, воздействием электромагнитных полей (ЭМП) и радиационного фона. Эти факторы способны изменять микроклимат, ухудшать качество воздуха, воды и почв, влиять на рост растений, а также создавать стрессовые условия для человека и флоры и фауны. В современных условиях комплексная оценка воздействия физических факторов является ключевой для устойчивого развития городских территорий, обеспечения безопасности жителей и сохранения экологического баланса.

## Материалы и методы

Исследование проводилось в крупных городских районах Каракалпакстана с разной степенью урбанизации, включая жилые кварталы, промышленные зоны и транспортные магистрали, с целью комплексной оценки влияния физических факторов на экологическое состояние городской среды. Основное внимание уделялось шуму, измеряемому в децибелах (дБ) с помощью специализированных шумомеров с учётом временных и сезонных колебаний, вибрации, оцениваемой по амплитуде и частоте колебаний вблизи транспортных магистралей, промышленных предприятий и строительных площадок, электромагнитным полям (ЭМП), регистрируемым с использованием приборов для измерения интенсивности радиочастотного и низкочастотного воздействия, а также радиации, контролируемой с помощью дозиметров для выявления локальных зон повышенного радиационного фона и оценки потенциального влияния на экосистему. Такое комплексное исследование позволило системно оценить влияние физических факторов на городскую среду и определить ключевые зоны риска для здоровья населения и состояния экосистемы.

Данные измерения проводились в течение года, чтобы учесть сезонные изменения физических факторов. Для анализа использовались статистические методы обработки информации, корреляционный анализ, оценка влияния

физических факторов на качество воздуха, воды и почв, а также сопоставление с установленными санитарными нормами и рекомендациями экологических служб.

#### Результаты и обсуждение

Исследования показали, что шумовое загрязнение является одним из наиболее значимых факторов воздействия на городскую среду. Высокие уровни шума наблюдаются вблизи транспортных магистралей, промышленных объектов и строительных площадок. Шум влияет на физиологическое состояние населения, вызывая стресс, повышенное давление, нарушения сна, снижение концентрации внимания, а также оказывает негативное влияние на рост и продуктивность зеленых насаждений, которые являются важным элементом городской экосистемы.

Вибрационные нагрузки, возникающие в основном от интенсивного транспортного движения и работы промышленных установок, оказывают разрушительное воздействие на строительные конструкции, почвы и микроклимат. Продолжительное воздействие вибрации может приводить к деградации почв, нарушению устойчивости растительных сообществ и стрессовым реакциям у человека, особенно вблизи крупных магистралей и производственных зон.

Электромагнитные поля, создаваемые линиями электропередач, мобильной и радиосвязью, а также бытовыми приборами, оказывают влияние на биологические системы. Результаты показали, что в зонах с повышенной интенсивностью ЭМП наблюдается снижение биологической активности растений, а у людей возможны функциональные изменения нервной и сердечно-сосудистой системы при длительном воздействии. Влияние ЭМП также может способствовать изменению видового состава флоры и фауны, снижая устойчивость экосистемы.

Радиационный фон в городах Каракалпакстана в большинстве случаев соответствует санитарным нормам, однако локальные зоны повышенного излучения были выявлены вблизи промышленных объектов, старых зданий с применением радиоактивных материалов и мест захоронения строительных отходов. Длительное воздействие радиации оказывает химическое влияние на почвы и воду, снижает устойчивость экосистем и повышает риск для здоровья населения.

Комплексное воздействие физических факторов выявило несколько закономерностей. Наибольший вред экологическому состоянию городов причиняют сочетания высоких уровней шума и вибрации в сочетании с усиленными электромагнитными полями. Эти факторы создают стрессовые условия, ухудшают качество жизни населения, снижают продуктивность зеленых насаждений и изменяют состав биоты.

#### Заключение

Физические факторы — шум, вибрация, электромагнитные поля и радиация — оказывают комплексное влияние на экологическое состояние городских территорий Каракалпакстана, включая здоровье населения,

качество воздуха, воды и почв, рост растений и устойчивость экосистемы. Для снижения негативного воздействия рекомендуется внедрение зеленых буферов, регулирование транспорта и промышленных выбросов, контроль ЭМП и радиации, а также разработка программ по улучшению микроклимата. Комплексная оценка этих факторов позволяет формировать научно обоснованные меры по планированию городской инфраструктуры и охране окружающей среды.

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## **ФОРМИРОВАНИЕ ФУНКЦИОНАЛЬНОЙ ГРАМОТНОСТИ У ОБУЧАЮЩИХСЯ ПЕРВЫХ КЛАССОВ**

***Аннотация:** в статье рассматривается проблема формирования функциональной грамотности у обучающихся первых классов как одной из ключевых задач начального общего образования в соответствии с требованиями ФГОС. Раскрывается сущность понятия «функциональная грамотность» и ее основные компоненты (читательская, математическая, естественно-научная, финансовая грамотность, глобальные компетенции). Анализируются возрастные особенности первоклассников, значимые для формирования функциональной грамотности. Представлены практические приемы и методы работы, направленные на развитие функциональной грамотности на уроках обучения грамоте, математики и окружающего мира.*

***Ключевые слова:** функциональная грамотность, первоклассники, начальная школа, читательская грамотность, математическая грамотность, метапредметные результаты, адаптация к школе.*

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## **FORMATION OF FUNCTIONAL LITERACY IN FIRST GRADE STUDENTS**

***Abstract.** The article examines the problem of developing functional literacy in first grade students as one of the key tasks of primary general education in accordance with the requirements of the Federal State Educational Standard. The essence of the concept of «functional literacy» and its main components (reading, mathematical, natural science, financial literacy, global competencies) are*

*revealed. The age characteristics of first-graders that are significant for the formation of functional literacy are analyzed. Practical techniques and methods of work aimed at developing functional literacy in literacy, mathematics and environmental studies lessons are presented.*

**Keywords:** *functional literacy, first-graders, primary school, reading literacy, mathematical literacy, meta-subject results, adaptation to school.*

В современном образовательном контексте понятие «функциональная грамотность» приобретает ключевое значение. Если традиционная грамотность понималась как владение навыками чтения, письма и счета, то функциональная грамотность – это способность человека использовать эти навыки для решения реальных жизненных задач в различных сферах деятельности. Согласно международным исследованиям PISA и TIMSS, российские школьники демонстрируют недостаточно высокий уровень функциональной грамотности по сравнению со сверстниками из развитых стран. В связи с этим формирование функциональной грамотности становится приоритетной задачей начального общего образования, закрепленной в обновленных ФГОС НОО.

Особую значимость эта задача приобретает при работе с первоклассниками. Первый год обучения в школе является сенситивным периодом для формирования базовых учебных навыков, мотивации к учению и основ функциональной грамотности. Именно в 1 классе закладывается фундамент, на котором будет строиться вся дальнейшая образовательная траектория ребенка. Однако возрастные особенности первоклассников (наглядно-образное мышление, быстрая утомляемость, трудности произвольного внимания, игровая мотивация) требуют особых подходов к формированию функциональной грамотности.

Функциональная грамотность младшего школьника включает несколько взаимосвязанных компонентов. Читательская грамотность – способность понимать и использовать письменные тексты для достижения своих целей. Математическая грамотность – умение применять математические знания в повседневных ситуациях. Естественно-научная грамотность – способность объяснять природные явления на основе научных знаний. Финансовая грамотность – понимание элементарных экономических понятий и умение делать простые финансовые выборы. Глобальные компетенции – способность понимать и уважать культурное разнообразие, взаимодействовать с людьми из разных культур.

Для первоклассников формирование функциональной грамотности означает постепенный переход от игровой деятельности к учебной, от конкретных действий к абстрактным обобщениям, от ситуативного понимания к осознанному применению знаний. Рассмотрим, как формируются различные компоненты функциональной грамотности на уроках в 1 классе.



Формирование читательской грамотности начинается с первых дней обучения в школе. В период обучения грамоте первоклассники осваивают не только технику чтения, но и умение понимать прочитанное. Для развития читательской грамотности используются следующие приемы: работа с пословицами и поговорками (объяснение смысла, соотнесение с жизненной ситуацией); чтение и анализ небольших текстов с последующим ответом на вопросы («О ком этот текст?», «Что случилось?», «Почему герой поступил так?»); восстановление деформированного текста (перепутанные предложения, пропущенные слова); составление плана текста в картинках; прогнозирование содержания по заголовку и иллюстрации.

Важно, чтобы тексты, предлагаемые первоклассникам, были не только учебными, но и имели практическую направленность. Например, прочитать объявление на двери магазина («Перерыв на обед с 13 до 14 часов»), расписание уроков, инструкцию к настольной игре. Такие задания формируют понимание, что умение читать необходимо в реальной жизни.

Математическая грамотность первоклассника проявляется в умении применять математические знания в бытовых ситуациях. На уроках математики формирование функциональной грамотности осуществляется через решение практико-ориентированных задач. Вместо абстрактных «У Маши было 5 яблок, а у Пети – 3» предлагаются задачи, моделирующие реальные жизненные ситуации: «Мама дала Саше 50 рублей. Булочка стоит 30 рублей, а сок – 25 рублей. Хватит ли денег, чтобы купить и булочку, и сок?»; «На полке 7 книг. 2 книги взяли почитать. Сколько книг осталось на полке?»; «В коробке 10 карандашей. 4 карандаша синих, остальные – красные. Сколько красных карандашей?».

Важным элементом формирования математической грамотности является работа с величинами. Первоклассники учатся измерять длину (с помощью линейки), массу (с помощью весов), объем (с помощью мерной емкости), время (по часам). Эти умения закрепляются в игровых ситуациях: «Измерь длину своей парты», «Сколько стаканов воды помещается в чайник?», «Который час показывают часы?».

Особое внимание уделяется развитию пространственного и логического мышления. Задания на сравнение («Что длиннее: ручка или карандаш?»), классификацию («Раздели фигуры на группы по форме и цвету»), поиск закономерностей («Продолжи ряд: круг, квадрат, треугольник...») формируют умение анализировать, обобщать и делать выводы – основы математического мышления.

Естественно-научная грамотность на уроках окружающего мира в 1 классе формируется через наблюдения за природными явлениями и простейшие опыты. Дети учатся различать объекты живой и неживой природы, описывать погоду, определять времена года по характерным признакам, устанавливать простейшие причинно-следственные связи («Почему осенью листья желтеют?», «Почему зимой медведь спит?», «Откуда берется дождь?»).

Эффективным методом является ведение дневника наблюдений, где первоклассники отмечают изменения в природе, зарисовывают растения и животных, фиксируют температуру воздуха. Это формирует не только естественно-научные знания, но и наблюдательность, умение фиксировать и систематизировать информацию.

Финансовая грамотность для первоклассников – это элементарные представления о деньгах, их функциях и разумном использовании. На уроках и во внеурочной деятельности дети знакомятся с понятиями «деньги», «монета», «купюра», «цена», «покупка», «сдача». Через сюжетно-ролевые игры («Магазин», «Рынок», «Банк») первоклассники учатся совершать покупки, рассчитываться за товар, получать сдачу, понимать, что деньги зарабатываются трудом.

Формирование глобальных компетенций начинается с осознания себя как части семьи, класса, школы, города, страны. Первоклассники знакомятся с символикой России (флаг, герб, гимн), с традициями и праздниками народов России, учатся уважать культуру разных народов. Важную роль играют коммуникативные игры и упражнения, направленные на развитие умения слушать друг друга, договариваться, выражать свои мысли и чувства, понимать эмоциональное состояние других людей.

Для эффективного формирования функциональной грамотности у первоклассников необходимо соблюдение ряда педагогических условий. Во-первых, интеграция содержания – задания должны носить межпредметный характер, связывать знания из разных областей. Во-вторых, практическая направленность – учебные задачи должны моделировать реальные жизненные ситуации. В-третьих, деятельностный подход – знания не передаются в готовом виде, а открываются детьми в процессе собственной деятельности. В-четвертых, систематичность – работа по формированию функциональной грамотности должна вестись на каждом уроке, а не от случая к случаю. В-пятых, учет возрастных особенностей – использование игровых форм, наглядности, посильных заданий, создание ситуации успеха.

Диагностика уровня сформированности функциональной грамотности у первоклассников имеет свою специфику. В отличие от традиционных контрольных работ, оценивающих предметные знания, диагностика функциональной грамотности предполагает оценку умения применять знания в нестандартных ситуациях. Используются комплексные работы, включающие задания разного типа: на понимание текста, на вычисления в реальном контексте, на объяснение природных явлений. Важно, чтобы задания были сформулированы на доступном языке, имели наглядное сопровождение и не требовали высокого уровня техники чтения.

Таким образом, формирование функциональной грамотности у обучающихся первых классов является стратегической задачей начального образования. Именно в 1 классе закладываются основы умения учиться, самостоятельно добывать знания и применять их в жизни. Учитель начальных классов играет ключевую роль в этом процессе, создавая образовательную

среду, в которой каждый первоклассник может почувствовать, что школьные знания нужны не для отметок, а для решения реальных жизненных задач. Дальнейшие направления работы в этой области связаны с разработкой системы заданий для формирования функциональной грамотности первоклассников, созданием диагностических материалов и повышением квалификации учителей в вопросах функциональной грамотности.

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## СТИЛИСТИЧЕСКОЕ ИСПОЛЬЗОВАНИЕ МЕТАФОРЫ И ЭПИТЕТА В ПРОЗЕ В.Г. РАСПУТИНА

***Аннотация:** В данной статье рассматривается стилистическое использование метафоры и эпитета в прозе В.Г. Распутина. В ходе исследования комплексно анализируется роль изобразительно-выразительных средств в художественной речи писателя, раскрываются их семантические и функциональные особенности, а также значение в создании художественного образа. Особое внимание уделяется роли метафоры и эпитета в усилении эмоционально-экспрессивной окраски текста, художественной интерпретации действительности и формировании индивидуального авторского стиля.*

*Кроме того, на основе анализа произведений В.Г. Распутина показано, как посредством языковых средств раскрываются внутренний мир персонажей, особенности изображения природы и социальная среда. В работе применяются методы лингвостилистического анализа, позволяющие определить функциональную нагрузку метафоры и эпитета в структуре художественного текста. В результате исследования обосновывается высокая степень образности и выразительности языка прозы В.Г. Распутина.*

***Ключевые слова:** метафора, эпитет, лингвостилистика, художественная речь, изобразительно-выразительные средства, русская литература, В.Г. Распутин, проза.*

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## STYLISTIC USE OF METAPHOR AND EPITHET IN THE PROSE OF V.G. RASPUTIN

***Abstract:** This article examines the stylistic use of metaphor and epithet in the prose of V.G. Rasputin. The study provides a comprehensive analysis of the role of figurative and expressive means in the writer's artistic language, revealing their semantic and functional features, as well as their significance in creating художественные images. Special attention is paid to the role of metaphor and epithet in enhancing the emotional and expressive tone of the text, interpreting reality artistically, and shaping the author's individual style.*

*Furthermore, based on the analysis of Rasputin's works, the study demonstrates how linguistic means are used to reveal the inner world of characters, depict nature, and reflect the social environment. The research employs linguo-stylistic methods to determine the functional load of metaphor and epithet within the structure of the literary text. As a result, the high level of imagery and expressiveness in Rasputin's prose is substantiated.*

**Keywords:** *metaphor, epithet, linguostylistics, artistic language, figurative and expressive means, Russian literature, V.G. Rasputin, prose.*

Изучение изобразительно-выразительных средств языка занимает важное место в современной лингвистике и литературоведении, поскольку язык в художественном произведении выполняет не только коммуникативную, но и эстетическую функцию. Особую роль в создании художественного текста играют такие средства, как метафора и эпитет, которые способствуют формированию образности, усилению эмоционально-экспрессивной окраски речи и раскрытию авторской позиции.

Актуальность данного исследования обусловлена необходимостью более глубокого анализа языковых средств в прозе русских писателей XX века, в частности в творчестве В.Г. Распутина. Его произведения представляют собой ценный материал для лингвостилистического анализа, поскольку отличаются высокой степенью образности, тесной связью с народной речевой традицией и глубоким философским содержанием.

В.Г. Распутин является одним из ведущих представителей «деревенской прозы», направления, сформировавшегося в русской литературе во второй половине XX века. В его произведениях особое внимание уделяется проблемам духовности, нравственного выбора, взаимоотношений человека и природы. Так, в повести «Прощание с Матёрой» автор через систему художественных образов раскрывает трагедию исчезновения традиционного уклада жизни. Уже в первых главах произведения можно встретить образные выражения, передающие состояние природы и внутренний мир героев, например: «река жила своей древней жизнью», где река наделяется свойствами живого существа.<sup>48</sup> Данный пример иллюстрирует использование метафоры как средства оживления природного образа и придания ему философской глубины.

Метафора, согласно теории концептуальной метафоры, разработанной Дж. Лакоффом и М. Джонсоном, является не просто стилистическим украшением речи, а фундаментальным механизмом человеческого мышления, позволяющим осмысливать абстрактные понятия через конкретные образы.<sup>49</sup> В этом контексте метафоры в прозе Распутина выполняют не только эстетическую, но и когнитивную функцию, отражая авторское восприятие мира.

1. Распутин В.Г. *Прощание с Матёрой*. — М.: Советский писатель, 1976.

<sup>49</sup> Лакофф Дж., Джонсон М. *Метафоры, которыми мы живём*. — М.: Прогресс,



Наряду с метафорой, важную роль в художественной системе Распутина играет эпитет. Эпитеты в его произведениях отличаются выразительностью и точностью, они помогают создать яркие визуальные и эмоциональные образы. Например, в описаниях природы автор использует такие сочетания, как «тихая река», «суровая земля», «старый дом», которые не только характеризуют предмет, но и передают определённое эмоциональное состояние. Эпитеты усиливают воздействие текста на читателя, создавая атмосферу напряжённости, тревоги или, наоборот, умиротворения.

Научная новизна исследования заключается в комплексном анализе метафоры и эпитета как взаимосвязанных элементов художественного текста. В отличие от традиционных литературоведческих исследований, в данной работе акцент делается на их функционально-стилистическом взаимодействии, что позволяет глубже раскрыть особенности авторского стиля В.Г. Распутина.

Объектом исследования является проза В.Г. Распутина, а предметом — стилистическое использование метафоры и эпитета в его произведениях. Цель исследования заключается в выявлении их семантических и функциональных особенностей, а также определении их роли в создании художественного образа. Для достижения поставленной цели необходимо решить следующие задачи: выявить и проанализировать примеры метафоры и эпитета, определить их классификацию и установить их стилистические функции в тексте.

Методологическую основу исследования составляют методы лингвистического анализа, контекстуального анализа и семантической интерпретации. Применение данных методов позволяет выявить особенности функционирования языковых средств в художественном тексте и определить их роль в формировании образности и выразительности.

Таким образом, анализ метафоры и эпитета в прозе В.Г. Распутина способствует более глубокому пониманию его индивидуального стиля, а также позволяет выявить общие закономерности функционирования изобразительно-выразительных средств в художественной речи. Это, в свою очередь, расширяет представления о роли языка в отражении культурных и духовных ценностей общества.

В прозе Распутина метафора и эпитет выступают как важнейшие средства художественной выразительности, формирующие образную систему произведения. Их активное использование обусловлено стремлением автора не только передать внешнюю картину действительности, но и раскрыть её глубинный философский и нравственный смысл.

Метафора в произведениях Распутина выполняет сложную функциональную нагрузку. Согласно когнитивной теории метафоры, разработанной Дж. Лакоффом и М. Джонсоном, метафора является не только стилистическим приёмом, но и способом концептуализации мира, позволяющим человеку осмысливать абстрактные явления через конкретные образы [1, с. 15]. В прозе Распутина данная функция проявляется особенно



ярко, поскольку его художественный мир тесно связан с природой и традиционным укладом жизни.

Например, в повести «Прощание с Матёрой» встречается выражение «река жила своей древней жизнью» [2, с. 34], где река наделяется признаками живого существа. Это позволяет автору подчеркнуть идею вечности природы и её независимости от человека. Подобные метафоры формируют особый тип художественного мышления, в котором природа воспринимается как активный участник событий.

С точки зрения классической стилистики, метафора определяется как перенос значения на основе сходства, что делает её одним из наиболее продуктивных средств создания образности<sup>50</sup>. В прозе Распутина данный приём часто используется для передачи эмоционального состояния героев и создания философского подтекста. Например, такие выражения, как «земля дышала» или «лес молчал», формируют ощущение одушевлённости окружающего мира.

Эпитет в произведениях Распутина также играет важную роль. По определению И.Б. Голуб, эпитет является образным определением, которое не только характеризует предмет, но и выражает авторское отношение к нему [4, с. 87]. В прозе Распутина эпитеты отличаются высокой степенью точности и эмоциональной насыщенности.

Например, в описаниях природы используются такие словосочетания, как «тихая река», «тяжёлое небо», «суровая земля» [2, с. 52]. Эти эпитеты не только создают визуальный образ, но и формируют определённое эмоциональное восприятие, усиливая воздействие текста на читателя. В данном случае эпитет выполняет одновременно описательную и оценочную функции.

Особое значение имеет взаимодействие метафоры и эпитета. В художественном тексте они часто используются совместно, образуя сложные синтаксические и семантические конструкции. Как отмечает В.В. Виноградов, сочетание различных изобразительно-выразительных средств позволяет создавать многослойные художественные образы, обладающие высокой степенью выразительности.<sup>51</sup>

В прозе Распутина подобное взаимодействие проявляется в сочетаниях типа «глухая тишина» или «тёмная, тяжёлая вода» [2, с. 60], где эпитет усиливает метафорический образ, делая его более насыщенным и эмоционально выразительным. Это свидетельствует о высоком уровне мастерства писателя в использовании языковых средств.

Кроме того, эпитеты и метафоры в произведениях Распутина выполняют важную текстообразующую функцию. Они способствуют формированию единого художественного пространства, в котором все элементы взаимосвязаны и подчинены общей авторской концепции. Через

<sup>50</sup> Арнольд И.В. Стилистика современного английского языка. — М.: Флинта, 2010.

<sup>51</sup> Виноградов В.В. О языке художественной литературы. — М.: Наука, 1971.

систему образных средств писатель передаёт идею гармонии человека и природы, а также трагедию её разрушения в условиях современной цивилизации.

Таким образом, анализ метафоры и эпитета в прозе В.Г. Распутина показывает, что данные стилистические средства играют ключевую роль в формировании художественного текста. Они не только усиливают выразительность речи, но и выполняют когнитивную, оценочную и философскую функции, способствуя более глубокому восприятию произведения.<sup>52</sup>

В ходе исследования установлено, что метафора и эпитет занимают важное место в системе изобразительно-выразительных средств прозы В.Г. Распутин. Их использование носит системный характер и направлено на создание образности, усиление эмоционально-экспрессивной окраски текста и раскрытие авторского замысла.

Анализ показал, что метафора в произведениях Распутина выполняет не только эстетическую, но и когнитивную функцию. С её помощью автор передаёт сложные философские идеи через конкретные образы, формируя особое восприятие мира, в котором природа представляется живым и одушевлённым организмом. Это отражает традиционное мировоззрение, основанное на единстве человека и природы.

Эпитет, в свою очередь, выполняет уточняющую и оценочную функцию. Он усиливает выразительность художественного текста, придаёт образам эмоциональную насыщенность и позволяет автору выразить своё отношение к изображаемым явлениям. В прозе Распутина эпитеты отличаются точностью и лаконичностью, что делает их важным элементом его индивидуального стиля.

Особое значение имеет взаимодействие метафоры и эпитета. Эти средства функционируют в тесной взаимосвязи, образуя единую систему художественной выразительности. Метафора создаёт образную основу, тогда как эпитет усиливает её, добавляя эмоциональные и оценочные оттенки. Это способствует формированию глубоких и многослойных художественных образов.

Таким образом, метафора и эпитет в прозе В.Г. Распутина выполняют комплексную функцию, объединяя эстетические, когнитивные и экспрессивные аспекты. Их анализ позволяет глубже понять особенности авторского стиля и роль языковых средств в создании художественного текста.

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## **РЫБЫ И КОРМОВЫЕ ОРГАНИЗМЫ ОЗЕРА СУДОЧЬЕ КУНГРАДСКОГО РАЙОНА**

***Аннотация:** В статье представлены результаты исследования рыб и кормовых организмов озера Судочье Кунградского района. Изучение проводилось весной, летом и осенью 2025 года с анализом наиболее распространённых видов рыб: карася, карпа, сазана и окуня. Питание рыб оценивалось по содержимому желудков, кормовая база — по пробам воды, донного грунта, зоопланктона и макрофитов. Выявлено, что рацион рыб зависит от сезона: весной и летом преобладают планктонные организмы, осенью — донные беспозвоночные, а растительные остатки служат дополнительным источником питания. Результаты показывают гибкость питания рыб и влияние разнообразия кормовой базы на продуктивность и устойчивость экосистемы.*

***Ключевые слова:** озеро Судочье, рыбы, кормовые организмы, зоопланктон, донные беспозвоночные, питание рыб, экология.*

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## **FISH AND FORAGE ORGANISMS OF LAKE SUDOC'E, KUNGRAD DISTRICT**

***Abstract:** This article presents the results of a study of fish and forage organisms in Lake Sudochie, Kungrad District. The study was conducted in the spring, summer, and fall of 2025, analyzing the most common fish species: crucian carp, common carp, carp, and perch. Fish nutrition was assessed based on stomach contents, and food resources were assessed based on water, bottom sediment,*

*zooplankton, and macrophyte samples. It was found that fish diet varies seasonally: planktonic organisms predominate in spring and summer, while benthic invertebrates predominate in autumn, with plant debris serving as an additional food source. The results demonstrate the flexibility of fish diets and the impact of food diversity on ecosystem productivity and resilience.*

**Key words:** Lake Sudochie, fish, food organisms, zooplankton, benthic invertebrates, fish nutrition, ecology.

## Введение

Озеро Судочье, расположенное в Кунградском районе, является важным элементом местной гидрологической системы и представляет собой ключевую экосистему для сохранения биоразнообразия региона. Оно служит естественной средой обитания для различных видов рыб, которые играют значительную роль как в экологии водоёма, так и в обеспечении населения продовольственными ресурсами. Современные изменения климата, колебания уровня воды и антропогенные факторы, такие как загрязнение и хозяйственная деятельность, оказывают прямое влияние на водоёмы региона, изменяя структуру кормовой базы и динамику популяций рыб. В этих условиях особую актуальность приобретает изучение питания рыб и их взаимодействия с кормовыми организмами, что позволяет оценить состояние экосистемы, продуктивность водоёма и разрабатывать рекомендации по рациональному использованию рыбных ресурсов.

Понимание экологии рыб и структуры их кормовой базы имеет как теоретическое, так и практическое значение. С одной стороны, это позволяет выявить закономерности питания, предпочтения рыб по видам кормовых объектов и влияние сезонных и экологических факторов на рацион. С другой стороны, полученные данные служат основой для эффективного управления водными ресурсами, обеспечения устойчивого рыболовства и сохранения популяций редких и промысловых видов рыб. Актуальность исследования также определяется необходимостью разработки научно обоснованных мероприятий по поддержанию биоразнообразия и сохранению экологического баланса озера.

## Материалы и методы

Исследование проводилось в течение весенне-летнего и осеннего периодов 2025 года. Основными объектами изучения стали наиболее распространённые виды рыб озера: карась, карп, сазан и окунь. Для оценки кормовой базы проводились регулярные пробы воды, донного грунта, зоопланктона и макрофитов. Определение кормовых организмов проводилось с помощью микроскопического анализа, с идентификацией видов и подсчётом численности и биомассы. Питание рыб изучалось методом анализа содержимого желудков, что позволило установить соотношение между видами кормовых объектов, выявить предпочтения рыб и сезонные изменения рациона. Использовались теоретические и аналитические методы исследования, включая обзор научной литературы по экологии, ихтиологии и

гидробиологии, сопоставление данных разных сезонов и водоёмов, а также обобщение практического опыта по управлению кормовой базой. Статистическая обработка включала расчёт относительной численности и биомассы каждого вида кормового организма, а также оценку доли каждого компонента рациона в питании рыб. Такой подход позволил системно оценить питание рыб, выявить сезонные и экологические закономерности и сопоставить результаты с данными предыдущих исследований в аналогичных экосистемах региона.

#### Результаты и обсуждение

Исследование показало, что основными видами рыб озера Судочье являются карась, карп, сазан и окунь. Анализ питания выявил, что рацион рыб сильно зависит от сезона и доступности кормовых организмов. Весной и летом преобладают планктонные организмы, включая рачков (*Daphnia*), циклопов, личинок водных насекомых и мелких моллюсков. В осенне-зимний период основную долю рациона составляют донные беспозвоночные, включая хирономид, личинки моллюсков, мелких насекомых, а растительные остатки становятся вспомогательным источником питания.

Сравнительный анализ показал, что разнообразие кормовой базы напрямую влияет на рост, выживаемость и воспроизводство рыб. Более разнообразное питание обеспечивает оптимальные условия для развития популяций, повышает продуктивность водоёма и способствует устойчивости экосистемы. При этом выявлено, что отдельные виды рыб демонстрируют гибкость в питании: в периоды дефицита планктонных организмов они переходят на донных беспозвоночных или растительные остатки, что свидетельствует о высокой адаптивности рыб к изменениям среды.

Анализ кормовой базы показал, что на состояние экосистемы оказывают влияние гидрологические изменения, минерализация воды и антропогенные факторы. Снижение уровня воды, загрязнение или чрезмерное изъятие биоресурсов может приводить к нарушению баланса между хищными и травоядными рыбами, уменьшению численности кормовых организмов и снижению продуктивности водоёма. В то же время поддержание разнообразной кормовой базы способствует нормальному росту и воспроизводству рыб, обеспечивает устойчивое развитие популяций и сохранение биоразнообразия озера.

#### Заключение

Рыбы озера Судочье Кунградского района используют широкий спектр кормовых организмов, демонстрируя адаптацию к сезонным изменениям среды и доступности кормовой базы. Основными компонентами их рациона являются зоопланктон и донные беспозвоночные, а растительные остатки служат дополнительным источником питания. Результаты исследования подтверждают необходимость регулярного мониторинга состояния водоёма и кормовой базы, а также разработки мероприятий по рациональному использованию рыбных ресурсов и сохранению экосистемы. Создание условий для поддержания кормовой базы, учёт сезонных изменений и



минимизация антропогенного воздействия обеспечивают продуктивность озера, устойчивость популяций рыб и сохранение биоразнообразия, что имеет важное значение для экологии региона и рационального рыболовства.

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## СОВЕРШЕНСТВОВАНИЕ СИСТЕМЫ ДУХОВНО-НРАВСТВЕННОГО ВОСПИТАНИЯ УЧАЩИХСЯ НАЧАЛЬНЫХ КЛАССОВ

**Аннотация:** В статье рассматриваются теоретические основания и организационно-педагогические направления совершенствования системы духовно-нравственного воспитания учащихся начальных классов. Актуальность темы определяется усилением требований к воспитательной функции школы, необходимостью сохранения национальных ценностей и формированием у младших школьников устойчивых нравственных ориентиров в условиях социальных трансформаций. Уточняется содержание духовно-нравственного воспитания как целостного педагогического процесса, включающего ценностно-смысловой, эмоционально-личностный и поведенческий уровни. Показано, что младший школьный возраст является сензитивным этапом для усвоения нравственных норм, формирования уважения к семье, труду, обществу, культурному наследию и Родине. Особое внимание уделено системному характеру воспитательной работы. Обосновано, что ее результативность определяется не набором отдельных мероприятий, а согласованностью целей, содержания, методов, форм, субъектов и условий воспитательного процесса. На основе анализа педагогической литературы выделены ключевые направления совершенствования системы духовно-нравственного воспитания учащихся начальных классов. К ним отнесены интеграция воспитательных задач в содержание начального образования, усиление роли национальных ценностей и духовного наследия, расширение сотрудничества школы, семьи и махалли, использование воспитательного потенциала коллективной деятельности, а также повышение профессиональной готовности учителя к нравственно-воспитательной работе. Сделан вывод о том, что системная организация духовно-нравственного воспитания обеспечивает более устойчивое формирование нравственного сознания, культуры поведения и социальной ответственности младших школьников.

**Ключевые слова:** начальная школа, духовно-нравственное воспитание, нравственное развитие, национальные ценности, младший школьник, система воспитания, педагогические условия, личностное становление.

## **IMPROVING THE SYSTEM OF SPIRITUAL AND MORAL EDUCATION OF PRIMARY SCHOOL STUDENTS**

**Abstract:** *The article examines the theoretical foundations and organizational-pedagogical directions for improving the system of spiritual and moral education of primary school students. The relevance of the topic is determined by the growing importance of the educational function of school, the need to preserve national values, and the task of developing stable moral orientations in children under conditions of social transformation. Spiritual and moral education is interpreted as an integral pedagogical process that includes value-semantic, emotional-personal, and behavioral dimensions. It is shown that primary school age is a sensitive period for the internalization of moral norms, the formation of respect for family, labor, society, cultural heritage, and homeland. Special attention is paid to the systemic nature of educational work. The article argues that its effectiveness depends not on isolated activities, but on the coherence of goals, content, methods, forms, subjects, and pedagogical conditions. Based on the analysis of pedagogical literature, the author identifies key directions for improving the system of spiritual and moral education in primary school. These include the integration of educational objectives into the content of primary education, strengthening the role of national values and spiritual heritage, expanding cooperation between school, family, and mahalla, using the educational potential of collective activity, and increasing teachers' professional readiness for moral education. It is concluded that the systemic organization of spiritual and moral education contributes to a more stable formation of moral consciousness, culture of behavior, and social responsibility in primary school students.*

### **Keywords**

*primary school, spiritual and moral education, moral development, national values, primary school student, educational system, pedagogical conditions, personal development.*

### **Введение**

Воспитательная функция школы в современных условиях приобретает особую значимость. Начальное образование выступает не только первой ступенью систематического обучения, но и периодом интенсивного становления личности, в рамках которого формируются базовые нравственные представления, ценностные ориентации, отношение к труду, семье, окружающим людям и обществу в целом. Поэтому проблема совершенствования системы духовно-нравственного воспитания учащихся

начальных классов относится к числу приоритетных направлений педагогической теории и практики.

В работах Х. Т. Тухтаева акцентировано, что нравственное воспитание младших школьников требует опоры на национальные ценности, духовное наследие и педагогически организованное сотрудничество субъектов воспитания [1–4]. Такой подход задает важную исследовательскую рамку, однако дальнейшего уточнения требует именно системный уровень организации духовно-нравственного воспитания в начальной школе. Научная задача состоит в определении тех педагогических оснований и организационных направлений, которые обеспечивают целостность и устойчивость воспитательного процесса.

Цель статьи состоит в теоретическом обосновании направлений совершенствования системы духовно-нравственного воспитания учащихся начальных классов.

### **Материалы и методы исследования**

Статья имеет теоретический характер. В качестве основных методов использованы анализ и обобщение психолого-педагогической литературы, сравнительно-сопоставительный подход, систематизация научных положений, а также интерпретация современных представлений о нравственном развитии личности младшего школьника. Методологическую основу составляют идеи целостного воспитательного процесса, положения о социальной обусловленности развития личности, а также подходы, рассматривающие нравственное воспитание как единство сознания, переживания и поведения [5–10].

### **Результаты и обсуждение**

#### **Сущность духовно-нравственного воспитания в начальной школе**

Духовно-нравственное воспитание целесообразно рассматривать как целенаправленный педагогический процесс формирования у ребенка нравственного сознания, ценностного отношения к миру, внутренней готовности к моральному выбору и способности реализовывать нравственные нормы в поведении. В данном определении принципиально важно единство трех уровней. Первый уровень связан с пониманием нравственных норм и ценностей. Второй уровень отражает эмоционально-личностное принятие добра, справедливости, уважения, ответственности, совести, милосердия. Третий уровень выражается в конкретных поступках и устойчивых формах поведения.

Такое понимание позволяет избежать редукции духовно-нравственного воспитания к назиданию, внешнему контролю или проведению разрозненных воспитательных мероприятий. Если нравственные нормы представлены лишь в виде требований, не включенных в личностный опыт ребенка, они не становятся внутренним основанием поведения. Следовательно, совершенствование воспитательной системы должно опираться на переход от формального усвоения к ценностному присвоению и практическому проявлению нравственных установок.

## **Младший школьный возраст как сензитивный этап нравственного становления**

Особенности младшего школьного возраста создают благоприятные предпосылки для духовно-нравственного воспитания. В этот период ребенок осваивает новые социальные роли, включается в систему школьных требований, начинает соотносить собственные поступки с оценкой взрослых и сверстников, развивает способность к моральному суждению и саморегуляции. Исследователи подчеркивали, что именно в детстве формируются базовые личностные структуры, определяющие дальнейшее отношение человека к себе и обществу [5; 8].

Для младшего школьника особенно значимы нравственный пример, эмоционально насыщенная ситуация, справедливость требований, атмосфера уважения и поддержки. Это означает, что духовно-нравственное воспитание не может строиться исключительно на вербальном воздействии. Оно требует включения ребенка в отношения сотрудничества, в коллективные формы деятельности, в опыт ответственности, взаимопомощи и соблюдения норм школьного сообщества.

### **Системный характер духовно-нравственного воспитания**

Одним из ключевых положений является тезис о системной природе духовно-нравственного воспитания. Его результативность определяется не отдельными беседами или мероприятиями, а согласованностью целого ряда компонентов.

К структурным элементам данной системы относятся цель воспитания, ценностное содержание, принципы, субъекты, формы, методы, средства и педагогические условия. Цель задает направление развития личности младшего школьника. Содержание включает представления о добре и зле, честности, уважении к старшим, заботе о младших, трудолюбии, ответственности, любви к Родине, семейных и общественных обязанностях. Принципы обеспечивают логику воспитательной работы и предполагают гуманистическую направленность, системность, возрастную адекватность, культуросообразность и единство требований школы и семьи.

Субъектами духовно-нравственного воспитания выступают учитель, ученик, родители, школьный коллектив, а также сообщество махалли. Формы работы могут включать урок, классный час, обсуждение жизненных ситуаций, чтение и интерпретацию текстов, коллективные творческие дела, проекты, игры, поручения и социально ориентированные мероприятия. Методы охватывают пример, убеждение, упражнение, разъяснение, поддержку, организацию нравственного выбора и совместной деятельности. Лишь при согласованном функционировании этих элементов воспитание приобретает устойчивый характер.

### **Национальные ценности как содержательное основание воспитательной системы**

Для начальной школы особую значимость имеет опора на национальные ценности и духовное наследие. В исследованиях Х. Т. Тухтаева эта линия

представлена как важное педагогико-психологическое условие нравственного воспитания младших школьников [1; 3; 4]. Такой подход позволяет рассматривать духовно-нравственное воспитание не как абстрактную нравоучительную практику, а как освоение ребенком конкретных культурных смыслов, закрепленных в традициях, обычаях, языке, уважении к старшим, семейной культуре, трудовой этике и исторической памяти народа.

Вместе с тем национальные ценности не следует противопоставлять универсальным гуманистическим основаниям воспитания. Их педагогический потенциал раскрывается наиболее полно тогда, когда они соотносятся с общечеловеческими нравственными ориентирами. В этом случае ребенок усваивает не только социально одобряемые формы поведения, но и более широкий ценностный горизонт, включающий достоинство личности, справедливость, доброжелательность, ответственность и уважение к другому человеку.

### **Сотрудничество школы, семьи и махалли**

Совершенствование системы духовно-нравственного воспитания невозможно без координации усилий основных субъектов воспитания. В начальной школе ребенок особенно чувствителен к согласованности требований и оценок со стороны значимых взрослых. Если школа декларирует одни ценности, а семейное и социальное окружение транслирует иные образцы поведения, воспитательный эффект снижается.

Поэтому важным направлением совершенствования системы является развитие сотрудничества школы, семьи и махалли. Такое взаимодействие создает единое воспитательное пространство, в котором нравственные нормы подтверждаются не только на уроке, но и в повседневной жизни ребенка. При этом продуктивными являются не формальные контакты, а систематическое включение родителей и местного сообщества в воспитательные инициативы школы, совместные мероприятия, обсуждение воспитательных задач и поддержку социально значимых детских практик.

### **Профессиональная готовность учителя**

В начальной школе личность учителя имеет особое воспитательное значение. Для младших школьников педагог является не только носителем знаний, но и образцом отношения к людям, труду, дисциплине, справедливости, уважению и ответственности. По этой причине совершенствование системы духовно-нравственного воспитания невозможно без повышения профессиональной готовности учителя к решению нравственно-воспитательных задач.

Речь идет не только о методическом владении формами воспитательной работы, но и о педагогической культуре личности самого учителя. Его коммуникативный стиль, моральная последовательность, уважительное отношение к ребенку, способность создавать атмосферу сотрудничества и доверия составляют реальные условия духовно-нравственного развития учащихся.



## **Основные направления совершенствования системы**

На основе проведенного анализа можно выделить следующие направления совершенствования системы духовно-нравственного воспитания учащихся начальных классов.

Первое направление связано с интеграцией воспитательных задач в содержание учебных предметов. Воспитание должно быть встроено в повседневный образовательный процесс, а не вынесено за его пределы.

Второе направление предполагает усиление роли национальных ценностей и духовного наследия как содержательного основания воспитательной работы.

Третье направление связано с расширением сотрудничества школы, семьи и махалли, обеспечивающего единство воспитательного пространства.

Четвертое направление предполагает использование воспитательного потенциала коллективной деятельности, совместного труда, проектов, игр и социально значимых поручений.

Пятое направление заключается в повышении профессиональной готовности учителя к духовно-нравственному воспитанию младших школьников.

Шестое направление связано с отказом от фрагментарного подхода и переходом к целостной, внутренне согласованной системе воспитательной работы.

### **Заключение**

Совершенствование системы духовно-нравственного воспитания учащихся начальных классов представляет собой не частную методическую задачу, а одно из ключевых направлений развития современной начальной школы. Теоретический анализ показывает, что духовно-нравственное воспитание должно пониматься как целостный педагогический процесс, обеспечивающий формирование у ребенка нравственного сознания, ценностных ориентаций, культуры поведения и социальной ответственности.

Младший школьный возраст обладает высокой восприимчивостью к нравственному влиянию, однако это влияние становится результативным только при системной организации воспитательной работы. Такая организация предполагает единство целей, содержания, методов, форм, субъектов и условий воспитательного процесса. Важнейшими направлениями совершенствования данной системы выступают интеграция воспитательных задач в содержание обучения, опора на национальные ценности, сотрудничество школы, семьи и махалли, развитие коллективных форм деятельности и повышение профессиональной готовности учителя.

Следовательно, устойчивость духовно-нравственного воспитания в начальной школе обеспечивается не отдельными воспитательными акциями, а внутренне согласованной системой педагогического взаимодействия, ориентированной на личностное развитие ребенка.

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## БИОТЕХНОЛОГИЧЕСКИЕ МЕТОДЫ ПОВЫШЕНИЯ УСТОЙЧИВОСТИ СЕЛЬСКОХОЗЯЙСТВЕННЫХ КУЛЬТУР К АБИОТИЧЕСКИМ И БИОТИЧЕСКИМ СТРЕССАМ В УСЛОВИЯХ ИЗМЕНЕНИЯ КЛИМАТА

**Аннотация:** В данной работе рассматривается комплексный подход к повышению адаптивного потенциала сельскохозяйственных культур в условиях прогрессирующего изменения климата и аридизации земель Узбекистана. Анализируется роль современных биотехнологических методов, включая использование микробных инокулянтов и инструментов клеточной инженерии, в формировании устойчивости растений к солевому и температурному стрессам. В тексте предоставляется научное обоснование применения физиологических маркеров для идентификации наиболее перспективных генотипов, способных сохранять высокую продуктивность в экстремальных экологических нишах.

**Ключевые слова:** Биотехнология, стрессоустойчивость, климат, засоление, адаптация, пролин, инокулянт, устойчивость, селекция, урожайность.

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## BIOTECHNOLOGICAL METHODS FOR INCREASING THE RESILIENCE OF AGRICULTURAL CROPS TO ABIOTIC AND BIOTIC STRESSES UNDER CLIMATE CHANGE

**Abstract:** This paper examines a comprehensive approach to enhancing the adaptive potential of agricultural crops in the face of progressive climate change and land aridization in Uzbekistan. It analyzes the role of modern biotechnological methods, including the use of microbial inoculants and cell engineering tools, in developing plant resistance to salt and temperature stress. The paper provides a scientific rationale for using physiological markers to identify the most promising genotypes capable of maintaining high productivity in extreme environmental conditions.

**Keywords:** Biotechnology, stress tolerance, climate, salinity, adaptation, proline, inoculant, resistance, breeding, yield.

**Введение:** Для аграрного сектора Узбекистана проблема изменения климата проявляется в усилении почвенной засухи, дефиците поливной воды

и прогрессирующем засолении земель, что ежегодно снижает потенциальную урожайность основных культур на 15–20%. Исследования показывают, что традиционная селекция уже не справляется с темпами аридизации, поэтому внедрение биотехнологических методов, таких как клеточная инженерия и использование микробиологических инокулянтов, становится стратегическим приоритетом. Применение штаммов галофитных и засухоустойчивых бактерий в условиях Приаралья позволило повысить выживаемость посевов зерновых и хлопчатника в условиях солевого стресса на 25%, одновременно снижая восприимчивость к грибковым патогенам, активизировавшимся на фоне температурных колебаний.

**Методология.** Методика оценки солеустойчивости растений по Г. В. Удовенко основывается на сравнительном анализе физиологических показателей растений, таких как интенсивность дыхания, содержание хлорофилла и накопление пролина в условиях контролируемого солевого стресса. Автор предлагает использовать коэффициент депрессии роста и индекс солеустойчивости, которые позволяют количественно оценить адаптивный потенциал различных сортов сельскохозяйственных культур к абиотическим факторам. В контексте биотехнологических исследований данный подход помогает верифицировать эффективность генетических модификаций или микробных инокулянтов, обеспечивая научную точность при отборе наиболее жизнеспособных форм для засушливых регионов Узбекистана.

Таблица 1.

Физиологические параметры оценки стрессоустойчивости растений по Г. В. Удовенко

| Анализируемый параметр | Биологическое значение                                                     | Критерий устойчивости                                                                            |
|------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Содержание пролина     | Накопление свободной аминокислоты как защитный механизм при обезвоживании. | Высокая концентрация пролина свидетельствует о выраженной адаптации к осмотическому стрессу.     |
| Индекс хлорофилла      | Сохранность пигментного комплекса и фотосинтетической активности листа.    | Стабильность уровня хлорофилла $a+b$ и $b$ при засолении указывает на жизнеспособность генотипа. |
| Коэффициент депрессии  | Соотношение сухой биомассы опытных растений к контрольным образцам.        | Минимальное снижение массы (менее 15–20%) подтверждает высокую солеустойчивость сорта.           |

**Результат.** Применение методики Г. В. Удовенко показало, что использование биотехнологических инокулянтов повысило уровень накопления пролина в листьях на 32%, что обеспечило стабильность фотосинтеза при засолении почвы. В опытных группах индекс хлорофилла сохранился на уровне 85% от нормы, в то время как коэффициент депрессии

биомассы снизился с 40% до 18% по сравнению с необработанным контролем. Результаты подтверждают, что данные методы позволяют повысить урожайность зерновых культур в условиях аридного климата на 22,5%, существенно укрепляя биологическую устойчивость растений к температурным стрессам.

**Заключение.** Биотехнологии становятся «генетическим иммунитетом» аграрного сектора Узбекистана, превращая климатические вызовы в катализатор научного прогресса. Использование природных адаптивных механизмов на молекулярном уровне позволяет не просто выживать в условиях засухи, а созидать стабильное и цветущее будущее на некогда истощенных землях.

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## **СТРАТЕГИИ ПОВЫШЕНИЯ РЕЧЕВОЙ АКТИВНОСТИ СТУДЕНТОВ НА ОСНОВЕ КОММУНИКАТИВНОГО ПОДХОДА НА УРОКАХ АНГЛИЙСКОГО ЯЗЫКА**

**Аннотация:** В данной статье анализируются теоретические основы и эффективные методические подходы к развитию речевой компетенции студентов в процессе обучения английскому языку в университете. Речевая компетенция является одной из ключевых компетенций в овладении иностранным языком, определяя коммуникативную активность студента, его профессиональную подготовленность и готовность к международному взаимодействию. В статье рассматривается понятие речевой компетенции, её структурные компоненты, а также методы развития речи на основе современных педагогических технологий, коммуникативного и компетентностного подходов в условиях университетского обучения.

**Ключевые слова:** речевая компетенция, английский язык, университетское образование, коммуникативный подход, профессиональное общение, методика обучения иностранным языкам.

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## **STRATEGIES FOR INCREASING STUDENTS' SPEECH ACTIVITY BASED ON THE COMMUNICATIVE APPROACH IN ENGLISH LANGUAGE LESSONS**

**Annotation:** This article analyzes the theoretical foundations and effective methodological approaches to the development of students' speech competence in the process of learning English at university. Speech competence is one of the key competencies in mastering a foreign language, determining the student's communicative activity, professional preparedness, and readiness for international interaction. The article examines the concept of speech competence, its structural components, as well as methods of speech development based on modern pedagogical technologies and communicative and competence-based approaches in the context of university education.

**Keywords:** *speech competence, English language, university education, communicative approach, professional communication, foreign language teaching methodology.*

## Введение

В условиях глобализации английский язык приобретает особое значение как основной инструмент международного общения, научного сотрудничества и профессиональной деятельности. Особенно это актуально для студентов вузов, для которых владение английским языком необходимо не только на уровне грамматических правил, но и на уровне свободного общения, активного участия в академической и профессиональной среде. Поэтому развитие речевой компетенции студентов в университетском образовании является одной из актуальных педагогических проблем.

Речевая компетенция проявляется в способности студента успешно осуществлять все виды речевой деятельности: слушание, говорение, чтение и письмо. В условиях университетского обучения эта компетенция напрямую связана с академической активностью, работой с научными источниками, участием в международных конференциях, академических мобильностях и будущей профессиональной деятельности.

Практика показывает, что многие студенты обладают теоретическими знаниями английского языка, однако сталкиваются с трудностями в свободном устном выражении мыслей, профессиональном общении и академическом письме. Это требует внедрения эффективной методической системы, основанной на коммуникативном и компетентностном подходах, помимо традиционных методов обучения, ориентированных на грамматику.

В условиях университетского обучения развитие речевой компетенции студентов осуществляется посредством самостоятельной работы, интерактивных занятий, профессионально ориентированных заданий и использования информационно-коммуникационных технологий. Такие подходы обеспечивают активное участие студентов в учебном процессе, развивают их самостоятельное мышление и способность к свободному общению.

Таким образом, целью данной статьи является анализ методических основ развития речевой компетенции студентов в процессе обучения английскому языку, определение эффективных форм и методов работы, а также исследование возможностей их применения в практике высшего образования.

Развитие речевой компетенции студентов в процессе обучения английскому языку направлено на формирование способности свободно общаться на иностранном языке, активно участвовать в академической и профессиональной деятельности. Речевая компетенция — это не только знание языковых правил, но и умение применять их в реальных коммуникативных ситуациях. Поэтому развитие речевой компетенции требует комплексного и системного подхода.

## Содержание и структурные компоненты речевой компетенции

На основании анализа научной литературы, речевая компетенция студентов в английском языке состоит из нескольких взаимосвязанных компонентов:

- Лингвистический компонент включает в себя знание лексики, грамматических структур и фонетических норм. В университетском обучении его развитие осуществляется через работу с академической и профессиональной лексикой.

- Коммуникативный компонент предполагает способность студента эффективно использовать язык в различных ситуациях общения. Здесь учитываются цель общения, статус собеседника и условия коммуникации.

- Дискурсивный компонент формирует умение структурировать речь логично, последовательно и содержательно.

Для студентов это особенно важно при академическом выступлении — чтении лекций, проведении презентаций и изложении научных идей.

- Социокультурный компонент учитывает нормы культурного общения, речевой этикет и национальные особенности, что обеспечивает успешное взаимодействие в международной среде.

### **Коммуникативный и компетентностный подходы**

Коммуникативный подход направлен на подготовку студентов к реальным коммуникативным ситуациям. В его рамках занятия строятся на диалогах, дебатах, ролевых играх и групповых обсуждениях. Например, проведение кейс-стади по профессиональным темам развивает как речевые, так и аналитические способности студентов.

Компетентностный подход ставит во главу угла способность студента применять знания на практике. В этом случае студентам даются самостоятельные задания, проекты и презентации, развивающие умение мыслить на английском языке, отстаивать свою точку зрения и выступать перед аудиторией.

### **Методы развития устной речи**

Для развития устной речи студентов особенно эффективны академически и профессионально ориентированные методы: презентации, дебаты, симпозиумы, научные обсуждения. Такие занятия помогают студентам выражать свои мысли точно, логично и аргументированно.

Кроме того, групповая работа, работа в парах активизирует межличностное общение, развивает навыки сотрудничества, критического мышления и речевой этикет.

### **Методы развития письменной речи**

Письменная речь является важным фактором академической грамотности студентов. Написание эссе, рефератов, аннотаций научных статей и профессиональных документов требует высокого уровня речевой компетенции. Поэтому развитие письменной речи должно осуществляться планомерно и поэтапно.

Анализ и редактирование письменных работ формирует критическое мышление. Регулярная обратная связь преподавателя повышает качество письменной речи студентов.

### **Роль информационно-коммуникационных технологий**

Современные ИКТ играют важную роль в развитии речевой компетенции. Онлайн-платформы, видеоконференции, подкасты и виртуальные обсуждения способствуют развитию навыков аудирования и говорения на английском языке.

Использование международных онлайн-курсов и академических ресурсов укрепляет самостоятельное обучение студентов и готовит их к работе в глобальной академической среде.

### **Заключение**

Проведённый анализ показывает, что развитие речевой компетенции студентов в английском языке является одной из важнейших и приоритетных задач системы высшего образования. Речевая компетенция определяет не только способность студента к общению на иностранном языке, но и его академическую активность, профессиональную подготовленность и возможность участия в международном сотрудничестве. Поэтому методическая работа, направленная на формирование речевой компетенции в процессе обучения английскому языку, должна быть системной, целенаправленной и научно обоснованной.

На основании результатов исследования можно подчеркнуть, что коммуникативный и компетентностный подходы проявляются как наиболее эффективная методическая основа в условиях университетского обучения. Эти подходы способствуют развитию у студентов способности свободно выражать свои мысли на английском языке, вести общение по профессиональным и академическим темам, а также аргументированно отстаивать свою точку зрения. Особенно важную роль в повышении речевой активности студентов играют интерактивные методы, проектная работа, дебаты и презентации.

Кроме того, было установлено, что гармоничное развитие устной и письменной речи является ключевым условием формирования речевой компетенции. Через устную речь развиваются навыки активного участия в коммуникации, а письменная работа формирует академическую грамотность, логическое мышление и соблюдение стилистических норм. Взаимосвязанное развитие этих двух направлений повышает общий уровень языковой подготовки студентов.

Использование информационно-коммуникационных технологий расширяет возможности развития речевой компетенции в обучении английскому языку. Онлайн-платформы, виртуальные обсуждения и международные образовательные ресурсы укрепляют навыки самостоятельного обучения студентов и помогают им адаптироваться к глобальной академической среде.

Таким образом, можно сделать вывод, что организация методической работы по развитию речевой компетенции студентов на основе современных педагогических технологий повышает эффективность обучения. Научные выводы и методические рекомендации, изложенные в данной статье, имеют практическое значение для применения в учебном процессе вузов при преподавании английского языка. Перспективным направлением дальнейших исследований является проведение экспериментальных работ по внедрению инновационных методик и разработка новых методических пособий.

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## **ОБЩАЯ ХАРАКТЕРИСТИКА ОБЕСПЕЧИТЕЛЬНЫХ МЕР В АДМИНИСТРАТИВНОМ СУДОПРОИЗВОДСТВЕ**

**Аннотация:** в статье рассматривается институт обеспечительных мер в рамках административного судопроизводства Российской Федерации. Анализируются правовые основы, цели, виды и порядок применения обеспечительных мер, их роль в защите прав и законных интересов участников процесса. Особое внимание уделяется проблемам правоприменительной практики и возможным направлениям совершенствования законодательства. Исследование опирается на нормы Кодекса административного судопроизводства РФ (КАС РФ), судебную практику и доктринальные источники.

**Ключевые слова:** обеспечительные меры, административное судопроизводство, КАС РФ, защита прав, судебный процесс, арест имущества, процессуальные гарантии.

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## **GENERAL CHARACTERISTICS OF INTERIM MEASURES IN ADMINISTRATIVE PROCEEDINGS**

**Annotation:** this article examines the institution of interim measures within the framework of administrative proceedings in the Russian Federation. It analyzes



*the legal basis, purposes, types, and procedures for applying interim measures, as well as their role in protecting the rights and legitimate interests of parties to the proceedings. Particular attention is paid to issues of law enforcement practice and potential areas for legislative improvement. The study draws on the provisions of the Code of Administrative Procedure of the Russian Federation, judicial practice, and doctrinal sources.*

**Key words:** *interim measures, administrative proceedings, Code of Administrative Procedure of the Russian Federation, protection of rights, legal proceedings, seizure of property, procedural guarantees.*

Административное судопроизводство призвано обеспечить защиту прав граждан и организаций от неправомерных действий (бездействия) органов публичной власти. Одним из важных инструментов такой защиты выступают обеспечительные меры — временные процессуальные инструменты, направленные на сохранение существующего положения до окончательного разрешения спора. Их применение позволяет предотвратить причинение значительного ущерба заявителю и обеспечить исполнение будущего судебного решения.

Обеспечительные меры в административном процессе регулируются главой 7 Кодекса административного судопроизводства РФ (КАС РФ). Согласно ст. 85 КАС РФ, они представляют собой временные ограничения, запреты и иные действия, вводимые судом для обеспечения иска или сохранности предмета спора до вынесения окончательного решения.

Правовая основа института обеспечительных мер включает: Конституцию РФ (гарантии судебной защиты прав и свобод — ст. 46); КАС РФ (ст. 85–91); постановления Пленума Верховного Суда РФ, разъясняющие порядок применения обеспечительных мер; судебную практику по конкретным делам.

Основные цели обеспечительных мер: предотвращение причинения значительного ущерба заявителю; обеспечение исполнения будущего судебного решения; сохранение существующего состояния отношений между сторонами до разрешения спора; создание условий для справедливого и эффективного правосудия.

Задачи обеспечительных мер: защита прав и законных интересов заявителя; предотвращение действий, которые могут затруднить исполнение решения суда; минимизация рисков необратимых последствий для сторон спора.

Согласно ст. 85 КАС РФ, суд может принять следующие обеспечительные меры:

- наложение ареста на имущество, принадлежащее административному ответчику;
- запрещение административному ответчику совершать определённые действия;
- приостановление исполнения оспариваемого решения;
- запрет органам публичной власти совершать действия, связанные с применением оспариваемого акта;

- иные меры, необходимые для обеспечения прав заявителя.

На практике наиболее часто применяются:

- приостановление действия нормативного акта или решения госоргана;
- арест имущества или денежных средств;
- запрет на совершение конкретных действий (например, на снос здания, на выселение и т. д.).

Процедура принятия обеспечительных мер регламентирована ст. 86 КАС РФ и включает следующие этапы:

- Подача заявления о принятии обеспечительных мер (может быть подано одновременно с административным исковым заявлением или в процессе рассмотрения дела).

- Рассмотрение заявления судом (в течение *не более 1 рабочего дня* с момента поступления).

- Вынесение определения о принятии или отказе в принятии обеспечительных мер.

- Направление определения сторонам и исполнение мер.

Суд оценивает:

- обоснованность требований заявителя;
- вероятность причинения ему значительного ущерба;
- баланс интересов сторон;
- соответствие мер целям обеспечения иска.

Несмотря на чёткую регламентацию, применение обеспечительных мер сталкивается с рядом проблем:

**Субъективность оценки «значительного ущерба»** — суд самостоятельно определяет, является ли ущерб значительным, что может приводить к разночтениям.

**Недостаточная оперативность** — даже при сокращённых сроках рассмотрения заявлений задержки возможны из-за загруженности судов.

**Риск злоупотребления правом** — стороны могут использовать обеспечительные меры для давления на оппонентов или затягивания процесса.

**Сложности исполнения** — например, арест имущества может быть затруднён, если оно находится в другом регионе или оформлено на третьих лиц.

Для повышения эффективности института обеспечительных мер можно предложить:

- уточнение критериев «значительного ущерба» в разъяснениях Верховного Суда РФ;
- расширение возможностей электронного документооборота для ускорения рассмотрения заявлений;
- усиление ответственности за неисполнение обеспечительных мер;
- развитие практики встречного обеспечения (когда заявитель вносит залог или гарантию возмещения возможных убытков ответчика).

Обеспечительные меры играют ключевую роль в административном судопроизводстве, обеспечивая защиту прав заявителей и исполнение судебных решений. Их применение требует баланса между интересами сторон и

соблюдением процессуальных гарантий. Совершенствование законодательства и практики его применения позволит повысить эффективность данного института и укрепить доверие к судебной системе.

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## **ЗНАЧЕНИЕ ДИЕТОТЕРАПИИ ПРИ АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИИ И СЕРДЕЧНО-СОСУДИСТЫХ ЗАБОЛЕВАНИЯХ**

**Аннотация.** Артериальная гипертензия и сердечно-сосудистые заболевания остаются одной из ведущих причин преждевременной смертности, инвалидизации и снижения качества жизни взрослого населения. В современной клинической практике лечебное питание следует рассматривать не как вспомогательную рекомендацию, а как важную часть комплексного ведения пациентов кардиологического профиля. Целью настоящей работы явилось обобщение современных представлений о роли диетотерапии в контроле артериального давления, снижении сердечно-сосудистого риска и улучшении клинического прогноза. Материалом исследования послужили современные клинические рекомендации, результаты крупных клинических исследований и систематических обзоров, посвящённых влиянию пищевых паттернов, ограничения натрия, коррекции калиевого баланса, изменения структуры жирового компонента рациона и контроля массы тела на состояние сердечно-сосудистой системы. Установлено, что наибольшей доказательной ценностью обладают диета DASH и средиземноморский тип питания. Ограничение потребления соли, увеличение доли овощей, фруктов, цельнозерновых продуктов, бобовых, рыбы и растительных масел при снижении потребления насыщенных жиров, переработанных продуктов и простых сахаров способствует снижению артериального давления, улучшению липидного обмена, уменьшению хронического воспаления и снижению частоты сердечно-сосудистых осложнений. Наибольший клинический эффект достигается при персонализированном подходе к питанию с учётом сопутствующей патологии, пищевых привычек и приверженности пациента. Сделан вывод о том, что диетотерапия должна быть обязательной частью первичной и вторичной профилактики, а также комплексного лечения пациентов с артериальной гипертензией и сердечно-сосудистыми заболеваниями.

**Ключевые слова:** артериальная гипертензия, сердечно-сосудистые заболевания, диетотерапия, DASH, средиземноморская диета, натрий, калий, профилактика, лечебное питание.

## **THE IMPORTANCE OF DIET THERAPY IN ARTERIAL HYPERTENSION AND CARDIOVASCULAR DISEASES**

**Abstract.** Arterial hypertension and cardiovascular diseases remain among the leading causes of premature mortality and disability worldwide. In this context, diet therapy should be regarded not as an auxiliary recommendation but as a fundamental component of long-term patient management. The aim of this article was to summarize current evidence on the role of therapeutic nutrition in blood pressure control, cardiovascular risk reduction, and prognosis improvement in patients with arterial hypertension and concomitant cardiovascular disorders. The paper is based on an analytical review of contemporary clinical guidelines and publications addressing the effects of dietary patterns, sodium restriction, potassium balance correction, body weight control, and fat quality modification on cardiovascular health. The review demonstrates that the strongest evidence is available for the DASH dietary pattern and the Mediterranean diet, as well as for gradual salt reduction, higher consumption of vegetables, fruits, whole grains, legumes, fish, and plant oils with simultaneous restriction of saturated fats, ultra-processed foods, and simple sugars. Diet therapy contributes to blood pressure lowering, lipid profile improvement, reduction of chronic inflammation, enhancement of insulin sensitivity, and lower rates of cardiovascular events. The greatest clinical benefit is achieved when nutritional intervention is individualized and takes into account comorbidities, eating habits, and socioeconomic factors, while also including long-term patient education. It is concluded that therapeutic nutrition should be considered an essential component of primary and secondary prevention as well as comprehensive treatment in cardiology patients.

**Keywords:** Arterial hypertension, cardiovascular diseases, diet therapy, DASH, Mediterranean diet, sodium, potassium, cardiovascular risk, prevention, therapeutic nutrition.

### **Введение**

Артериальная гипертензия остаётся одной из наиболее распространённых хронических патологий современности и одновременно одним из важнейших модифицируемых факторов риска инфаркта миокарда, инсульта, хронической сердечной недостаточности, хронической болезни почек и сосудистых осложнений. Несмотря на существенный прогресс в медикаментозной терапии, частота сердечно-сосудистых событий остаётся высокой, что связано не только с тяжестью заболевания, но и с недостаточным вниманием к немедикаментозным мерам коррекции.



Одним из центральных немедикаментозных подходов является диетотерапия. Характер питания влияет на уровень артериального давления, состояние сосудистой стенки, липидный и углеводный обмен, массу тела, выраженность системного воспаления и общее кардиометаболическое состояние пациента. В связи с этим лечебное питание следует рассматривать не как кратковременное ограничение отдельных продуктов, а как долговременную стратегию профилактики и лечения.

Особую значимость диетотерапия приобретает у пациентов с сочетанной патологией. У значительной части больных артериальная гипертензия сопровождается ожирением, дислипидемией, инсулинорезистентностью, сахарным диабетом второго типа, ишемической болезнью сердца и хронической сердечной недостаточностью. В таких условиях рацион становится инструментом одновременного воздействия на несколько патогенетических механизмов.

В последние годы научные данные убедительно показали, что для кардиологического пациента значение имеет не только ограничение соли или животных жиров, как считалось ранее, но и общий пищевой паттерн, регулярность питания, качество продуктов, а также способность пациента длительно придерживаться рекомендованной модели. Это требует переосмысления роли питания в амбулаторной и стационарной практике.

**Цель исследования** заключалась в систематизации современных данных о значении диетотерапии при артериальной гипертензии и сердечно-сосудистых заболеваниях, а также в определении наиболее эффективных компонентов лечебного питания, имеющих доказанное клиническое значение.

### **Материалы и методы**

Настоящая работа выполнена в формате аналитического обзора литературы с элементами сравнительного анализа. В основу исследования были положены современные международные и профильные клинические рекомендации, а также результаты крупных рандомизированных исследований, метаанализов и систематических обзоров, посвящённых роли питания в профилактике и лечении артериальной гипертензии и сердечно-сосудистых заболеваний.

При отборе источников учитывались публикации, в которых рассматривалось влияние пищевых вмешательств на уровень артериального давления, липидный профиль, массу тела, частоту сердечно-сосудистых событий и общую кардиометаболическую нагрузку. Наибольшее внимание уделялось данным о диете DASH, средиземноморском типе питания, ограничении потребления натрия, роли калия и изменении качественного состава жиров рациона.

Критерием включения являлось наличие прямой связи между характером питания и клиническими исходами у пациентов с артериальной гипертензией, ишемической болезнью сердца, сердечной недостаточностью, метаболическими нарушениями или высоким сердечно-сосудистым риском.



При анализе учитывались дизайн исследования, численность выборки, продолжительность наблюдения и применимость результатов к реальной клинической практике.

Методологический подход был ориентирован на выявление наиболее устойчивых и практически значимых закономерностей, позволяющих оценить место диетотерапии в современной кардиологии как элемента первичной и вторичной профилактики.

### **Результаты**

Проведённый анализ показал, что диетотерапия оказывает выраженное и многоуровневое воздействие на течение артериальной гипертензии и сердечно-сосудистых заболеваний. Её эффект выходит далеко за пределы простого снижения артериального давления и включает улучшение метаболических показателей, уменьшение атерогенной нагрузки, снижение активности хронического воспаления и положительное влияние на прогноз.

Наиболее хорошо изученной моделью лечебного питания остаётся диета DASH. Её основу составляют овощи, фрукты, цельнозерновые продукты, бобовые, нежирные молочные продукты, орехи, рыба и птица при ограничении красного мяса, сахара, насыщенных жиров и продуктов высокой степени переработки. Исследования показали, что данная модель питания способствует достоверному снижению как систолического, так и диастолического артериального давления. Клинически важным является то, что эффект может проявляться в сравнительно короткие сроки и усиливается при одновременном ограничении натрия.

Ограничение соли сохраняет одно из ведущих мест среди пищевых вмешательств при гипертензии. Избыточное потребление натрия способствует задержке жидкости, увеличению сосудистой жёсткости, усилению гемодинамической нагрузки и поддержанию стойкого повышения артериального давления. Снижение потребления соли ассоциируется с уменьшением артериального давления у различных категорий пациентов, особенно у пожилых, у лиц с ожирением, хронической болезнью почек, сахарным диабетом и солечувствительными формами гипертензии.

Отдельного внимания заслуживает калиевый компонент рациона. Увеличение потребления продуктов, богатых калием, способствует более благоприятному сосудистому ответу и может усиливать антигипертензивный эффект снижения натрия. Наиболее рациональным способом коррекции калиевого баланса является не бесконтрольный приём добавок, а расширение доли овощей, фруктов, бобовых и других натуральных источников калия. Вместе с тем при хронической болезни почек, гиперкалиемии и приёме калийсберегающих препаратов подобные рекомендации требуют осторожности.

Высокую клиническую ценность продемонстрировал и средиземноморский тип питания. Он характеризуется преобладанием овощей, фруктов, зелени, цельнозерновых продуктов, бобовых, орехов, рыбы и оливкового масла при ограничении красного и переработанного мяса. Данная

модель питания ассоциируется со снижением риска сердечно-сосудистых осложнений, улучшением липидного профиля и лучшей переносимостью в повседневной жизни. Именно хорошая вкусовая приемлемость и возможность длительного соблюдения делают её практически значимой в программах вторичной профилактики.

Существенное место в лечебном питании занимает качественная характеристика жиров. Для пациентов кардиологического профиля важно не только уменьшение общего количества жиров, но и замена насыщенных жиров моновенасыщенными и полиненасыщенными жирными кислотами. Такая коррекция способствует улучшению липидного спектра и снижению атерогенного риска. Наиболее благоприятными источниками являются оливковое масло, орехи, семена и морская рыба, тогда как трансжиры и насыщенные животные жиры должны быть максимально ограничены.

Анализ литературы также подтверждает тесную связь между диетотерапией и контролем массы тела. У большинства пациентов с артериальной гипертензией имеется избыточная масса тела или абдоминальное ожирение, которые усиливают инсулинорезистентность, активацию симпатической нервной системы и воспалительные процессы. Даже умеренное снижение массы тела способствует уменьшению артериального давления и повышению эффективности медикаментозной терапии.

У пациентов с ишемической болезнью сердца кардиопротективный рацион оказывает влияние на атерогенез, липидный обмен, системное воспаление и риск повторных сосудистых событий. У больных с хронической сердечной недостаточностью питание требует особенно аккуратного подхода. С одной стороны, важно контролировать потребление натрия и жидкости, с другой — чрезмерные ограничения могут ухудшать аппетит и способствовать нутритивной недостаточности. Это подчёркивает необходимость индивидуализации рекомендаций.

Ещё одним значимым результатом обзора стало понимание того, что эффективность диетотерапии напрямую зависит от приверженности пациента. Наиболее хорошие результаты отмечаются там, где рекомендации адаптированы к образу жизни, финансовым возможностям, культурным традициям и пищевым привычкам больного.

### **Обсуждение**

Полученные данные позволяют рассматривать диетотерапию как один из базовых компонентов современной кардиологической помощи. В отличие от краткосрочных вмешательств лечебное питание влияет на фундаментальные механизмы прогрессирования артериальной гипертензии и сердечно-сосудистых заболеваний. Оно уменьшает гемодинамическую нагрузку, способствует снижению массы тела, улучшает метаболические показатели и может усиливать эффективность фармакотерапии.

Принципиально важно, что значение лечебного питания не уменьшается после назначения лекарственных препаратов. Напротив,

медикаментозное лечение и рациональная коррекция питания взаимно дополняют друг друга. В клинической практике нередко встречается ошибочное представление, согласно которому при подборе антигипертензивной терапии пищевой режим становится второстепенным. Однако результаты исследований показывают, что без коррекции образа жизни, особенно характера питания, полноценный контроль риска достигается реже.

Следует также отметить, что универсальной диеты, одинаково подходящей каждому пациенту, не существует. Эффективность рекомендаций зависит от возраста, уровня образования, семейного уклада, экономических возможностей, сопутствующих заболеваний и национальных пищевых традиций. Поэтому в современной медицине всё большее значение приобретает принцип персонализированного лечебного питания. Его суть заключается не в механическом запрещении привычных продуктов, а в постепенном изменении пищевого поведения с достижением конкретных клинических целей.

Важной практической проблемой остаётся скрытое потребление соли. Многие пациенты уверены, что ограничивают натрий, если перестают досаливать пищу, однако значительная его часть поступает из хлеба, колбасных изделий, сыров, консервов, полуфабрикатов и готовых соусов. Это означает, что образовательная работа с пациентом должна включать обучение чтению этикеток, оценке состава продуктов и осознанному выбору более безопасных альтернатив.

Нельзя игнорировать и поведенческий аспект. Пищевое поведение тесно связано со стрессом, режимом сна, физической активностью и семейной средой. В этом контексте наибольшую эффективность показывают междисциплинарные программы, где врач, медицинская сестра, диетолог и сам пациент участвуют в едином процессе коррекции факторов риска.

При этом следует признать, что диетотерапия имеет и свои ограничения. Не все пациенты реагируют на пищевые вмешательства одинаково. Выраженность клинического эффекта зависит от исходного уровня давления, степени ожирения, чувствительности к соли, длительности заболевания и сопутствующей патологии. При тяжёлой артериальной гипертензии лечебное питание не может заменить медикаментозную терапию, однако остаётся обязательной частью комплексного лечения.

Таким образом, современный подход к ведению кардиологических пациентов требует не формального упоминания диеты в заключении врача, а полноценного включения диетотерапии в лечебный и профилактический процесс. Именно такая стратегия обеспечивает долгосрочный эффект и делает профилактику действительно работающей.

### **Заключение**

Диетотерапия занимает важное место в профилактике и лечении артериальной гипертензии и сердечно-сосудистых заболеваний. Современные данные подтверждают, что рациональное питание способствует

снижению артериального давления, улучшению липидного и углеводного обмена, уменьшению воспалительной активности и снижению риска сердечно-сосудистых осложнений.

Наиболее обоснованными с позиций доказательной медицины являются диета DASH, средиземноморский тип питания, ограничение потребления натрия, увеличение доли продуктов, богатых калием и пищевыми волокнами, а также замена насыщенных жиров более благоприятными источниками. Практическая ценность этих подходов особенно велика при их раннем назначении, длительном соблюдении и адаптации к индивидуальным особенностям пациента.

Лечебное питание должно рассматриваться как обязательный компонент первичной и вторичной профилактики, а также как неотъемлемая часть комплексного ведения больных кардиологического профиля. Эффективность диетотерапии возрастает при персонализированном подходе, последовательном обучении пациента и формировании устойчивой приверженности к изменению образа жизни.

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## **ОБЗОР ГИДРОЛОГИЧЕСКОГО РЕЖИМА РЕКИ ПЯНДЖ НА ОСНОВЕ АНАЛИЗА ОПУБЛИКОВАННЫХ ИСТОЧНИКОВ**

***Аннотация.** В статье представлен комплексный обзор научных исследований, посвящённых гидрологическому режиму реки Пяндж – одного из крупнейших притоков Амударьи. На основе анализа отечественных и зарубежных публикаций рассмотрены особенности формирования стока, сезонная динамика водности, роль снегово-ледникового питания, а также влияние климатических изменений на водные ресурсы бассейна. Выполнено сопоставление результатов различных исследований, выявлены противоречия в оценке вклада ледникового питания и сроков наступления максимального стока. Показано, что в условиях глобального изменения климата гидрологический режим реки Пяндж претерпевает трансформацию, выражающуюся в смещении фаз стока и увеличении его изменчивости. Определены ключевые научные пробелы и перспективные направления дальнейших исследований.*

***Ключевые слова:** река Пяндж, гидрологический режим, ледниково-снеговое питание, изменение климата, сток, Центральная Азия.*

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## **REVIEW OF THE HYDROLOGICAL REGIME OF THE PYANJ RIVER BASED ON THE ANALYSIS OF PUBLISHED SOURCES**

***Abstract.** The article provides a comprehensive review of scientific research on the hydrological regime of the Pyanj River, one of the largest tributaries of the Amu Darya River. Based on an analysis of domestic and foreign publications, the article examines the features of flow formation, seasonal dynamics of water content, the role of snow and glacier feeding, and the impact of climate change on the basin's water resources. The article compares the results of various studies and identifies contradictions in the assessment of the contribution of glacier feeding and the timing of maximum flow. It is shown that under conditions of global climate change,*



*the hydrological regime of the Pyanj River undergoes transformation, which is expressed in the shift of the flow phases and the increase in its variability. Key scientific gaps and promising directions for further research are identified.*

**Key words:** *Pyanj River, hydrological regime, glacier-snow feeding, climate change, flow, Central Asia.*

**Введение.** Река Пяндж является одним из крупнейших притоков Амударьи и формирует значительную часть водных ресурсов верхнего течения бассейна. В условиях аридного климата Центральной Азии её водные ресурсы имеют стратегическое значение для водоснабжения, орошения и поддержания экологического равновесия в регионе.

Гидрологический режим реки Пяндж формируется в высокогорных районах Памира и определяется преимущественно снегово-ледниковым типом питания. Это обуславливает выраженную сезонную неравномерность стока, при которой основной объём воды формируется в весенне-летний период.

В последние десятилетия на фоне глобального изменения климата наблюдаются существенные изменения гидрологического режима горных рек мира. Повышение температуры воздуха, изменение режима осадков и деградация ледников оказывают значительное влияние на водные ресурсы. В этом контексте изучение гидрологического режима реки Пяндж приобретает особую актуальность, поскольку она является важнейшей составляющей стока Амударьи.

**Целью исследования** является комплексный анализ гидрологического режима реки Пяндж на основе обобщения и систематизации опубликованных научных исследований. Реализация этой цели предполагает рассмотрение исследований, посвящённых формированию речного стока, сезонной динамике водности, роли снегового и ледникового питания, а также влиянию климатических факторов на гидрологические процессы в бассейне реки. Особое внимание уделяется выявлению современных тенденций изменения гидрологического режима в условиях глобального изменения климата, оценке пространственно-временных особенностей формирования стока и определению ключевых факторов, влияющих на водные ресурсы реки Пяндж как важнейшей составляющей бассейна Амударьи.

**Обзор опубликованных исследований по изучению гидрологического режима реки Пяндж**

*Классические основы исследований.* Фундаментальные основы изучения гидрологического режима горных рек Центральной Азии, включая бассейн реки Пяндж, были заложены в работах В.Л. Шульца (1965), где детально рассмотрены процессы формирования речного стока в условиях высокогорного рельефа. Автор проанализировал закономерности распределения атмосферных осадков, процессы аккумуляции снежного покрова и его последующего таяния, а также влияние высотной поясности на формирование водного режима рек. Особое место в работе занимает сезонная

трансформация стока, определяемая сочетанием климатических условий и особенностей рельефа. Полученные результаты стали основой для последующего понимания закономерностей формирования стока в бассейнах горных рек Памира, в том числе реки Пяндж, являющейся важнейшей частью водной системы Амударьи [1].

В трудах В.Л. Шульца содержатся и характеристики непосредственно бассейна реки Пяндж, формирующегося в высокогорных районах Памира и отличающегося преобладанием снегово-ледникового питания. Для реки характерна значительная сезонная неравномерность стока: до 70-80% годового объёма формируется в весенне-летний период, а максимум водности приходится на июль–август вследствие интенсивного таяния снежного покрова и ледников. Зимой расходы воды резко снижаются, что связано с минимальным поступлением талых вод.

Существенную роль в формировании общего стока Пянджа играют его притоки – Гунт, Бартанг, Ванч и Язгулем, развивающиеся в условиях высокогорного рельефа и значительного оледенения водосборов. Их вклад в водность главной реки неодинаков и определяется высотной зональностью, климатическими условиями и степенью развития ледников. С увеличением высоты возрастает доля ледникового питания, что еще раз подчеркивает зависимость гидрологического режима Пянджа от природных особенностей Памира и его приточной сети.

*Международные исследования.* Комплексное изучение бассейна реки Пяндж получило развитие в международных исследованиях, среди которых особое место занимают отчёты, подготовленные в рамках проектов Японского агентства международного сотрудничества (JICA). В этих материалах бассейн Пянджа рассматривается как один из крупнейших и наиболее значимых элементов водной системы Амударьи.

Согласно материалам JICA, площадь бассейна реки Пяндж составляет около 82 500 км<sup>2</sup>. Он занимает значительную часть территории Таджикистана и формируется в условиях высокогорного рельефа Памира, отличающейся сложной орографией и значительными высотными контрастами. Гидрографическая сеть бассейна характеризуется высокой расчленённостью и включает многочисленные притоки, формирующиеся в зонах современного оледенения [2].

Материалы JICA подтверждают, что гидрологический режим реки определяется преимущественно снегово-ледниковым типом питания. Основная часть стока формируется за счёт таяния снежного покрова и ледников, а средние расходы воды достигают порядка 900 м<sup>3</sup>/с, что определяет ключевую роль реки в формировании водных ресурсов Амударьи. Сезонная динамика стока выражена отчетливо: максимум наблюдается летом, тогда как зимой фиксируются минимальные значения, что соответствует общим представлениям о режиме горных рек Центральной Азии.

Дополнительный интерес представляет внимание авторов отчета к геодинамическим и экзогенным процессам – селям, оползням, эрозии, –

которые существенно влияют на устойчивость русловых процессов и особенности формирования стока. Благодаря этому исследованию ЛСА факторы оказывают существенное влияние на устойчивость русловых расширяют классические представления о гидрологическом режиме реки Пяндж, дополняя их современной комплексной характеристикой бассейна и факторов его функционирования.

*Современные научные исследования.* В последние годы исследования гидрологического режима реки Пяндж всё в большей степени сосредоточены на анализе последствий глобального изменения климата. Повышение температуры воздуха, изменение режима атмосферных осадков, деградация ледников рассматриваются как ключевые факторы трансформации стока в бассейнах со снегово-ледниковым типом питания.

Одним из наиболее значимых современных исследований является работа Гулахмадова и соавторов (2025), где проведён сравнительный анализ климатических моделей CMIP5 и CMIP6 применительно к бассейну реки Пяндж. Показано, что модели нового поколения достаточно точно воспроизводят температурный режим, тогда как моделирование осадков сохраняет более высокую неопределённость.

Исследование фиксирует устойчивый рост температуры воздуха в бассейне Пянджа, превышающий среднемировые показатели, а также изменение режима осадков и усиление климатической изменчивости [3]. Прогнозные оценки указывают на дальнейшее повышение температуры и возможную высокую вариабельность осадков, что свидетельствует о росте климатической нестабильности в регионе. Особое значение имеет вывод о том, что модели CMIP6 дают более надежные оценки будущих изменений гидрологического режима и водных ресурсов бассейна.

Изменения климатических условий находят отражение в трансформации гидрологических характеристик речных систем, особенно в высокогорных бассейнах со снегово-ледниковым питанием.

В этом контексте работа Каюмова К.А., Расулзода Т.Х., Курбонова Н.Б. и Восидова Ф.К. (2022) посвящена влиянию климатических изменений на формирование водных ресурсов бассейна Пянджа на основе анализа многолетних гидрометеорологических наблюдений. Авторы показывают, что гидрологический режим водотоков региона определяется не только изменением температуры воздуха и атмосферных осадков, но и их выраженной пространственно-высотной неоднородностью [4].

Подчеркивается, что процессы формирования стока в бассейне Пянджа тесно связаны с особенностями снегово-ледникового питания, а распределение осадков и температурный режим по высотным поясам оказывают определяющее влияние на водность рек и её сезонную динамику.

Практическое проявление этих закономерностей особенно наглядно прослеживается на уровне отдельных притоков бассейна. В частности, в работе Норматова И. и Норматова П. (2020) основное внимание уделено анализу процессов формирования стока в высокогорных условиях Памира с

учётом влияния климатических факторов и орографических особенностей региона. На основе гидрометеорологических данных показано, что орография играет ключевую роль в перераспределении воздушных масс, формируя выраженную пространственную неоднородность атмосферных осадков и снегозапасов [5].

Авторы установили, что при относительно стабильном уровне атмосферных осадков в отдельных суббассейнах, в частности в бассейне реки Ванч, в последние десятилетия наблюдается увеличение стока по сравнению с более ранним периодом наблюдений. Это объясняется повышением температуры воздуха и связанным с этим усилением деградации ледников, что приводит к росту их водоотдачи и временному увеличению водности рек.

Анализ внутригодового распределения стока выявил смещение максимальных расходов воды на более ранние сроки, что свидетельствует об ускорении процессов таяния снежно-ледниковых ресурсов. При этом максимум атмосферных осадков приходится на весенний период, тогда как пик стока наблюдается летом, что подтверждает доминирующую роль ледникового питания в формировании гидрологического режима бассейна Пянджа.

Региональные климатические тенденции дополнительно раскрываются в работе Мирзохоновой С.О. и Ниязова Дж. (2021), где на основе многолетних рядов наблюдений выявлены устойчивые тенденции повышения температуры воздуха и изменения режима осадков. Эти изменения приводят к трансформации сезонного распределения стока, включая изменение продолжительности и интенсивности половодья, что непосредственно влияет на гидрологический режим реки [6].

Сопоставление региональных данных с зарубежными исследованиями позволяет более глубоко понять роль криосферных процессов в формировании стока. В работе Pohl E., Gloaguen R., Andermann C. и Knoche M. (2017), выполненной с использованием гидрологического моделирования и анализа многолетних климатических и гидрологических рядов, показано, что ледниковое питание играет ключевую роль в формировании водного режима рек Памира, включая бассейн реки Пяндж [7].

Ледники обеспечивают значительную долю годового стока и выступают в качестве природного регулятора, сглаживая межгодовые колебания водности и поддерживая устойчивость водных ресурсов в условиях климатической изменчивости. Благодаря накоплению и постепенному высвобождению влаги ледниковые системы компенсируют дефицит стока в засушливые периоды, что особенно важно для рек, формирующихся в высокогорных условиях.

Вместе с тем в современной литературе всё больше внимания уделяется оценке трансформации ледников под влиянием продолжающегося потепления.

Так, в работе Knoche M., Merz R., Lindner M. и Weise S. (2017) выполнен сравнительный анализ изменений ледников и гидрологических характеристик в регионе Памир-Гиндукуш-Каракорум [8].

Показано, что изменение температурного режима ведет к ускоренной деградации ледников и отражается на динамике стока. Для южной части Памира фиксируются рост температуры воздуха и изменение структуры водного баланса, сопровождающиеся трансформацией сезонного распределения стока. В этой связи сток рассматривается авторами как один из важнейших индикаторов криосферных процессов.

*Национальные сообщения Республики Таджикистан.* Результаты современных научных исследований находят подтверждение и дальнейшее развитие в официальных национальных отчётах Республики Таджикистан, отражающих изменения гидрологического режима в условиях современного климата.

Существенный вклад в изучение гидрологического режима реки Пяндж и его трансформации представлен в национальных сообщениях Республики Таджикистан по Рамочной конвенции ООН об изменении климата. В Третьем национальном сообщении (2014) приведены обобщённые данные о гидрологических характеристиках бассейна, согласно которым река Пяндж является крупнейшей и наиболее водообильной рекой страны, формирующей значительную часть стока Амударьи. Средний многолетний расход воды в створе Нижний Пяндж составляет около 1010 м³/с, а годовой объём стока достигает порядка 31,9 км³. Гидрологический режим характеризуется четко выраженной сезонностью с максимумом в летние месяцы, обусловленным снегово-ледниковым питанием [9].

В том же сообщении отмечается тенденция к незначительному увеличению стока в бассейне рек Памирского региона в последние десятилетия. Одновременно в условиях продолжающегося изменения климата прогнозируется повышение средней температуры воздуха на 1,4-3,0° С к концу XXI века, что может привести к сокращению объёма ледников на 50-70% и смещению максимума стока с июля на более ранние сроки – май-июнь.

Эти положения получили дальнейшее развитие в Четвёртом национальном сообщении Республики Таджикистан (2022), где подчёркиваются усиление климатической изменчивости, сокращение ледников и увеличение частоты экстремальных гидрологических явлений. Отмечается, что гидрологический режим рек бассейна Амударьи, включая Пяндж, становится всё более зависимым от температурных условий и режима осадков, что повышает неопределённость в оценке водных ресурсов и требует адаптации систем водопользования [10].

**Выводы.** Проведённый анализ опубликованных научных исследований показывает, что гидрологический режим реки Пяндж формируется под воздействием сложного комплекса природных факторов, среди которых



определяющее значение имеют климатические условия, высотная зональность и снегово-ледниковое питание.

В классических работах основное внимание уделялось выявлению общих закономерностей формирования стока и роли природных факторов, тогда как современные исследования сосредоточены на оценке последствий глобального изменения климата и трансформации ледниковых систем.

Обобщение рассмотренных работ свидетельствует о том, что в последние десятилетия в бассейне реки Пяндж наблюдаются устойчивые тенденции повышения температуры воздуха, изменения режима атмосферных осадков и деградации ледников, что приводит к заметным изменениям гидрологического режима. Эти процессы проявляются в смещении сроков половодья, изменении сезонной структуры стока и росте его межгодовой изменчивости. При этом влияние ледникового фактора носит двойственный характер: в краткосрочной перспективе усиленное таяние может способствовать увеличению стока, тогда как в долгосрочной – привести к его сокращению.

Анализ научных публикаций показывает, что исследования гидрологического режима реки Пяндж охватывают широкий спектр вопросов, связанных с формированием стока, климатическими изменениями и ролью снегово-ледникового питания. Совокупность этих работ позволяет более полно оценить современное состояние водных ресурсов бассейна и выявить особенности их формирования в различных природно-климатических условиях.

В рассмотренных исследованиях подчёркивается необходимость дальнейшего развития системы гидрологического мониторинга, совершенствования методов оценки водных ресурсов и рационального управления водным режимом реки. Полученные результаты представляют значительный научный интерес и могут служить важной основой для последующих исследований гидрологического режима реки Пяндж, а также для разработки практических мер по обеспечению устойчивого функционирования водных систем бассейна Амударьи.

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## **КОМПЛЕМЕНТ-ОПОСРЕДОВАННЫЕ ГЛОМЕРУЛОПАТИИ У ДЕТЕЙ: СОВРЕМЕННЫЕ ПОДХОДЫ К ДИАГНОСТИКЕ, СТРАТИФИКАЦИИ РИСКА И ЛЕЧЕНИЮ**

***Аннотация:** Цель:* оценка клинико-лабораторных особенностей комплемент-опосредованных гломерулопатий (КОГ) у детей и разработка прогностической модели на основе алгоритмов искусственного интеллекта. *Материалы и методы:* обследовано 108 детей с верифицированными формами КОГ. Проведён анализ сывороточных маркёров комплемента и морфологических данных. Для стратификации риска применены алгоритмы машинного обучения. *Результаты:* установлены достоверные различия уровней C3 и sC5b-9 между нозологическими группами ( $p < 0,001$ ). Модель Random Forest продемонстрировала AUC 0,91. *Заключение:* интеграция биомаркёров комплемента с ИИ-алгоритмами повышает точность прогнозирования исходов КОГ у детей.

***Ключевые слова:** комплемент, гломерулопатия, дети, C3-гломерулопатия, машинное обучение, диагностика.*

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## **COMPLEMENT-MEDIATED GLOMERULOPATHIES IN CHILDREN: CURRENT APPROACHES TO DIAGNOSIS, RISK STRATIFICATION, AND TREATMENT**

***Abstract:** Objective:* to evaluate clinical and laboratory features of complement-mediated glomerulopathies (CMG) in children and develop an AI-based prognostic model. *Methods:* 108 children with verified CMG were examined. Serum complement markers and morphological data were analyzed. Machine learning algorithms were applied for risk stratification. *Results:* significant differences in C3 and sC5b-9 levels were found between groups ( $p < 0.001$ ). Random Forest model achieved AUC 0.91. *Conclusion:* integrating complement biomarkers with AI algorithms improves outcome prediction in pediatric CMG.

***Keywords:** complement, glomerulopathy, children, C3 glomerulopathy, machine learning, diagnostics.*

Введение

Комплемент-опосредованные гломерулопатии (КОГ) представляют собой гетерогенную группу заболеваний почек, объединённых общим патогенетическим механизмом — дисрегуляцией системы комплемента, преимущественно её альтернативного пути [1]. К данной группе относят С3-гломерулопатию (С3-ГП), включающую болезнь плотных депозитов (БПД) и С3-гломерулонефрит (С3-ГН), а также иммунокомплексный мембранопролиферативный гломерулонефрит (ИК-МППН) и атипичный гемолитико-уремический синдром (аГУС). По данным литературы, БПД чаще диагностируется в детском возрасте, тогда как С3-ГН — у пациентов более старших возрастных групп [2].

Усовершенствование понимания роли комплемента в патогенезе мембранопролиферативного гломерулонефрита привело к реклассификации данной нозологии на иммуноглобулин-опосредованные и неиммуноглобулин-опосредованные формы [3]. Современные диагностические алгоритмы основываются на оценке сывороточных уровней компонентов комплемента (С3, С4, sC5b-9), выявлении С3-нефритических факторов и антител к фактору Н, а также на морфологическом исследовании биоптатов почек с обязательной иммунофлуоресценцией [4]. Важным достижением последних лет стало признание перекрёстных клинических, гистологических и генетических аномалий альтернативного пути комплемента между различными формами КОГ [5].

Несмотря на значительный прогресс в диагностике, вопросы стратификации риска и персонализации терапии у детей остаются нерешёнными [6]. Применение иммуносупрессивной терапии глюкокортикостероидами и микофенолатом мофетилом позволяет добиться ремиссии протеинурии у части пациентов, однако долгосрочные исходы остаются неудовлетворительными. В настоящее время интенсивно изучаются комплемент-таргетные препараты, направленные на различные компоненты каскада комплемента [7]. Целью настоящего исследования явилась оценка клинико-лабораторных и морфологических особенностей КОГ у детей, а также разработка прогностической модели на основе алгоритмов машинного обучения.

#### Материалы и методы

Проведено одноцентровое ретроспективное когортное исследование, включившее 108 детей в возрасте от 2 до 17 лет (средний возраст  $9,4 \pm 3,7$  года; 61 мальчик, 47 девочек), госпитализированных в приёмное отделение нефрологического центра в период с января 2021 по декабрь 2024 года с морфологически верифицированными формами КОГ. Критерии включения: возраст до 18 лет, наличие результатов нефробиопсии с иммунофлуоресцентным исследованием, полный набор лабораторных данных. Критерии исключения: вторичные формы МППН (системная красная волчанка, гепатиты В и С), онкологические заболевания.

Всем пациентам выполнены: общеклинический и биохимический анализы крови, определение уровней С3 и С4 методом нефелометрии, sC5b-9

методом ИФА, скрининг С3-нефритических факторов, генетическое тестирование генов CFH, CFI, CFB, MCP (у 74 пациентов). Морфологическая классификация проводилась согласно критериям KDIGO (2021). Для прогностического моделирования использованы алгоритмы Random Forest, Gradient Boosting и логистическая регрессия. Модели обучались на 80% выборки с пятикратной кросс-валидацией. Статистический анализ выполнен с применением критерия Краскела–Уоллиса, U-критерия Манна–Уитни и  $\chi^2$ -теста. Различия считались достоверными при  $p < 0,05$ .

### Результаты

Среди 108 обследованных детей были выделены четыре нозологические группы: С3-ГН — 42 пациента (38,9%), БПД — 31 (28,7%), ИК-МПГН — 22 (20,4%) и аГУС — 13 (12,0%). Средний возраст в группах составил  $10,2 \pm 3,1$ ,  $7,8 \pm 4,2$ ,  $11,3 \pm 2,9$  и  $8,5 \pm 3,6$  года соответственно. Соотношение мальчиков и девочек не различалось достоверно между группами ( $p = 0,34$ ).

Анализ сывороточных маркёров комплемента выявил достоверные различия между группами (табл. 1). Наиболее низкий уровень С3 отмечался в группе БПД ( $29,5 \pm 11,3$  мг/дл), наиболее высокий — в группе аГУС ( $72,8 \pm 18,4$  мг/дл;  $H = 42,7$ ,  $p < 0,001$ ). Уровень sC5b-9 был максимальным при аГУС ( $621,4 \pm 187,2$  нг/мл) и БПД ( $538,7 \pm 162,5$  нг/мл), что отражает выраженную терминальную активацию комплемента (рис. 1).

**Таблица 1. Клинико-лабораторная характеристика пациентов с различными формами КОГ (M $\pm$ SD)**

| Показатель                      | С3-ГН<br>(n=42)   | БПД (n=31)        | ИК-МПГН<br>(n=22) | аГУС<br>(n=13)    | p      |
|---------------------------------|-------------------|-------------------|-------------------|-------------------|--------|
| Возраст, лет                    | $10,2 \pm 3,1$    | $7,8 \pm 4,2$     | $11,3 \pm 2,9$    | $8,5 \pm 3,6$     | 0,02   |
| С3, мг/дл                       | $38,2 \pm 14,6$   | $29,5 \pm 11,3$   | $61,4 \pm 19,8$   | $72,8 \pm 18,4$   | <0,001 |
| С4, мг/дл                       | $22,1 \pm 7,3$    | $24,5 \pm 8,1$    | $14,6 \pm 5,2$    | $26,3 \pm 6,9$    | <0,001 |
| sC5b-9, нг/мл                   | $412,5 \pm 143,8$ | $538,7 \pm 162,5$ | $285,3 \pm 98,4$  | $621,4 \pm 187,2$ | <0,001 |
| Протеинурия, г/сут              | $2,8 \pm 1,4$     | $3,5 \pm 1,9$     | $2,1 \pm 1,1$     | $1,4 \pm 0,8$     | 0,001  |
| СКФ, мл/мин/1,73 м <sup>2</sup> | $78,4 \pm 22,6$   | $64,2 \pm 28,3$   | $82,1 \pm 19,5$   | $52,7 \pm 31,4$   | 0,003  |
| С3NeF (+), %                    | 61,9              | 74,2              | 22,7              | 7,7               | <0,001 |

Примечание: С3NeF — С3-нефритический фактор; СКФ — скорость клубочковой фильтрации; p — критерий Краскела–Уоллиса.

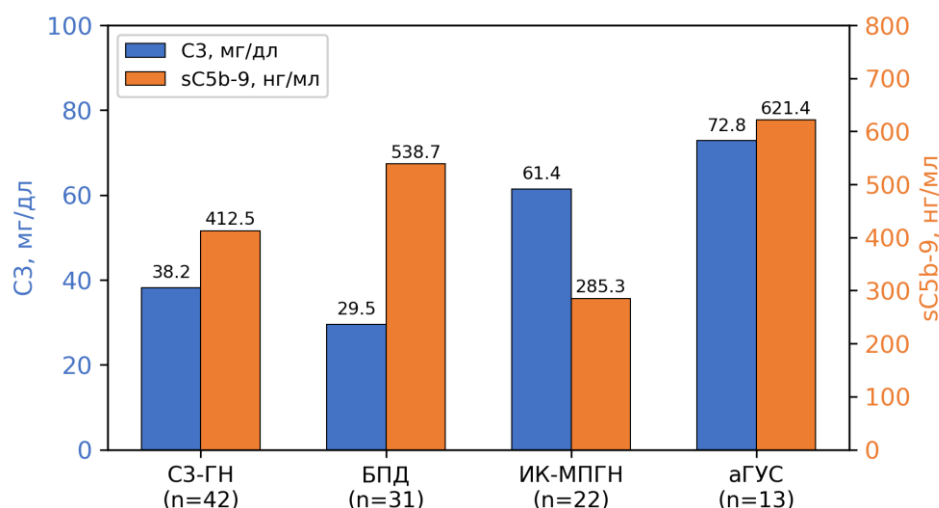


Рис. 1. Уровни СЗ и sC5b-9 в сыворотке крови у детей с различными формами комплемент-опосредованных гломерулопатий (M±SD)

Генетическое тестирование выполнено у 74 (68,5%) пациентов. Патогенные варианты генов регуляторов комплемента выявлены у 32 (43,2%) обследованных: мутации CFH — 14 (18,9%), MCP — 8 (10,8%), CFI — 6 (8,1%), CFB — 4 (5,4%). Частота выявления генетических аномалий была достоверно выше в группах аГУС (69,2%) и БПД (51,6%) по сравнению с СЗ-ГН (33,3%) и ИК-МПГН (18,2%;  $\chi^2=11,4$ ,  $p=0,01$ ).

Прогностическое моделирование с использованием алгоритмов машинного обучения показало, что модель Random Forest обладает наибольшей прогностической ценностью в отношении неблагоприятного исхода (снижение СКФ >50% в течение 24 месяцев): AUC составила 0,91 (95% ДИ: 0,85–0,96), чувствительность — 87,5%, специфичность — 89,2%. Наиболее значимыми предикторами явились: исходный уровень sC5b-9 (важность признака = 0,28), уровень СЗ (0,22), степень протеинурии (0,18) и наличие мутаций CFH (0,14). Модель Gradient Boosting продемонстрировала сопоставимые результаты (AUC = 0,88), тогда как логистическая регрессия уступала нелинейным моделям (AUC = 0,79).

### Обсуждение

Полученные результаты согласуются с данными современной литературы о ключевой роли дисрегуляции альтернативного пути комплемента в патогенезе КОГ у детей. В нашем исследовании наиболее выраженное снижение СЗ выявлено при БПД, что подтверждает данные Ponticelli и соавторов (2023) о преимущественной активации СЗ-конвертазы при данной форме заболевания [2]. Высокие уровни sC5b-9 при аГУС и БПД указывают на значительную терминальную активацию комплемента, что соотносится с результатами исследований Tarragon Estebanez и Bomback (2024) о роли терминального пути в формировании фенотипа СЗ-гломерулопатии [7].

Частота выявления СЗ-нефритических факторов в нашей когорте (61,9% при СЗ-ГН и 74,2% при БПД) сопоставима с данными, представленными

Wong и соавторами (2021), которые установили связь между наличием C3NeF и более тяжёлым течением заболевания у детей [4]. Обращает на себя внимание низкая частота генетических аномалий при ИК-МПГН (18,2%), что может свидетельствовать о преобладании приобретённых механизмов дисрегуляции комплемента в этой подгруппе, как указывают Noris и соавторы (2023) [6].

Применение алгоритмов машинного обучения для стратификации риска при КОГ является инновационным подходом. Высокая прогностическая ценность модели Random Forest (AUC = 0,91) свидетельствует о возможности интеграции множественных клинических и лабораторных параметров в единый прогностический инструмент. Полученные данные о ведущей роли sC5b-9 как предиктора неблагоприятного исхода подтверждают результаты Andeen и Hou (2024), подчёркивающих значение биомаркёров терминального пути комплемента в оценке прогноза [5]. Ограничениями настоящего исследования являются его ретроспективный характер, относительно небольшой объём выборки и одноцентровой дизайн, что требует валидации результатов на независимых когортах.

### **Заключение**

Комплемент-опосредованные гломерулопатии у детей характеризуются выраженной гетерогенностью клинических проявлений и лабораторных маркёров, отражающей различные механизмы дисрегуляции системы комплемента. Результаты настоящего исследования демонстрируют, что сывороточные уровни C3 и sC5b-9, наряду с генетическим профилем, являются ключевыми детерминантами нозологической принадлежности и прогноза. Интеграция биомаркёров комплемента с алгоритмами искусственного интеллекта открывает принципиально новые перспективы для персонализированной стратификации риска и выбора оптимальной терапевтической стратегии. Внедрение подобных моделей в клиническую практику способно трансформировать подход к ведению детей с КОГ — от реактивного лечения к проактивному предупреждению неблагоприятных исходов, что особенно актуально в эпоху комплемент-таргетной терапии.

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## **МЕЪДАНИНГ ЯРА КАСАЛЛИКЛАРИ ВА ЁМОН СИФАТЛИ ЎСМАЛАРИДА АЪЗО ИЧКИ ҚОН ТОМИРЛАРИНИНГ ЎЗГАРИШИ**

**Резюме:** Мақолада меъданинг яра касаллигида ва ёмон сифатли ўсма касалликларида аъзо ички қон томирларининг ўзгариши ўрганилган. Сероз пардада аниқ контурли қалин капиллярлар тармоғи аниқланган. Яра касаллигида капиллярлар ва майда томирлар кўпинча ўралган, кенгайган ва қон билан тўлган ҳолатда кузатилади. Ўрта калибмли томирлар эса бироз торайган ҳолатда кўринади. Ўсма касаллигида эса веналар деворида бармоқсимон бўртмалар учрайди. Шилиқ ости қаватининг чегарасида майда вена томирларнинг шарсимон кенгайишлар кузатилган.

**Калим сўзлар:** қон томирлари, девор, ўсма, меъда, яра касаллиги, капиллярлар, томир тармоғи, томирлар контурлари, веналар.

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## **CHANGES IN THE INTRAORGAN BLOOD VESSELS OF THE STOMACH IN MALIGNANT TUMORS AND PEPTIC ULCER**

**Abstract:** The article studies changes in the intraorgan blood vessels of the stomach in malignant tumors and peptic ulcer disease. A dense network of capillaries with clear contours was revealed in the serous membrane. In peptic ulcer disease, the capillaries and small vessels were often tortuous, dilated and filled with blood, and medium-sized vessels were somewhat narrowed. In tumors, finger-shaped protrusions were found on the veins, and spherical expansions were found on the venules at the border with the submucosal layer.

**Keywords:** blood vessels, wall, tumor, stomach, peptic ulcer disease, capillaries, vascular network, vessel contours, veins.

**Кириш.** Яра касаллигини ўрганиш муаммоси ҳозирги вақтда ҳам назарий, ҳам амалий жиҳатдан долзарб бўлиб қолмоқда. Ушбу мавзу бўйича кўплаб маҳаллий ва хорижий ишлар мавжуд бўлишига қарамасдан, патогенез, клиника ва даволашнинг кўплаб муҳим масалалари баҳсли ва тўлиқ ўрганилмаган ҳолда қолмоқда [1,2,3]. Сўнгги ўн йилликлар яра касаллигининг

патогенези, клиник кечиши, диагностикаси ва даволашнинг турли жиҳатларини ўрганишда сезиларли ютуқлар билан ажралиб туради. Хусусан, томир ўзгаришларининг патогенетик аҳамиятини таҳлил қилишга [4,5], яра касаллигининг жараённинг турли локализациясидаги клиник кўринишларига ва уни юрак-қон томир тизими касалликлари билан бирга кечишига бағишланган комплекс тадқиқотлар натижалари ўз аксини топган. Сўнгги пайтгача яра касаллигида касаллик фазаларининг кетма-кетлиги, меъда ва ўн икки бармоқ ичак деворининг зарарланиш чуқурлиги, гемодинамика ва микроциркуляция ҳолатининг ўзгаришларини ўрганиш, қоида тариқасида, алоҳида-алоҳида ўтказилган; аниқланган бузилишлар динамикаси ўрганилмаган, демак, уларни адекват ва патофизиологик жиҳатдан асосланган даволаш йўллари таклиф этилмаган [6,7].

**Тадқиқот мақсади.** Меъданинг яра касалликлари ва ёмон сифатли ўсмаларида аъзо ички қон томирларининг ўзгаришини ўрганишдан иборат.

**Тадқиқот материаллари ва методлари.** Тадқиқот материали 28–61 ёшдаги беморлар танлаб олинди. Меъда яра касаллиги билан операция қилинган 11 та бемордан олинган материал ва ёмон сифатли ўсмалар туфайли резекция қилинган 25 та бемордан олинган меъдага (28–61 ёшдаги беморларда) томирлар рангли масса билан тўлдирилди. Меъда тўқимаси глицериннинг сувли эритмаларида тиниқлантирилди. Унинг девори қаватма қават очилди. Қон томирлардаги ўзгаришлар МБС-2 бинокуляр микроскопи остида ўрганилди.

**Тадқиқот натижалари.** Ўсмаларда капилляр тармоқлари айрим участкаларда зичроқ, бошқаларида эса сийрақ жойлашган. Баъзи майда томирлар кескин ўралган ва нотекис, гўёки кемирлган контурларга эга бўлган. Бошқалари тўғри чизик бўйлаб жойлашган. Ўзгаришга учрамаган томирлар ҳам кузатилади. Артериялар веналарга қараганда камроқ ўралган ҳолда жойлашган. Ёмон сифатли ўсмаларда веналар деворида бармоқсимон ўсиклар ҳосил бўлган. Шилиқ ости қатлам чегарасида майда вена томирларида шарсимон кенгайишлар кузатилди. Мушак қаватидаги капилляр томирлар тармоқлари зичлашган. Майда ва ўрта калибирдаги вена томирлар спиралсимон ўралган шаклда ўзгарган. Бир томирнинг ўзида кўпинча торайишлар ва кенгайишларнинг алмашинуви қайд этилган. Умуман олганда, мушак қаватида веналарнинг ўзгаришлари артерияларга нисбатан яққолроқ ифодаланган. Майда веналарда букилиш жойларида қалинлашган деворли сезиларли кенгайишлар кузатилган. Кўп томирлар нотекис калибрга ва ноаниқ, баъзан кемирлган контурларга эга бўлган, бу кўпроқ ёмон сифатли ўсмаларда кузатилади. Мушак қаватининг чуқур қатламларида кўп веналар варикоз кенгайган. Ўсма атрофидаги томир тармоғидан ўсмага нотекис калибрли ингичка томирлар йўналган; кейин улар гўёки узилиб, яна кўринмай қолган. Шилиқ ости қон томир чигалларида айрим ҳолларда кескин спиралсимон ўралган ва кенгайган ҳолатда бўлади. Шилиқ ости қаватдаги айрим майда калибрли веналари бой тармоқлар ҳосил қилган (одатда ўсмаларда) ёки кам сонли бўлиб жойлашган. Улар билан бирга ингичка тўғри

артериолалар ва венулалар учрайди. Шиллик парда томирлари шакли жуда кўп ўзгарган. Ўсма билан чегарада капиллярлар умуман аниқланмайди ёки оролчалар шаклида аниқланган, ўралган, баъзи жойларда биров кенгайган ёки аксинча, бутун узунлиги бўйича ёки қисман торайган. Ўсма зонаси зич томир тармоғи билан чегараланган. Ўсма перифериясида томир тармоқларининг узилган ҳалқалари ва гўёки синган артериолалар ва венулалар аниқланган. Майда ва ўрта томирлар юумалоқ, спираль ва ҳалқа шаклида ўралган. Шиллик парданинг томирлар кам сонли бўлган участкалари аниқланади. Барча калибрдаги томирларнинг контурлари кўпинча ноаниқ ва кемирлган шаклда кўринади. Бутун узунлиги бўйича ёки айрим участкаларда кескин кенгайган веналар тез-тез учрайди. Айрим ҳолларда томирлар тотал, бошқа ҳолларда эса фрагментар равишда патологик ўзгаришларга учраган деб ўйлаш мумкин. Кўпинча кескин торайган ёки аксинча, кенгайган веналар кузатилган. Уларга ҳамроҳ артериялар камроқ ўзгарган.

**Хулоса.** Меда яра касаллигида ва ёмон сифатли ўсмаларда ўзига хос бўлган томир ўзгаришларини жумладан, ўсма атрофидаги зич томир тармоғи, шилиқ ости майда веналарнинг бой тармоқлари ва улардаги кўплаб шарсимон ҳамда ўқсимон кенгайишлар, сероз пардада энг майда тармоқларнинг нотекис аниқланиши ва уларнинг тез-тез қон билан тўлиб, кўплаб экстравазальларнинг мавжудлиги аниқланди. Турли хилдаги этиологик омиллар томирларда бир хил ўзгаришларни келтириб чиқаради деган хулоса қилиш мумкин.

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## **ЭФФЕКТИВНОЕ УПРАВЛЕНИЕ АДАПТАЦИЕЙ ДЕТЕЙ В ДОШКОЛЬНОМ И НАЧАЛЬНОМ ОБРАЗОВАНИИ И МЕТОДЫ ПЕДАГОГИЧЕСКОГО МЕНЕДЖМЕНТА**

***Аннотация:** В статье рассматриваются методы педагогического менеджмента для эффективного управления процессом адаптации детей в дошкольном и начальном образовании. Анализируются психологические этапы адаптации, механизмы взаимодействия педагогов с родителями, методы управления, педагогические стратегии, а также организация ресурсов и образовательной среды. Кроме того, рассматриваются индивидуальный подход и использование инновационных технологий в этом процессе.*

***Ключевые слова:** адаптация, менеджмент, педагогическая стратегия, развитие детей, сотрудничество с родителями, ресурсы.*

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## **EFFECTIVE MANAGEMENT OF CHILDREN'S ADAPTATION IN PRESCHOOL AND PRIMARY EDUCATION AND METHODS OF PEDAGOGICAL MANAGEMENT**

***Abstract:** This article examines the methods of pedagogical management for the effective organization of the adaptation process of children in preschool and primary education. It analyzes the psychological stages of adaptation, mechanisms of interaction between teachers and parents, management methods, pedagogical strategies, as well as the organization of resources and the educational environment. Additionally, the article discusses the use of an individual approach and innovative technologies in this process.*

***Keywords:** adaptation, management, pedagogical strategy, child development, parental collaboration, resources.*

Адаптация детей к новой образовательной среде в дошкольном и начальном образовании является процессом, оказывающим значительное



влияние на их психологическое, социальное и академическое развитие. Процесс адаптации связан с эмоциональной стабильностью ребенка, его социальными навыками и способностью соблюдать правила.

В настоящее время, в условиях активных реформ системы дошкольного и школьного образования Узбекистана, педагоги широко используют инновационные технологии, индивидуальный подход и механизмы сотрудничества с родителями для эффективной организации процесса адаптации. С точки зрения менеджмента, адаптация детей к новой среде в дошкольном и начальном образовании является важным психологическим и педагогическим процессом.

Психологические особенности и уровень развития детей играют ключевую роль в адаптации. У детей дошкольного возраста слабо развиты социальные навыки и самостоятельность, поэтому они могут испытывать тревогу и страх при попадании в новый класс. В таких случаях задача педагога — обеспечить психологическую стабильность ребенка и поддержать его адаптацию к среде.

Процесс адаптации обычно проходит в три этапа:

**1. Этап трудностей при освоении новой среды** – ребенку сложно понять новые правила, он может чувствовать себя некомфортно.

**2. Этап наблюдения и изучения** – ребенок наблюдает за окружающими и учится, как вести себя в классе и в коллективе.

**3. Этап адаптации** – ребенок устанавливает эффективное взаимодействие с другими и полностью адаптируется к среде.

Эффективность адаптации во многом зависит от того, насколько педагоги и руководители учитывают эмоциональное и социальное состояние детей, их интересы и потребности при разработке программ и стратегий.

Критериями оценки эффективности адаптации являются:

- активность и заинтересованность ребенка в занятиях;
- эмоциональная устойчивость и способность справляться со стрессом;
- уровень социальных контактов и взаимодействия со сверстниками.

На основе этих критериев педагоги определяют степень адаптации ребенка.

Правильная организация сотрудничества педагогов с родителями облегчает процесс адаптации. Педагог не только управляет образовательным процессом, но и постоянно поддерживает связь с родителями, предоставляя консультации. Такое сотрудничество способствует психологической стабильности ребенка и более быстрой адаптации к новой среде.

**Формы сотрудничества включают:**

**1. Менеджмент-ресурсы.** Педагоги используют дневники наблюдений, тесты и мониторинг учебной деятельности для отслеживания развития ребенка, а также обмениваются информацией с родителями через встречи и онлайн-платформы.

**2. Консультации.** Для решения возникающих трудностей педагог и родители обсуждают и дают рекомендации; родители поддерживают ребенка дома.

**3. Согласование отношений.** Сотрудничество семьи и школы облегчает адаптацию ребенка к новой среде. Педагоги информируют родителей о состоянии ребенка, а родители поддерживают его, следуя рекомендациям педагога.

Эффективное сотрудничество создает безопасную и поддерживающую среду, ускоряет адаптацию и способствует развитию социальных навыков ребенка.

Методы педагогического менеджмента и стратегии педагогов также имеют важное значение в процессе адаптации. Они направлены на обеспечение психологического, социального и академического развития ребенка одновременно:

**1. Педагогические методы для облегчения адаптации.** Учитываются личные особенности и потребности ребенка, а также упрощается процесс адаптации:

- **интегративные игры и занятия:** развивают социальные навыки и укрепляют отношения со сверстниками;

- **индивидуальный подход:** занятия проводятся с учетом особенностей и трудностей каждого ребенка;

- **эмоциональная поддержка:** используются психологические методы, творческие задания и юмор для снижения стресса.

**2. Методы менеджмента.** Для эффективной организации образовательной среды и координации деятельности ребенка применяются:

- **наблюдение и оценка:** мониторинг ежедневной деятельности и эмоционального состояния ребенка, с корректировкой подходов при необходимости;

- **стратегии сотрудничества:** регулярная связь с родителями для раннего выявления проблем;

- **поддержание порядка:** соблюдение правил класса и планируемых занятий облегчает адаптацию ребенка.

**3. Инновационные педагогические технологии.** Широко применяются для поддержки адаптации:

- **интерактивные мультимедиа средства:** делают уроки интересными и привлекают внимание;

- **групповые и проектные методы:** развивают навыки работы в команде и решения проблем;

- **динамические системы оценки:** позволяют быстро и точно оценивать активность ребенка.

Применение педагогических стратегий и методов менеджмента обеспечивает системное и эффективное управление адаптацией ребенка, поддерживает его психологическую стабильность, а также способствует социальному и академическому развитию.

В дошкольном и начальном образовании процесс адаптации детей должен эффективно управляться с точки зрения педагогического менеджмента. Эффективность адаптации зависит от трех факторов: психологического развития ребенка, сотрудничества педагогов с родителями и эффективного управления ресурсами и образовательной средой. В этом процессе особое значение имеют индивидуальный подход, инновационные педагогические технологии и планирование деятельности.

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## **ПРОГНОЗИРОВАНИЕ РАЗВИТИЯ ПРЕЭКЛАМПСИИ У БЕРЕМЕННЫХ С ИЗБЫТОЧНОЙ МАССОЙ ТЕЛА И ОЖИРЕНИЕМ**

**Аннотация:** Цель исследования — разработка прогностической модели на основе алгоритмов искусственного интеллекта для раннего выявления риска развития преэклампсии у беременных с избыточной массой тела и ожирением. Материал и методы. Обследованы 108 беременных, распределённых по группам в зависимости от индекса массы тела. Применены методы машинного обучения (Random Forest, градиентный бустинг). Результаты. Разработанная модель продемонстрировала AUC 0,89 для группы с ожирением. Частота преэклампсии составила 41,2% при ожирении против 8,3% при нормальном ИМТ.

**Ключевые слова:** преэклампсия, ожирение, беременность, прогнозирование, искусственный интеллект, индекс массы тела.

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## **FORECASTING THE DEVELOPMENT OF PREECLAMPSIA IN PREGNANT WOMEN WITH EXCESS BODY MASS AND OBESITY**

**Abstract:** Objective — to develop an AI-based predictive model for early detection of preeclampsia risk in pregnant women with overweight and obesity. Methods. 108 pregnant participants were stratified by BMI categories. Machine learning algorithms (Random Forest, gradient boosting) were applied. Results. The model achieved AUC of 0.89 for the obese group. Preeclampsia incidence was 41.2% in obese vs. 8.3% in normal BMI participants.

**Keywords:** preeclampsia, obesity, pregnancy, prediction, artificial intelligence, body mass index.

### **Введение**

Преэклампсия (ПЭ) остаётся одной из ведущих причин материнской и перинатальной заболеваемости и смертности во всём мире, поражая от 2 до 8% всех беременностей [1]. Данное мультисистемное гипертензивное расстройство манифестирует после 20 недель гестации и характеризуется артериальной гипертензией, протеинурией и полиорганной дисфункцией. По

данным Всемирной организации здравоохранения, преэклампсия ежегодно обуславливает до 30% материнских смертей [2].

Среди многочисленных факторов риска развития преэклампсии особое место занимают избыточная масса тела и ожирение. Многочисленные исследования подтвердили, что материнское ожирение увеличивает риск развития преэклампсии в 3–4 раза по сравнению с беременными, имеющими нормальный индекс массы тела [3]. Патофизиологические механизмы, связывающие ожирение и преэклампсию, включают усиление оксидативного стресса, хроническое системное воспаление, эндотелиальную дисфункцию и вазоконстрикцию [4]. Schiavone M.J. и соавт. (2024) в своём обзоре подчёркивают, что глобальная пандемия ожирения, особенно среди женщин репродуктивного возраста, обуславливает неуклонный рост распространённости преэклампсии [5].

В последние годы методы искусственного интеллекта (ИИ) и машинного обучения (МО) всё активнее внедряются в акушерскую практику для прогнозирования осложнений беременности. Систематический обзор Malik V. и соавт. (2024) показал, что алгоритмы машинного обучения, такие как XGBoost, Random Forest и нейронные сети, демонстрируют значение площади под ROC-кривой (AUC) от 0,76 до 0,97 при прогнозировании преэклампсии [6]. Edvinsson C. и соавт. (2024) разработали модель на основе машинного обучения с включением рутинных лабораторных параметров (АСТ, мочевая кислота) и ИМТ, достигнув AUC 0,91 для прогнозирования тяжёлой преэклампсии [7].

Целью настоящего исследования явилась разработка и валидация прогностической модели на основе алгоритмов искусственного интеллекта для раннего выявления риска развития преэклампсии у беременных с избыточной массой тела и ожирением.

#### Материал и методы

Проведено проспективное когортное исследование на базе приёмного отделения перинатального центра г. Фергана в период с января 2024 по декабрь 2025 г. В исследование были включены 108 беременных женщин, обратившихся для планового наблюдения в сроки 11–14 недель гестации. Критерии включения: одноплодная беременность, срок гестации 11–14 недель, возраст 18–42 года. Критерии исключения: многоплодная беременность, хроническая артериальная гипертензия, сахарный диабет, аутоиммунные заболевания, хронические болезни почек.

Участницы были распределены на три группы: группа 1 (n=36) — нормальный ИМТ (18,5–24,9 кг/м<sup>2</sup>); группа 2 (n=38) — избыточная масса тела (ИМТ 25,0–29,9 кг/м<sup>2</sup>); группа 3 (n=34) — ожирение (ИМТ  $\geq 30,0$  кг/м<sup>2</sup>). Всем пациенткам выполнено стандартное клинико-лабораторное обследование: измерение артериального давления, определение протеинурии, биохимический анализ крови, доплерометрия маточных артерий.

Для построения прогностической модели использованы алгоритмы машинного обучения: Random Forest и градиентный бустинг (XGBoost).

Входными переменными модели являлись: возраст, ИМТ, систолическое и диастолическое артериальное давление, уровень протеинурии, пульсационный индекс маточных артерий, уровень PAPP-A и PlGF. Валидация осуществлялась методом 10-кратной перекрёстной проверки. Статистическая обработка данных проводилась с использованием программ Python 3.11 (scikit-learn) и SPSS v.26. Различия считались статистически значимыми при  $p < 0,05$ . Для сравнения групп применялись критерий Краскела–Уоллиса и  $\chi^2$ -тест Пирсона.

### Результаты

Средний возраст обследованных беременных составил  $29,3 \pm 4,9$  лет. Клинико-демографические характеристики и основные результаты исследования представлены в таблице 1. Установлены статистически значимые различия между группами по уровню систолического артериального давления (САД):  $118,2 \pm 8,4$  мм рт.ст. в группе 1,  $129,5 \pm 10,3$  мм рт.ст. в группе 2 и  $138,7 \pm 12,1$  мм рт.ст. в группе 3 ( $p < 0,001$ ). Аналогичная тенденция отмечена для диастолического артериального давления (ДАД):  $74,6 \pm 6,2$ ,  $82,3 \pm 7,8$  и  $91,4 \pm 9,5$  мм рт.ст. соответственно ( $p < 0,001$ ).

**Таблица 1. Клинико-лабораторные показатели и эффективность прогностической модели в исследуемых группах**

| Показатель                     | Группа 1<br>(n=36) Норма<br>ИМТ | Группа 2<br>(n=38) Избыт.<br>масса | Группа 3<br>(n=34)<br>Ожирение | p       |
|--------------------------------|---------------------------------|------------------------------------|--------------------------------|---------|
| Возраст, лет (M±SD)            | 27,4±4,2                        | 29,1±5,1                           | 31,6±4,8                       | 0,003*  |
| ИМТ, кг/м <sup>2</sup> (M±SD)  | 22,3±1,8                        | 27,4±1,3                           | 33,7±3,1                       | <0,001* |
| САД при поступл.,<br>мм рт.ст. | 118,2±8,4                       | 129,5±10,3                         | 138,7±12,1                     | <0,001* |
| ДАД при поступл.,<br>мм рт.ст. | 74,6±6,2                        | 82,3±7,8                           | 91,4±9,5                       | <0,001* |
| Протеинурия, г/л<br>(M±SD)     | 0,12±0,08                       | 0,34±0,21                          | 0,67±0,39                      | <0,001* |
| Частота ПЭ, n (%)              | 3 (8,3%)                        | 9 (23,7%)                          | 14 (41,2%)                     | <0,001* |
| AUC модели (95%<br>ДИ)         | 0,78 (0,71–<br>0,85)            | 0,84 (0,78–<br>0,90)               | 0,89 (0,83–<br>0,95)           | —       |

Примечание: \* — различия статистически значимы ( $p < 0,05$ ); M±SD — среднее ± стандартное отклонение; ПЭ — преэклампсия; AUC — площадь под ROC-кривой; ДИ — доверительный интервал.

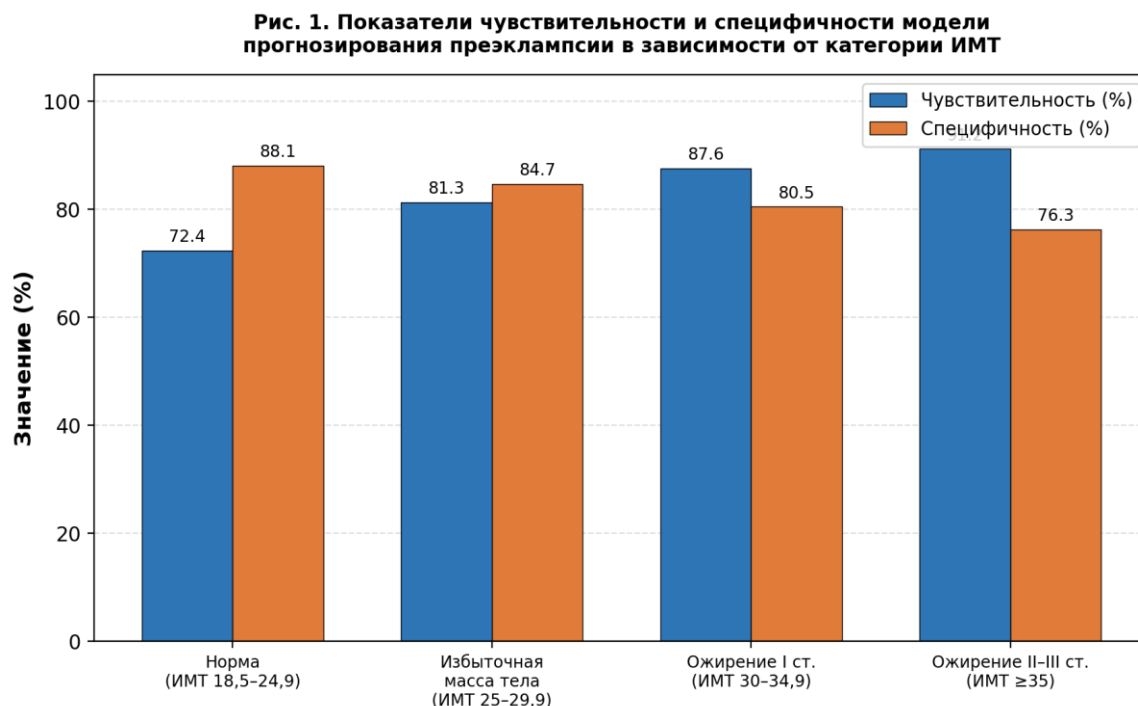
Частота развития преэклампсии прогрессивно возрастала с увеличением ИМТ: 8,3% (3/36) в группе с нормальным ИМТ, 23,7% (9/38) в группе с избыточной массой тела и 41,2% (14/34) в группе с ожирением ( $\chi^2=11,84$ ;



$p < 0,001$ ). Общая частота преэклампсии в исследуемой когорте составила 24,1% (26/108).

Прогностическая модель на основе алгоритма Random Forest продемонстрировала наилучшие показатели эффективности. Площадь под ROC-кривой (AUC) составила 0,78 (95% ДИ: 0,71–0,85) для группы с нормальным ИМТ, 0,84 (95% ДИ: 0,78–0,90) для группы с избыточной массой тела и 0,89 (95% ДИ: 0,83–0,95) для группы с ожирением. Общая чувствительность модели составила 83,4%, специфичность — 81,2%, положительная прогностическая ценность — 76,8%, отрицательная прогностическая ценность — 86,9%.

На рисунке 1 представлены показатели чувствительности и специфичности модели в зависимости от категории ИМТ. Наблюдается закономерное повышение чувствительности с 72,4% при нормальном ИМТ до 91,2% при ожирении II–III степени, при одновременном снижении специфичности с 88,1% до 76,3% соответственно.



### Обсуждение

Результаты настоящего исследования подтверждают и расширяют имеющиеся данные о взаимосвязи между избыточной массой тела, ожирением и риском развития преэклампсии. Установленная частота преэклампсии в группе с ожирением (41,2%) превышает данные Wang Y. и соавт. (2017), которые в когортном исследовании с участием 9863 беременных обнаружили, что женщины с избыточной массой тела и ожирением в сочетании с чрезмерной гестационной прибавкой массы тела имели значение отношения шансов 3,78 (95% ДИ: 2,65–5,41) для развития преэклампсии [1]. Более высокая частота в нашей когорте может быть обусловлена особенностями выборки и региональными факторами.

Применение алгоритмов машинного обучения для прогнозирования преэклампсии является перспективным направлением современного акушерства. В нашем исследовании модель Random Forest достигла AUC 0,89 для группы с ожирением, что сопоставимо с результатами Edvinsson С. и соавт. (2024), получивших AUC 0,91 при использовании комбинации лабораторных параметров и ИМТ [7]. Систематический обзор, проведённый Malik V. и соавт. (2024), также подтвердил превосходство алгоритмов XGBoost и Random Forest над традиционными логистическими моделями [6].

Важным аспектом нашего исследования является демонстрация зависимости диагностической эффективности модели от категории ИМТ. Повышение чувствительности модели при увеличении степени ожирения может объясняться более выраженными патофизиологическими изменениями, которые легче поддаются распознаванию алгоритмами машинного обучения. Как отмечают Barbouni K. и соавт. (2025), ожирение нарушает гормональный баланс, включая снижение уровня глобулина, связывающего половые гормоны, и повышение инсулинорезистентности, что создаёт характерные биохимические паттерны [3].

Полученные данные о прогрессивном повышении уровня протеинурии и артериального давления с увеличением ИМТ согласуются с результатами обзора Schiavone M.J. и соавт. (2024), подчёркивающего, что ожирение и преэклампсия имеют общие патофизиологические механизмы, включающие оксидативный стресс и эндотелиальную дисфункцию [5]. Li T. и соавт. (2024) также показали высокую эффективность моделей машинного обучения при включении материнских характеристик, биофизических и биохимических маркеров [4].

Ограничениями настоящего исследования являются относительно небольшой объём выборки (108 участниц), одноцентровой дизайн и отсутствие внешней валидации модели. Для подтверждения полученных результатов необходимы многоцентровые проспективные исследования с внешней валидацией на независимых когортах.

#### Заключение

Настоящее исследование продемонстрировало, что избыточная масса тела и ожирение являются значимыми предикторами развития преэклампсии, а частота данного осложнения прогрессивно возрастает с увеличением индекса массы тела. Разработанная прогностическая модель на основе алгоритма Random Forest с включением клинико-лабораторных показателей обеспечивает высокую диагностическую точность (AUC до 0,89), что позволяет проводить персонифицированную стратификацию риска уже в первом триместре беременности.

Внедрение подобных моделей искусственного интеллекта в рутинную клиническую практику перинатальных центров открывает принципиально новые возможности для раннего выявления беременных группы высокого риска и своевременного начала профилактических мероприятий, включая назначение низких доз ацетилсалициловой кислоты и модификацию образа

жизни. Дальнейшее совершенствование алгоритмов прогнозирования, их многоцентровая валидация и интеграция в системы поддержки принятия клинических решений представляют собой перспективное направление для снижения материнской и перинатальной заболеваемости, обусловленной преэклампсией.

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## **ЗАЩИТА ПРАВ И СВОБОД ЧЕЛОВЕКА И ГРАЖДАНИНА В КОНСТИТУЦИОННОМ СУДЕ РОССИЙСКОЙ ФЕДЕРАЦИИ**

**Аннотация:** В статье исследуется роль Конституционного Суда Российской Федерации в механизме судебной защиты прав и свобод человека и гражданина. Цель работы состоит в определении места конституционной жалобы среди иных средств судебной защиты и в выявлении факторов, влияющих на эффективность конституционного правосудия. Методологическую основу составили формально-юридический, системный и сравнительно-правовой методы, а эмпирическую базу - законодательство и актуальные постановления Конституционного Суда 2024-2025 гг. Сделан вывод, что потенциал конституционной защиты раскрывается при ясных критериях допустимости жалобы, развитии косвенного доступа к конституционному контролю и своевременном исполнении правовых позиций Конституционного Суда. Практическая значимость исследования связана с уточнением направлений совершенствования механизма защиты конституционных прав.

**Ключевые слова:** судебная защита, права и свободы человека, конституционное правосудие, конституционный контроль, конституционная жалоба, Конституционный Суд РФ.

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## **PROTECTION OF HUMAN AND CIVIL RIGHTS AND FREEDOMS IN THE CONSTITUTIONAL COURT OF THE RUSSIAN FEDERATION**

**Abstract:** The article examines the role of the Constitutional Court of the Russian Federation within the system of judicial protection of human and civil rights and freedoms. The purpose of the study is to determine the place of the constitutional complaint among other judicial remedies and to identify the factors affecting the effectiveness of constitutional justice. The methodological basis combines formal-legal, systemic, and comparative legal methods, while the empirical basis includes legislation and current rulings of the Constitutional Court

*issued in 2024-2025. The study concludes that constitutional protection becomes more effective when admissibility criteria are clear, indirect access to constitutional review develops, and the legal positions of the Constitutional Court are implemented without delay. The practical significance of the article lies in clarifying the directions for improving the mechanism for protecting constitutional rights.*

**Keywords:** *judicial protection, human and civil rights, constitutional justice, constitutional review, constitutional complaint, Constitutional Court of the Russian Federation.*

## Введение

Конституция Российской Федерации исходит из приоритета прав и свобод человека и гражданина, что предопределяет особое значение судебных механизмов их охраны. В этой системе Конституционный Суд Российской Федерации занимает самостоятельное место, поскольку оценивает не фактические обстоятельства частного спора, а конституционность нормы, подлежащей применению в конкретном деле<sup>53</sup>. Обращение в Конституционный Суд не подменяет апелляционное или кассационное обжалование, а выступает особым способом судебной защиты, направленным на устранение нормативной причины нарушения права. Итоговое решение Конституционного Суда влияет не только на положение конкретного заявителя, но и на правоприменение в сходных ситуациях.

Актуальность темы подтверждается устойчивым обращением граждан к институтам конституционного правосудия. По официальным данным, в 2024 году в Конституционный Суд РФ поступило 13 258 обращений, а по итогам года Суд принял 59 итоговых решений по вопросам конституционности проверяемых норм<sup>54</sup>. Эти показатели подтверждают, что граждане рассматривают Конституционный Суд как значимый элемент национального механизма защиты основных прав.

Вместе с тем эффективность данного механизма зависит не только от возможности подать жалобу, но и от критериев ее допустимости, готовности судов учитывать конституционные ориентиры и своевременности исполнения правовых позиций Конституционного Суда. Поэтому целью статьи является определение места Конституционного Суда Российской Федерации в системе защиты прав и свобод человека и гражданина, а также выявление факторов, снижающих доступность и результативность конституционного правосудия.

## Методы исследования

Методологическую основу исследования составили формально-юридический, системный и сравнительно-правовой методы. Формально-юридический метод использован при анализе положений Конституции

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53 Конституция Российской Федерации; О Конституционном Суде Российской Федерации: федер. конст. закон от 21.07.1994 № 1-ФКЗ.

54 Количество обращений в Конституционный Суд РФ по годам // Конституционный Суд Российской Федерации: офиц. сайт; 27 декабря 2024 года Конституционный Суд РФ подвел итоги работы за год // Конституционный Суд Российской Федерации: офиц. сайт.



Российской Федерации и Федерального конституционного закона «О Конституционном Суде Российской Федерации»; системный метод позволил определить место конституционного правосудия в общем механизме судебной защиты; сравнительно-правовой метод применен для разграничения конституционной жалобы, апелляционного и кассационного пересмотра. Анализ судебной практики использован для оценки актуальных постановлений Конституционного Суда 2024-2025 гг., затрагивающих жилищные права, свободу и личную неприкосновенность, честь и достоинство личности.

Результаты оригинального авторского исследования

Конституционный Суд Российской Федерации выполняет двойную задачу охраны конституционных прав. С одной стороны, он устраняет из правовой системы положения, не соответствующие Конституции; с другой стороны, выявляет обязательный конституционно-правовой смысл нормы, который должен учитываться законодателем и судами. Именно поэтому текст Конституции задает первичное содержание прав и свобод, а правовые позиции Конституционного Суда придают ему прикладную форму<sup>55</sup>. Обращение гражданина в Конституционный Суд приобретает публично-правовой масштаб: индивидуальный спор сочетается с устранением модели возможных аналогичных нарушений.

Конституционная жалоба выступает основным средством прямой судебной защиты в конституционном судопроизводстве. Ее допустимость связана с наличием конкретного дела, указанием на нарушение конституционных прав оспариваемым нормативным актом и, как правило, с исчерпанием иных внутригосударственных средств судебной защиты. Такие фильтры препятствуют подмене системой конституционного правосудия обычных судебных инстанций, однако при чрезмерно формальном применении способны затруднять доступ заявителя к защите. В этих условиях особое значение приобретает косвенный доступ через судебные запросы и применение правовых позиций Конституционного Суда в текущем правоприменении<sup>56</sup>.

Сформировалась двуканальная архитектура конституционного контроля, в рамках которой точечная жалоба инициирует прямую проверку нормы, а косвенные механизмы расширяют конституционные стандарты на более широкий круг сходных правоотношений. Такой подход ориентирует правовую систему на требования юридической определенности, соразмерности и уважения достоинства личности. В результате конституционное правосудие влияет не только на содержание законодательства, но и на повседневную практику разрешения споров судами общей юрисдикции.

55 О Конституционном Суде Российской Федерации: федер. конст. закон от 21.07.1994 № 1-ФКЗ; Бондарь Н.С. Судебный конституционализм в России в свете конституционного правосудия.

56 О Конституционном Суде Российской Федерации: федер. конст. закон от 21.07.1994 № 1-ФКЗ; Дудко И.А., Кряжкова О.Н. Косвенный доступ граждан к конституционному правосудию в России.



Эффективность конституционной защиты во многом определяется реальной доступностью Суда и темпами исполнения его решений. Без специальной юридической подготовки заявителю трудно отделить конституционный дефект нормы от простого несогласия с оценкой обстоятельств дела. Не менее существенная проблема связана с тем, что после признания нормы неконституционной либо после выявления ее обязательного конституционного смысла обновление законодательства и судебной практики нередко затягивается, что снижает практический эффект постановления<sup>57</sup>.

Показательны постановления, затрагивающие права, с которыми граждане сталкиваются в повседневной жизни. В Постановлении от 25.04.2024 № 21-П по жалобе Я.В. Штраус Конституционный Суд акцентировал необходимость реальной, а не формальной защиты жилищных прав лиц, отказавшихся от приватизации и сохраняющих связь с аварийным жилым помещением. В Постановлении от 23.05.2025 № 21-П по жалобе И.В. Федониной и Ю.В. Федониной Суд подтвердил недопустимость сведения жилищных гарантий лишь к регистрационным признакам и техническому статусу помещения<sup>58</sup>.

Не менее значимы постановления, посвященные защите личной неприкосновенности, достоинства и нематериальных благ личности. В Постановлении от 09.07.2024 № 36-П по жалобе Н.С. Смирнова Суд признал не соответствующим конституционным требованиям регулирование условий содержания лиц в конвойных помещениях судов, подчеркнув значение человеческого достоинства<sup>59</sup>. В Постановлении от 19.11.2024 № 53-П по жалобе Е.В. Боголюбской сформулирован сбалансированный подход к делам о защите чести и достоинства, исключающий формальный отказ в охране нематериальных благ и необоснованное ограничение свободы выражения мнения<sup>60</sup>.

Повышение эффективности защиты прав и свобод в Конституционном Суде Российской Федерации предполагает модернизацию пользовательских цифровых сервисов для подготовки жалобы, развитие разъяснений по типичным ошибкам заявителей и более удобный доступ к базе правовых позиций Суда. Одновременно требуется усиление косвенного канала защиты через более активное обращение судов общей юрисдикции к конституционному измерению споров и системный мониторинг исполнения постановлений. Совокупность этих мер способна укрепить практический эффект конституционного контроля и повысить устойчивость судебной защиты основных прав.

#### Заключение

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57 Дудко И.А. «Нет ничего важнее мелочей», или Проблемы исполнения решений Конституционного Суда РФ.

58 Постановления Конституционного Суда РФ от 25.04.2024 № 21-П и от 23.05.2025 № 21-П.

59 Постановление Конституционного Суда РФ от 09.07.2024 № 36-П по жалобе Н.С. Смирнова.

60 Постановление Конституционного Суда РФ от 19.11.2024 № 53-П по жалобе Е.В. Боголюбской.

Конституционный Суд Российской Федерации обеспечивает защиту прав и свобод человека и гражданина посредством конституционного контроля за содержанием применяемых норм. Его мандат ориентирован не на исправление единичной ошибки правоприменителя, а на устранение нормативной причины нарушения права либо на закрепление обязательного конституционного стандарта толкования закона. Поэтому индивидуальная конституционная жалоба обладает значением, выходящим за пределы частного интереса заявителя: она влияет на законодательство и на судебную практику.

Проведенное исследование позволяет заключить, что эффективность рассматриваемого механизма возрастает при сочетании нескольких условий: ясности и предсказуемости критериев допустимости жалобы, развития косвенного доступа к конституционному правосудию, последовательного применения правовых позиций Конституционного Суда судами общей юрисдикции и своевременного исполнения постановлений. Усиление указанных элементов способно обеспечить более устойчивую и основополагающую защиту прав и свобод человека и гражданина в Российской Федерации.

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## **МЕХАНИЗМЫ РЕАЛИЗАЦИИ ЦИФРОВОЙ СТРАТЕГИИ В СОЦИАЛЬНОЙ СФЕРЕ**

***Аннотация:** Статья посвящена изучению механизмов реализации цифровой стратегии в социальной сфере и выявлению особенностей её внедрения на региональном уровне.*

***Ключевые слова:** цифровая трансформация, цифровая стратегия, социальная сфера, социальные услуги, цифровизация государственного и муниципального управления*

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## **MECHANISMS OF IMPLEMENTING THE DIGITAL STRATEGY IN THE SOCIAL SECTOR**

***Abstract:** The article is devoted to the study of mechanisms for implementing the digital strategy in the social sector and the identification of its features in the context of regional governance.*

***Keywords:** Digital transformation, digital strategy, social sector, social services, digitalization of state and municipal governance.*

Современный мир стремительно меняется, и вместе с ним трансформируется государственное и муниципальное управление, включая переход к цифровым технологиям. Гражданам и организациям становится всё проще получать услуги в электронном формате, сокращая время на оформление документов и снижая зависимость от личного присутствия в учреждениях. Это делает цифровизацию государственных и муниципальных услуг не просто технической модернизацией, а одним из ключевых факторов повышения качества государственного управления и социальной защиты населения.

Для дальнейшего изучения данной темы рассмотрим понятие цифровых государственных и муниципальных услуг в социальной сфере. Как отмечают Волков И. С. и Реут Д.В.<sup>61</sup>, цифровизация в муниципальном и государственном управлении — это «процесс глубокой трансформации традиционных форм предоставления услуг на основе внедрения цифровых технологий, направленный на повышение доступности, прозрачности и качества взаимодействия с гражданами и бизнесом». В свою очередь, Денисенко В. В. и Майоров В. И.<sup>62</sup> подчёркивают важность выработки единого понятийного аппарата цифровизации государственного управления, включая такое понятие, как «цифровая государственная услуга» — услуга, оказываемая в электронной форме через общедоступные информационные системы, с минимальным участием бумажных документов и ручных процедур.

Исходя из этого, механизм реализации цифровой стратегии в социальной сфере можно определить как комплексный процесс внедрения цифровых технологий и цифровых сервисов для повышения качества и доступности социальных услуг, направленный на повышение адресности, прозрачности и эффективности их предоставления. Этот процесс напрямую влияет на уровень социальной защищённости, качество жизни и доверие граждан к органам власти.

Крайне важно учитывать, что тенденция ускорения цифровизации услуг в социальной сфере обусловлена рядом факторов: высоким уровнем числа уязвимых групп населения, ростом ожиданий быстрого и качественного сервиса, необходимостью повышения эффективности распределения бюджетных ресурсов, а также требованиями национальных стратегий цифровой трансформации. Как показывают авторы исследования «Тенденции цифровизации социального обеспечения в Российской Федерации», переход к цифровым форматам социальных услуг позволяет сократить сроки оформления мер поддержки, снизить административную нагрузку на граждан и повысить прозрачность распределения ресурсов.

Обращаясь к понятию «механизмы реализации цифровой стратегии в социальной сфере», можно выделить следующие ключевые направления:

- Создание единой цифровой платформы и личных кабинетов получателей социальных услуг является краеугольным камнем модернизации. Это включает в себя «разработку и внедрение онлайн-сервисов для подачи заявлений на меры социальной поддержки, проверки статуса их рассмотрения и получения информации о назначенных выплатах, а также

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<sup>61</sup> Волков И. С., Реут Д. В. ЦИФРОВИЗАЦИЯ В МУНИЦИПАЛЬНОМ И ГОСУДАРСТВЕННОМ УПРАВЛЕНИИ // International Journal of Open Information Technologies. 2023. №1. URL: <https://cyberleninka.ru/article/n/tsifrovizatsiya-v-munitsipalnom-i-gosudarstvennom-upravlenii> (дата обращения: 04.04.2026).

<sup>62</sup> Денисенко В. В., Майоров В. И. О понятийном аппарате цифровизации государственного управления // Проблемы права. 2025. №4 (100). URL: <https://cyberleninka.ru/article/n/o-ponyatiynom-apparate-tsifrovizatsii-gosudarstvennogo-upravleniya> (дата обращения: 04.04.2026).

использование единого цифрового портала для взаимодействия граждан с органами социальной защиты» [1]. Важную роль играет интеграция таких систем с государственными информационными ресурсами (например, ЕСИА, федеральными и региональными базами данных социальных услуг), что обеспечивает достоверность информации, снижает бюрократические барьеры и повышает прозрачность процесса назначения мер поддержки [3].

- Внедрение цифровых инструментов для адресной и проактивной социальной защиты направлено на повышение точности и справедливости распределения социальных ресурсов. Данное направление подразумевает использование аналитики данных о получателях услуг для «автоматического выявления тех, кто может нуждаться в поддержке, а также проактивного предложения им мер социальной помощи без необходимости подачи прямого заявления» [2]. Такой подход позволяет минимизировать «человеческий фактор» в принятии решений, оперативно реагировать на изменения в социальном статусе граждан и формировать более персонализированные и детализированные программы поддержки для уязвимых групп населения, что подтверждается исследованиями по цифровой трансформации социальной сферы [6].

Если рассматривать развитие механизмов реализации цифровой стратегии в социальной сфере на уровне Республики Башкортостан, одним из показательных примеров является перевод в электронный формат значительного числа государственных услуг, в том числе в сфере социальной защиты и социальной помощи. В рамках реализации цифровой трансформации в Министерстве семьи, труда и социальной защиты республика развивает государственную информационную систему «Адресная социальная помощь», а также другие цифровые сервисы, позволяющие гражданам оформлять выплаты, уточнять их статус и получать консультации онлайн. Это «значительно упрощает доступ к мерам поддержки, особенно для малообеспеченных семей, пожилых людей и инвалидов, делая услуги более прозрачными и удобными». Аналогичный принцип работает и с интерактивными цифровыми сервисами для взаимодействия граждан с органами социальной защиты. Жители могут оставлять обращения, подавать жалобы или предложения через электронные сервисы, а сотрудникам органов предоставляются инструменты для оперативной обработки заявок и контроля сроков исполнения. Такой подход делает процесс взаимодействия прозрачным и контролируемым со стороны граждан, а для управления — информационно-насыщенным и более ответственным. В результате качество и скорость оказания социальных услуг повышаются.

Аналогичный принцип работает и с интерактивными цифровыми сервисами для взаимодействия граждан с органами социальной защиты. Жители могут оставлять обращения, подавать жалобы или предложения через электронные сервисы, а сотрудникам органов предоставляются инструменты для оперативной обработки заявок и контроля сроков исполнения. Такой подход делает процесс взаимодействия прозрачным и контролируемым со



стороны граждан, а для управления — информационно-насыщенным и более ответственным. В результате качество и скорость оказания социальных услуг повышаются.

Таким образом, осознавая стремительное технологическое развитие во всём мире, основные инструменты и приоритеты цифровизации должны оставаться гибкими. Механизмы внедрения новых цифровых сервисов должны иметь возможность к видоизменению, дабы подстроиться под новые вызовы и технологические тренды, такие как искусственный интеллект для прогнозирования социальных рисков или аналитики больших данных для персонализации услуг. Также важно постоянно проводить мониторинг и оценку эффективности реализованных цифровых решений, а также создавать новые инструменты, которые приведут к более прозрачному, экономичному и качественному функционированию социальной сферы, «с учётом цифрового неравенства и необходимости повышения цифровой грамотности населения»

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**КЛИНИКО-ДИАГНОСТИЧЕСКИЕ ОСОБЕННОСТИ, ФАКТОРЫ  
РИСКА И СОВРЕМЕННЫЕ ПОДХОДЫ К ЛЕЧЕНИЮ  
ГИПЕРПЛАСТИЧЕСКИХ ПРОЦЕССОВ ЭНДОМЕТРИЯ У ЖЕНЩИН  
РЕПРОДУКТИВНОГО ВОЗРАСТА**

***Аннотация:** Гиперпластические процессы эндометрия (ГПЭ) представляют собой актуальную проблему современной гинекологии, обусловленную высоким риском малигнизации и значительным влиянием на репродуктивное здоровье женщин. В статье представлен обзор клинико-диагностических особенностей, факторов риска и современных подходов к лечению гиперплазии эндометрия у женщин репродуктивного возраста. Рассматриваются патогенетические механизмы, роль гормонального дисбаланса, метаболических нарушений и воспалительных процессов. Особое внимание уделено современным методам диагностики, включая ультразвуковое исследование, гистероскопию и морфологическую верификацию. Представлены основные принципы консервативного и хирургического лечения, направленные на сохранение репродуктивной функции.*

*Ключевые слова: гиперплазия эндометрия, репродуктивный возраст, гормональный дисбаланс, диагностика, гистероскопия, лечение*

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**CLINICAL AND DIAGNOSTIC FEATURES, RISK FACTORS, AND  
MODERN APPROACHES TO THE TREATMENT OF ENDOMETRIAL  
HYPERPLASTIC PROCESSES IN WOMEN OF REPRODUCTIVE AGE**

**Abstract.** Endometrial hyperplastic processes (EHP) represent an important issue in modern gynecology due to their potential for malignant transformation and their impact on reproductive health. This review presents clinical and diagnostic features, risk factors, and current approaches to the treatment of endometrial hyperplasia in women of reproductive age. The article discusses pathogenetic mechanisms, including hormonal imbalance, metabolic disorders, and inflammatory factors. Special attention is given to modern diagnostic techniques such as ultrasound, hysteroscopy, and histological verification. Current conservative and surgical treatment strategies aimed at preserving reproductive function are also described.

**Keywords:** endometrial hyperplasia, reproductive age, hormonal imbalance, diagnostics, hysteroscopy, treatment

**Введение.** Гиперплазия эндометрия является распространённой патологией у женщин репродуктивного возраста и занимает важное место в структуре гинекологических заболеваний. Частота данной патологии увеличивается в последние годы, что связано с ростом метаболических нарушений, гормональных дисфункций и стрессовых факторов [1].

Клинико-диагностические особенности гиперплазии эндометрия являются аномальные маточные кровотечения, включая меноррагии, метроррагии и межменструальные кровянистые выделения. У части пациенток заболевание может протекать бессимптомно и выявляться случайно при ультразвуковом исследовании [2].

Диагностика включает:

Ультразвуковое исследование (УЗИ) — позволяет оценить толщину эндометрия и его структуру;

Гистероскопия — визуализация полости матки с возможностью прицельной биопсии;

Гистологическое исследование — «золотой стандарт» диагностики, позволяющий определить тип гиперплазии [3].

К основным факторам риска развития гиперплазии эндометрия относятся:

Гормональные нарушения — гиперэстрогения при дефиците прогестерона;

Ожирение — усиленный синтез эстрогенов в жировой ткани;

Синдром поликистозных яичников (СПКЯ);

Сахарный диабет и метаболический синдром;

Хронические воспалительные заболевания органов малого таза;

Наследственная предрасположенность [4].

Эти факторы способствуют длительной стимуляции эндометрия эстрогенами без адекватной секреторной трансформации.

Патогенез

В основе развития гиперпластических процессов лежит нарушение гормонального баланса, преимущественно гиперэстрогения. Эстрогены

стимулируют пролиферацию эндометрия, тогда как недостаток прогестерона препятствует его нормальной секреторной трансформации. Это приводит к избыточному росту эндометриальных клеток и формированию гиперплазии [5].

Дополнительную роль играют: инсулинорезистентность; хроническое воспаление; нарушения апоптоза клеток.

#### **Современные подходы к лечению:**

Консервативное лечение

Основной метод терапии — гормональная коррекция:

Гестагены (дидрогестерон, медроксипрогестерон)

Комбинированные оральные контрацептивы (КОК)

Левоноргестрел-высвобождающая внутриматочная система (ЛНГ-ВМС)

Гормональная терапия направлена на подавление пролиферации эндометрия и восстановление менструального цикла [6].

Хирургическое лечение применяется при неэффективности консервативной терапии или наличии атипии: гистероскопическая резекция эндометрия;

диагностическое и лечебное выскабливание; в тяжёлых случаях — гистерэктомия (при высоком риске малигнизации) [7].

Современные исследования направлены на: использование антипролиферативных препаратов; таргетную терапию; персонализированный подход к лечению с учётом молекулярных маркеров.

**Заключение.** Гиперпластические процессы эндометрия у женщин репродуктивного возраста требуют комплексного подхода к диагностике и лечению. Ранняя диагностика, учет факторов риска и индивидуализированная терапия позволяют снизить риск осложнений и сохранить репродуктивную функцию. Внедрение современных методов лечения и мониторинга улучшает прогноз и качество жизни пациенток.

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## **СОСТОЯНИЕ И СОВЕРШЕНСТВОВАНИЕ МАРКЕТИНГОВОГО АУДИТА В КИТАЕ**

**Аннотация:** Маркетинговый аудит был внедрен в Китае в 1980-х годах и значительно развился за последние несколько десятилетий. Из-за последствий экономического кризиса в последние годы конкуренция на рынке становится все более жесткой, и компании уделяют все больше внимания маркетинговой деятельности и результативности маркетинга. Однако, поскольку теорию и практику легко отделить друг от друга, маркетинговый аудит необходимо применять к практике предприятия, чтобы повысить его маркетинговый эффект. В этой статье мы проанализируем проблемы, существующие в отечественном маркетинговом аудите, проведем соответствующий анализ поднятых проблем и предложим несколько скромных идей для их решения, направленных на улучшение сферы отечественного маркетингового аудита. Стремитесь анализировать внутренние маркетинговые аудиты полностью, объективно и правдиво.

**Ключевые слова:** Маркетинговый аудит, Эффективность маркетинга, Маркетинг

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## **THE STATE AND IMPROVEMENT OF MARKETING AUDIT IN CHINA**

**Summary:** Marketing auditing was introduced in China in the 1980s and has developed significantly over the past few decades. Due to the effects of the economic crisis in recent years, competition in the market has become increasingly fierce, and companies are paying more and more attention to marketing activities and marketing effectiveness. However, since theory and practice are easy to separate from each other, marketing audit must be applied to the practice of an enterprise in order to increase its marketing effect. In this article, we will analyze the problems that exist in the domestic marketing audit, conduct an appropriate analysis of the issues raised and propose some modest ideas for their solution aimed at improving the field of domestic marketing audit. Strive to analyze internal marketing audits fully, objectively, and truthfully.



**Keywords:** *Marketing Audit, Marketing Effectiveness, Marketing*

## 1. Концепция маркетингового аудита

Маркетинговый аудит является продолжением внутреннего аудита в области маркетинга. Он может эффективно улучшать маркетинговые показатели, тем самым укрепляя позиции предприятия, и является неотъемлемой частью деловой деятельности предприятия. Маркетинговый аудит - это всесторонний, систематический, независимый и регулярный анализ маркетинговой среды предприятия, маркетинговых целей, маркетинговой стратегии, организации маркетинга, эффективности маркетинга и ряда маркетинговых мероприятий<sup>63</sup>.

Независимость является одной из характеристик маркетинговых аудитов и важной гарантией обеспечения качества маркетинговых аудитов в нашей стране, но многие компании в нашей стране не преуспели в этом отношении. Представление о руководителях и менеджерах различных функциональных отделов является относительно устаревшим.

В моей стране существует проблема “одна акция независима” в некоторых компаниях, котирующихся на бирже. В составе совета директоров преобладают инсайдеры и представители контролирующих акционеров, а также не хватает внешних директоров и независимых директоров. Следовательно, отсутствует надлежащая система сдержек и противовесов власти, так что права и интересы мелких и средних акционеров не гарантируются, а председатель правления и генеральный директор значительного числа компаний, котирующихся на бирже, объединены в одно целое, и явление “инсайдерского контроля” является очень серьезным. В этом случае, чтобы соответствовать требованиям “circle money”, установленным регулирующим органом, клиент платит за то, чтобы поручить сертифицированному государственному бухгалтеру провести аудит его собственных финансовых данных, что потребует услуг независимого аудита<sup>64</sup>.

## 2. Анализ причин текущих проблем в китайском маркетинге

В Китае не так много результатов исследований по маркетинговому аудиту. Причина в том, что теория маркетингового аудита в Китае появилась поздно. По сравнению с западными странами, исследования по теории маркетингового аудита в нашей стране в основном все еще находятся в зачаточном состоянии. Более того, среди немногочисленных результатов исследований большинство из них кратко знакомят с этим предметом, но систематических исследований, основанных на реальной ситуации в Китае, не хватает, то есть результатов “китаизации маркетингового аудита” очень мало.

<sup>63</sup> Дэн Цюцзю, Шань Тао. Обсуждение вопросов, связанных с маркетинговым аудитом. Теоретический мир. 2017(3):202.

<sup>64</sup> Дэн Цюцзю, Шань Тао. Обсуждение вопросов, связанных с маркетинговым аудитом. Теоретический мир. 2017(3):202.

Отношение предприятия к маркетинговому аудиту напрямую определяет направление его развития. Однако в моей стране руководители многих корпораций пренебрегают контролем за маркетинговыми аудитами, что делает их неспособными выполнять возложенные на них функции. Также есть много корпоративных лидеров, которые уделяют внимание только внутреннему производству и внешним связям. Многие руководители уделяют слишком много внимания сиюминутным интересам и не заботятся о долгосрочном развитии предприятия. Они рассматривают маркетинговые аудиты только как форму прогулки и не проводят существенной работы. , Некоторые даже не проводят регулярных маркетинговых аудитов. Некоторые корпоративные лидеры на самом деле не осознают кризиса в своей деятельности и в глубине души не ощущают конкуренции, поэтому они считают, что регулярные и всесторонние маркетинговые аудиты не нужны.

#### 4. Предложения по совершенствованию маркетингового аудита в Китае

Теория является основой для руководства практикой. Без достаточных теоретических знаний маркетинговый аудит - это просто дерево без корней. Поэтому нашему теоретическому сообществу следует усилить исследования в области маркетингового аудита и усилить внедрение передовых зарубежных знаний в области маркетингового аудита для изучения проблем, с которыми предприятия могут столкнуться при проведении маркетинговых аудитов в текущих условиях. условия и эффективные способы их решения, чтобы практическое сообщество могло постепенно понять содержание маркетинговых аудитов.

Существующий статус исследований в области маркетингового аудита не может удовлетворить потребности развития корпоративного маркетингового аудита. Необходимо проводить глубокие и систематические исследования в области маркетингового аудита, а также усердно работать над изучением передовых зарубежных знаний в области маркетингового аудита и их “китаизацией”, чтобы такие знания могли соответствовать требованиям отечественных теоретических разработки.

Контроль качества маркетингового аудита относится к деятельности или поведению, которые систематически контролируются и координируются определенной организацией или отделом посредством разработки ряда политик контроля и процедур контроля для различных видов деловой активности или поведения, осуществляемых учреждениями по маркетинговому аудиту.

Роль контроля качества заключается в том, чтобы обеспечить соблюдение и внедрение стандартов сертифицированных бухгалтеров; это важная часть системы внутреннего контроля; это основное условие выживания и развития бухгалтерских фирм.

В современных рыночных условиях китайские компании сталкиваются со все более жесткой конкуренцией в развитии своего бизнеса. То, как лучше применять маркетинговые стратегии, рационально распределять маркетинговые ресурсы и эффективно контролировать маркетинговую

деятельность, неизбежно станет для предприятий ключом к получению преимущества в рыночной конкуренции. Учитывая огромную роль маркетингового аудита в продвижении корпоративной маркетинговой деятельности, предприятия должны создать разумный и обоснованный механизм маркетингового аудита и усилить управление маркетингом, чтобы увеличить свои конкурентные преимущества.

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## **ЭНЕРГЕТИЧЕСКИЙ МАРКЕТИНГОВЫЙ АУДИТ И АНАЛИЗ МОДЕЛИ**

**Аннотация:** В условиях сегодняшнего непрерывного развития национальной экономики Китая рыночные реформы в той или иной степени затронули различные предприятия, особенно энергетические компании. Стремясь к получению экономических выгод, они также требуют от компаний прорывов в области маркетинга и управления электроэнергией. Работа по энергосбыту является важным средством для энергоснабжающих предприятий по освоению новых рынков и новых потребителей, поддержанию и консолидации существующих клиентов, а также по захвату и расширению рынка. Она играет важную роль в текущем экономическом развитии и новой ситуации в стране, связанной с либерализацией рынка сбыта электроэнергии. Поэтому, в дополнение к обладанию солидными знаниями в области маркетинга, внутренние аудиторы электроэнергетических предприятий должны также своевременно обновлять свои аудиторские идеи и концепции и повышать порог аудита на основе четкой национальной политики, законов и нормативных актов в области управления маркетингом, а также выдвигать рационализаторские предложения и мнения для продвижения электроэнергетики. снабдите предприятия необходимым оборудованием, чтобы они были непобедимы в рыночной конкуренции.

**Ключевые слова:** Рынок электроэнергии; маркетинговый аудит

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## **ENERGY MARKETING AUDIT AND MODEL ANALYSIS**

**Annotation:** In today's continuous development of China's national economy, market reforms have affected various enterprises to varying degrees, especially energy companies. In their quest for economic benefits, they also require companies to make breakthroughs in marketing and energy management. Energy marketing is

*an important means for energy supply companies to explore new markets and new consumers, maintain and consolidate existing customers, and capture and expand the market. It plays an important role in the current economic development and the new situation in the country related to the liberalization of the electricity market. Therefore, in addition to having solid marketing knowledge, internal auditors of electric power companies should also update their audit ideas and concepts in a timely manner and raise the audit threshold based on clear national policies, laws and regulations in the field of marketing management, as well as put forward innovative proposals and opinions to promote the electric power industry. provide enterprises with the necessary equipment so that they are invincible in market competition.*

**Keywords:** Electricity market; marketing audit

С развитием экономики численность населения увеличилась, а потребление электроэнергии увеличилось, содержание работы энергетических компаний становилось все более сложным, а рабочая нагрузка - все более и более высокой. Энергетический маркетинг является важным средством развития компании, а аудит - важной частью обеспечения бесперебойной работы этого метода. Аудит внутреннего контроля энергосбытовой деятельности является требованием развития рынка, а также ключом к внутреннему контролю предприятий. Для того чтобы корпоративный маркетинг мог лучше выполнять свою работу, необходимо усилить аудиторскую работу, способствующую всестороннему улучшению различных бизнес-возможностей корпоративного персонала, с тем чтобы достичь цели долгосрочного здорового развития энергетических предприятий<sup>65</sup>.

## 1 Модель энергетического маркетинга и аудита

### 1.1 Маркетинг электроэнергии

При обычных обстоятельствах маркетинговая система делится на три основных элемента, а именно производственную систему, систему бренда и систему продаж и обслуживания. Производственная система - это предприятие, предоставляющее корпоративные продукты или корпоративные услуги, которые корпоративные клиенты покупают, выбирают и обменивают. Для энергетических компаний система маркетинга и производства электроэнергии заключается в обеспечении передачи электроэнергии потребителям, чтобы потребители могли ее использовать. Система брендинга предназначена для создания предприятием хорошего корпоративного имиджа и системы распознавания корпоративного бренда, чтобы у клиентов возникало желание покупать товары, производимые предприятием. Для энергетических компаний это использование очевидных вывесок и легко запоминающихся корпоративных

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<sup>65</sup> Цуй Юнхуа. Общие проблемы и меры противодействия маркетинговому аудиту энергоснабжающих предприятий окружного уровня [J]. Ежемесячник деловой культуры, 2016 (3): 91-91.

телефонных номеров для повышения узнаваемости общественности. осведомленность об энергетических компаниях. Система продаж и сервисного обслуживания заключается в том, что предприятие предоставляет удовлетворяющую потребности клиента модель продаж или послепродажного обслуживания для привлечения или удержания клиентов. Для энергетических компаний это обеспечение стабильной передачи электроэнергии и быстрое и эффективное техническое обслуживание в случае сбоя в цепи<sup>66</sup>.

## 1.2 Режим аудита

Модель аудита также можно назвать моделью метода аудита или моделью сбора аудиторских доказательств. Это метод аудита, принятый аудиторским подразделением для достижения определенной цели. Он определяет начальную точку работы по сбору аудиторских доказательств и место, где аудиторы приступают к выполнению аудиторской работы. Основное содержание его работы включает в себя базовый аудит учетных записей, базовый аудит систем и базовый аудит рисков. Целью базового аудита бухгалтерской отчетности является сбор доказательств путем анализа бухгалтерской информации, с тем чтобы выявить ошибки и лазейки в бухгалтерской отчетности и дать аудиторские заключения. Основной аудит системы заключается в выборе соответствующего объема и направленности проверки внутри подразделения и составлении статистических выводов на основе большого количества выборочных обследований. Достоверность выводов должна быть высокой. Цель состоит в обеспечении подлинности и легитимности финансовой отчетности. Аудит, основанный на оценке рисков, - это систематическая оценка и анализ аудиторских рисков, сочетающий методы контроля рисков с традиционными аудиторскими проверками, и его целью является обеспечение подлинности и легитимности финансовой отчетности. Основное содержание аудита, используемого в области энергомаркетинга в электроэнергетической отрасли, заключается в проведении аудита фактического потребления электроэнергии энергетическими компаниями и потребителями электроэнергии, аудита маркетинговых цен на электроэнергию и повышении уровня внутреннего управления энергетическими компаниями.

## 2 Важность энергетического маркетингового аудита

Целью аудиторской работы является выявление пробелов в финансовой отчетности и обеспечение ее достоверности. В любой работе по разным причинам могут быть ошибки или лазейки. С ростом экономики и увеличением численности населения количество электроприборов и других электроинструментов также постоянно растет, а количество электроэнергии, потребляемой ежеминутно, постоянно увеличивается. Для энергетических компаний потребление электроэнергии представляет собой сумму дохода

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<sup>66</sup> Цуй Юнхуа. Общие проблемы и меры противодействия маркетинговому аудиту энергоснабжающих предприятий окружного уровня [J]. Ежемесячник деловой культуры, 2016 (3): 91-91.



энергетических компаний. Пробелы или халатность в любом звене могут привести к большим потерям в области маркетинга электроэнергии для энергетических компаний, поэтому необходимо срочно усилить аудит маркетинга электроэнергии и ускорить внедрение инноваций в области аудита.

С ростом экономики, увеличением численности населения, увеличением количества объектов, потребляющих электроэнергию, функционирование и совершенствование системы маркетинга энергетических предприятий, а также аудит производственной ситуации - все это имеет важное значение для функционирования и развития энергетических предприятий. Аудиторское звено является важной гарантией бесперебойной работы системы сбыта электроэнергии, и для энергетических компаний уделение внимания аудиторской работе по внутреннему контролю может не только эффективно повысить эффективность работы энергетики, но и помочь самой компании сформулировать эффективную корпоративную маркетинговую стратегию и способствовать долгосрочному стабильному развитию энергетической компании.

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**ТЕХНОЛОГИЯ РАЗВИТИЯ НАЦИОНАЛЬНЫХ КАЧЕСТВ У  
ДЕВУШЕК-УЧАЩИХСЯ НА ПРИМЕРЕ ОБРАЗОВ УЗБЕКСКИХ  
ЖЕНЩИН**

**Аннотация:** В статье рассматривается технология развития национальных качеств у девушек-учащихся на примере образов узбекских женщин. Цель работы состоит в теоретическом обосновании структуры данного педагогического явления, выявлении его психологических и педагогических оснований, а также в моделировании технологических механизмов его развития в образовательной практике. Методологическую основу статьи составляет аксиологический подход в сочетании с личностно-деятельностным, культурологическим и социально-педагогическим подходами. Исследование имеет теоретический характер и основано на анализе научной литературы, сопоставлении позиций ведущих авторов, логико-структурном моделировании и понятийной реконструкции. Показано, что развитие национальных качеств у девушек-учащихся не должно трактоваться как навязывание фиксированных гендерных стереотипов или как прямой результат включения культурного материала в образовательный процесс. Более корректно рассматривать его как педагогически организованный процесс интериоризации ценностей, культурных норм, коммуникативных образцов и нравственно значимых моделей поведения, представленных в историко-культурных и современных образах узбекских женщин. Установлено, что структурно данное явление включает когнитивный, ценностно-аффективный, поведенческий и рефлексивный компоненты. В статье представлены исходные определения, научные подходы, классификации, теоретические основания, внутренняя структура явления, спорные вопросы, междисциплинарные связи и практические следствия в пределах доказанного. Сделан вывод о том, что технология развития национальных качеств у девушек-учащихся может быть научно обоснована только при условии методологической осторожности, отказа от эссенциализации культурных признаков и сохранения различия между педагогическим воздействием, личностным присвоением ценностей и фактическим поведением.

**Ключевые слова**

девушки-учащиеся, национальные качества, аксиологический подход, социокультурное развитие, образ узбекских женщин, педагогическая технология, ценности, рефлексия, культурная идентификация.

## **TECHNOLOGY FOR THE DEVELOPMENT OF NATIONAL QUALITIES IN FEMALE STUDENTS THROUGH THE EXAMPLE OF UZBEK WOMEN'S IMAGES**

**Abstract:** *The article examines the technology for the development of national qualities in female students through the example of Uzbek women's images. The purpose of the study is to provide a theoretical substantiation of the structure of this pedagogical phenomenon, to identify its psychological and pedagogical foundations, and to model the technological mechanisms of its development in educational practice. The methodological basis of the article is the axiological approach in combination with personality-activity, culturological, and socio-pedagogical approaches. The study is theoretical in nature and is based on the analysis of scientific literature, the comparison of the positions of leading authors, logical-structural modeling, and conceptual reconstruction. It is shown that the development of national qualities in female students should not be interpreted as the imposition of fixed gender stereotypes or as a direct result of the inclusion of cultural material in the educational process. It is more accurate to regard it as a pedagogically organized process of the interiorization of values, cultural norms, communicative patterns, and morally significant models of behavior represented in historical-cultural and contemporary images of Uzbek women. It has been established that, structurally, this phenomenon includes cognitive, value-affective, behavioral, and reflective components. The article presents the initial definitions, scientific approaches, classifications, theoretical foundations, internal structure of the phenomenon, controversial issues, interdisciplinary connections, and practical implications within the limits of what has been demonstrated. It is concluded that the technology for developing national qualities in female students can be scientifically substantiated only under conditions of methodological caution, refusal to essentialize cultural traits, and preservation of the distinction between pedagogical influence, personal appropriation of values, and actual behavior.*

### **Keywords**

*female students, national qualities, axiological approach, sociocultural development, the image of Uzbek women, pedagogical technology, values, reflection, cultural identification*

### **Введение**

Современная педагогика всё в большей степени ориентируется на задачи, связанные не только с передачей знаний, но и с формированием ценностных оснований личности. Особую актуальность в этом контексте приобретает проблема развития национальных качеств у девушек-учащихся, поскольку она связана с вопросами культурной идентичности, нравственной

ориентации, самоуважения, социальной ответственности и норм взаимодействия в образовательной и семейной среде [1; 3; 14; 24; 25].

При этом сама постановка вопроса требует методологической осторожности. Национальные качества не могут пониматься как набор врождённых или жестко предзаданных признаков. В педагогическом плане речь должна идти о культурно опосредованных ценностных ориентирах, моделях взаимодействия, формах саморегуляции и социально одобряемых способах поведения, которые усваиваются в процессе воспитания, общения, идентификации и рефлексии. Поэтому использование образов узбекских женщин в образовательной технологии возможно не как средство закрепления стереотипа, а как культурно-символический ресурс, позволяющий раскрывать нравственные, коммуникативные, трудовые и гражданские ценности в личностно значимой форме.

Цель статьи — теоретически обосновать технологию развития национальных качеств у девушек-учащихся на примере образов узбекских женщин.

Задачи статьи состоят в уточнении исходных определений, раскрытии психологических и педагогических теорий, систематизации научных подходов и школ, построении классификации, описании внутренней структуры явления, анализе спорных вопросов и междисциплинарных связей, а также в формулировании практических следствий в пределах доказанного.

### **Материалы и методы**

Исследование имеет теоретико-аналитический характер. Используются методы понятийного анализа, сравнительно-сопоставительного рассмотрения научных позиций, логико-структурного моделирования, а также теоретического обобщения литературы [1–25]. Статья не содержит экспериментальной проверки эффективности конкретной программы. Поэтому выводы не интерпретируются как эмпирически доказанный результат, а сохраняются в пределах теоретической модели.

## 1. Исходные определения

Таблица 1. Исходные определения, принятые в статье

| Понятие                                | Рабочее определение                                                                                                                                                                                                             | Методологическая функция                |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Национальные качества девушек-учащихся | педагогически развиваемые ценностные, коммуникативные, нравственные и поведенческие характеристики, культурно соотнесённые с национальными нормами и гуманистическими ориентирами                                               | задаёт предмет анализа                  |
| Образы узбекских женщин                | культурно значимые символические и биографические модели, через которые в воспитательном процессе репрезентируются ценности достоинства, ответственности, уважения, трудолюбия, нравственной устойчивости и социального участия | задаёт содержательный ресурс технологии |
| Технология развития                    | воспроизводимая система педагогических целей, механизмов, форм, средств и процедур, обеспечивающих направленное формирование заданных качеств                                                                                   | задаёт процессуальную рамку             |
| Ценностно-аффективный компонент        | личностное принятие культурно и нравственно значимых ориентиров, их эмоциональное переживание и смысловое присвоение                                                                                                            | раскрывает внутренний уровень           |
| Рефлексивный компонент                 | способность соотносить собственные установки, поступки и способы взаимодействия с ценностной и культурной нормой                                                                                                                | задаёт механизм самокоррекции           |

Предлагаемая понятийная рамка исключает трактовку национальных качеств как неизменной сущности. В исследовательской логике они понимаются как результат педагогически организованной интериоризации ценностей и норм, опосредованной культурными образцами и личностной рефлексией [14; 15; 17; 18; 23].

## 2. Психологические и педагогические теории, значимые для темы

Проблема развития национальных качеств у девушек-учащихся находится на пересечении нескольких теоретических направлений. Она не сводится ни к педагогике нравственного воспитания, ни к социальной психологии идентификации, ни к культурологическому описанию традиций. Для её раскрытия требуется сочетание нескольких научных линий.

**Таблица 2. Теоретические основания анализа**

| Теоретическая линия                                     | Представители                                 | Ключевое положение                                                                                       | Значение для темы                                                       |
|---------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Теория формирования личности                            | Л. И. Божович [18]                            | личность развивается через систему мотивов, отношений и внутренней позиции                               | национальные качества не формируются вне личностного присвоения         |
| Гуманистическая педагогика                              | В. А. Сухомлинский [23]                       | воспитание строится через уважение к личности, нравственный пример и культуру отношений                  | образец должен быть личностно значимым, а не декларативным              |
| Психология саморегуляции и личностного поведения        | А. Т. Абдурахманова [4–8; 12; 13]             | самооценка, защитные реакции, внимание и личностные предикторы влияют на поведение и адаптацию           | развитие качеств требует внутренней регуляции, а не только нормирования |
| Нравственное воспитание через ценности и сотрудничество | Х. Тухтаев [1; 3; 24; 25]                     | культурные и нравственные ценности эффективнее усваиваются в кооперативных и ценностно насыщенных формах | технология должна соединять содержание и совместную деятельность        |
| Социокультурная компетентность и роль семьи             | Х. Б. Бердиева [14–17]                        | культурное и семейное окружение выступает важнейшим фактором формирования личности                       | развитие качеств требует связи школы и семейно-культурной среды         |
| Социальный интеллект и педагогическое взаимодействие    | С. Норбоева, Г. Урокова [19; 22]              | понимание другого и адекватное взаимодействие являются условием зрелого социального поведения            | национальные качества неотделимы от коммуникативной зрелости            |
| Педагогические технологии                               | А. Kenjaboev, О. Ergasheva, J. Kenjabayev [2] | результативность зависит от организационной и технологической выстроенности обучения                     | ценностное содержание должно быть технологически операционализировано   |

Из данного сопоставления следует, что национальные качества девушек-учащихся педагогически оправданно рассматривать как интегративное образование, объединяющее когнитивные, ценностные, коммуникативные и регулятивные элементы.



### 3. Научные подходы и школы

**Таблица 3. Научные подходы к исследованию темы**

| Подход                   | Что объясняет                                                   | Сильная сторона                                     | Ограничение                                                            |
|--------------------------|-----------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------|
| Аксиологический          | роль ценностей в формировании личности                          | позволяет выявить смысловое ядро воспитания         | требует точной операционализации                                       |
| Культурологический       | связь личности с культурой, традицией и символическими образами | раскрывает содержание национально значимых образцов | риск описательности без психологического блока                         |
| Личностно-деятельностный | развитие качеств в деятельности и взаимодействии                | объясняет переход от знания к действию              | требует продуманной педагогической организации                         |
| Социально-педагогический | влияние семьи, школы, среды и общества                          | раскрывает контекст развития                        | недостаточен без внутреннего личностного измерения                     |
| Гендерно-чувствительный  | позволяет избежать стереотипизации и нормативной жесткости      | обеспечивает методологическую осторожность          | требует точного разграничения культурного ресурса и гендерного шаблона |
| Междисциплинарный        | объединяет педагогику, психологию, культурологию и этику        | обеспечивает целостность анализа                    | усложняет диагностику и интерпретацию                                  |

В статье принимается интегративная модель, в которой системообразующим выступает аксиологический подход, а остальные подходы выполняют уточняющую и предохраняющую функцию. Это особенно важно для темы, где любое упрощение легко приводит к стереотипизации.

#### 4. Классификация национальных качеств как педагогического результата

Таблица 4. Классификация национальных качеств в логике статьи

| Группа качеств         | Содержательное наполнение                                                               | Педагогически наблюдаемое проявление                 |
|------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------|
| Нравственно-ценностные | уважение, достоинство, ответственность, доброжелательность, уважение к старшим и к себе | ценностно аргументированное поведение                |
| Коммуникативные        | тактичность, умение вести диалог, культурно соразмерное общение                         | корректное взаимодействие в учебной и семейной среде |
| Поведенческие          | дисциплина, трудолюбие, самообладание, участие в совместной деятельности                | устойчивость поведенческих решений                   |
| Рефлексивные           | самонаблюдение, самооценка, способность к коррекции поведения                           | осмысление собственных поступков                     |
| Социокультурные        | понимание символов культуры, языка, семейно-нормативных традиций                        | культурно адекватная интерпретация ситуации          |

Такая классификация нужна для того, чтобы не смешивать культурную осведомлённость с нравственной зрелостью, а внешнее поведение — с внутренним ценностным принятием.

#### 5. Позиции ведущих авторов

Ведущие авторы по данной тематике могут быть сгруппированы в три аналитические линии.

Первая линия сосредоточена на личности и внутренней позиции субъекта. В рамках этой линии значимы положения о том, что любое устойчивое качество формируется не через внешнее предписание, а через систему мотивов, отношений и личностного смысла [18].

Вторая линия связана с педагогикой нравственного и социокультурного воспитания. Здесь ключевым является тезис о том, что культурные и нравственные ценности приобретают воспитательную силу лишь при включении в реальные формы общения, сотрудничества и воспитательной практики [1; 3; 14–17; 23–25].

Третья линия раскрывает психологические регуляторы поведения. Исследования о самооценке, бессознательных защитных реакциях, внимании, личностных предикторах и поведении в учебной деятельности показывают, что усвоение ценностей не гарантирует автоматически зрелого поведения, если не сформированы механизмы саморегуляции и личностной устойчивости [4–8; 10; 12; 13].

#### 6. Внутренняя структура явления

Национальные качества девушек-учащихся, развиваемые на примере образов узбекских женщин, целесообразно рассматривать как многоуровневое образование.

**Таблица 5. Внутренняя структура явления**

| Компонент             | Содержание                                                                    | Основная функция                              | Внешнее проявление                                 |
|-----------------------|-------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------|
| Когнитивный           | знание культурных образцов, норм, биографических примеров, смыслов и символов | обеспечивает понимание ценностного содержания | аргументированное осмысление культурного материала |
| Ценностно-аффективный | эмоционально-личностное принятие культурно и нравственно значимых ориентиров  | превращает знание в личностный смысл          | положительное отношение к значимым образцам        |
| Поведенческий         | практическая реализация норм и ценностей в действиях                          | переводит смысл в поступок                    | культурно соразмерное поведение                    |
| Рефлексивный          | самооценка, анализ собственных действий и установок                           | обеспечивает внутреннюю коррекцию             | способность к саморегуляции и пересмотру позиции   |

Структура показывает, что образовательная работа с образами узбекских женщин может быть научно оправдана только тогда, когда она переводится из уровня простого описания в уровень когнитивной интерпретации, ценностного переживания, поведенческой апробации и рефлексии.

## **7. Технология развития**

Если структура описывает, что именно развивается, то педагогическая технология задаёт, через что и в какой логике это развитие может быть обеспечено. В рамках статьи технология понимается как система целенаправленно организованных способов, средств и условий педагогического воздействия, через которые культурно значимые образцы становятся регуляторами личностного и поведенческого становления девушек-учащихся.

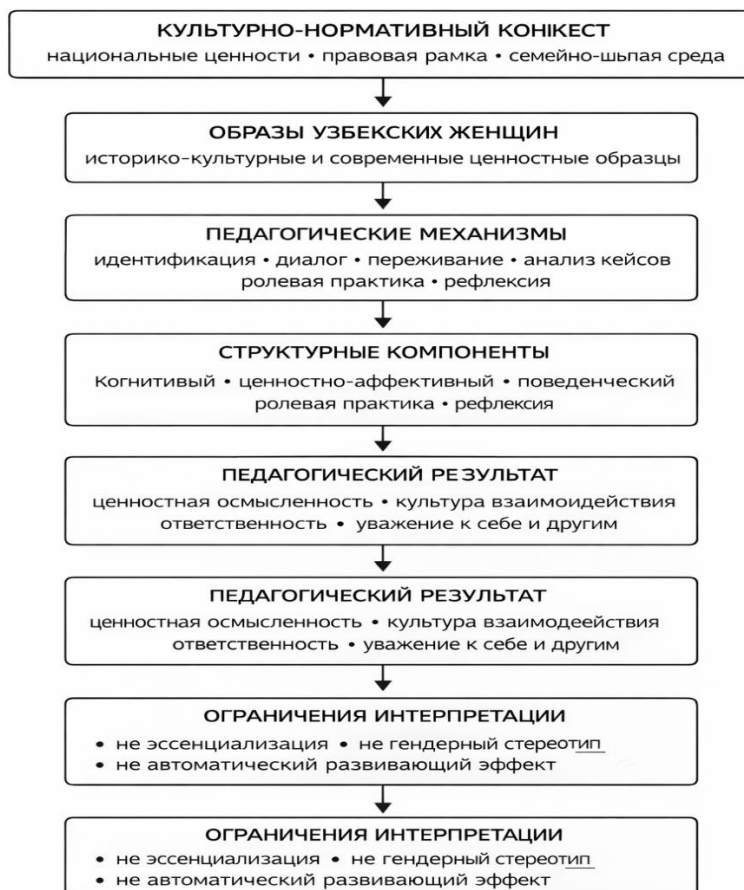
**Таблица 6. Технологические механизмы развития**

| Механизм               | Содержательная роль                                    | Предполагаемый педагогический результат         |
|------------------------|--------------------------------------------------------|-------------------------------------------------|
| Идентификация          | соотнесение себя с культурно значимым образом          | усиление личностной включённости                |
| Диалог                 | обсуждение ценностей, поступков, жизненных выборов     | развитие смысловой и коммуникативной активности |
| Переживание            | эмоциональное проживание нравственно значимых ситуаций | ценностное принятие содержания                  |
| Анализ кейсов          | разбор культурно и нравственно сложных ситуаций        | развитие когнитивной и поведенческой готовности |
| Рольевая практика      | моделирование социального и коммуникативного поведения | перенос ценностей в действие                    |
| Рефлексия и самооценка | осмысление собственного отношения и поведения          | формирование саморегуляции                      |

## 8. Диаграмма темы

### Рисунок 1. Концептуальная модель технологии развития национальных качеств у девушек-учащихся на примере образов узбекских женщин

**Рисунок 1.** Концептуальная модель технологии развития национальных качеств у девушек-учащихся на примере образов узбекских женщин



## 9. Спорные вопросы и междисциплинарные связи

**Таблица 7. Спорные вопросы и методологически корректные решения**

| Спорный вопрос                                                            | Междисциплинарная плоскость                     | Рабочее решение                                                                                           |
|---------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Являются ли национальные качества устойчивой сущностью                    | педагогика, культурология, психология личности  | нет, они рассматриваются как педагогически формируемые и личностно присваиваемые характеристики           |
| Не ведёт ли обращение к образам женщин к гендерному стереотипу            | гендерные исследования, педагогика, этика       | риск существует, поэтому образы трактуются как культурно-символические ресурсы, а не как предписание роли |
| Можно ли прямо измерить национальные качества                             | психометрика, педагогическая методология        | корректнее оценивать компоненты и проявления, а не абстрактный конструкт целиком                          |
| Достаточно ли культурной информации для формирования поведения            | когнитивная психология, педагогика деятельности | нет, необходимы эмоциональное принятие, практика и рефлексия                                              |
| Совместимы ли национальные ценности и универсальные гуманистические нормы | этика, культурология, педагогика                | продуктивна модель их сопряжения, а не противопоставления                                                 |

Междисциплинарный анализ показывает, что педагогическое использование культурных образов допустимо лишь при выполнении двух условий. Во-первых, должна быть исключена эссенциализация, то есть представление о том, что определённые качества будто бы закреплены за полом или этносом как неизменная сущность. Во-вторых, необходимо различать культурный материал как ресурс воспитания и реальное личностное присвоение ценностей, которое не гарантируется автоматически.

## 10. Практические следствия в пределах доказанного

В пределах теоретического анализа можно считать обоснованными следующие положения.

Во-первых, развитие национальных качеств у девушек-учащихся целесообразно строить не на назидательном перечислении норм, а на работе с культурно значимыми образцами, раскрываемыми через смысл, поступок и жизненный выбор.

Во-вторых, образовательная технология должна соединять когнитивное освоение культурного материала с эмоциональным переживанием, коммуникативной проработкой, поведенческой апробацией и рефлексией.

Во-третьих, использование образов узбекских женщин требует методологической осторожности. Оно педагогически продуктивно лишь тогда, когда направлено на развитие достоинства, ответственности, уважения,

трудолюбия и культуры взаимодействия, а не на воспроизводство жёстких ролевых предписаний.

В-четвёртых, семья и школьная среда должны рассматриваться как соучаствующие пространства развития. Без этого технология теряет контекстуальную устойчивость [14–17].

В-пятых, в диагностике необходимо оценивать не абстрактные «национальные качества», а конкретные компоненты — ценностную аргументацию, коммуникативную корректность, рефлексивную зрелость и поведенческую устойчивость.

### **Заключение**

Технология развития национальных качеств у девушек-учащихся на примере образов узбекских женщин может быть научно описана как многоуровневая педагогическая система, основанная на сочетании аксиологического, культурологического, личностно-деятельностного и социально-педагогического подходов. Внутренняя структура явления включает когнитивный, ценностно-аффективный, поведенческий и рефлексивный компоненты, а его формирование обеспечивается через механизмы идентификации, диалога, переживания, анализа ситуаций, ролевой практики и рефлексии.

При этом теоретический анализ не даёт оснований утверждать автоматический развивающий эффект самого по себе включения культурных образов в воспитательный процесс. Педагогический результат возможен только при условии технологически выстроенной организации работы, личностного принятия ценностей учащимися и сохранения методологической дистанции от стереотипизации. Именно в этих пределах данная модель может рассматриваться как научно состоятельная основа для дальнейшей операционализации и эмпирической проверки.

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## **КЛИНИКО-ПАТОГЕНЕТИЧЕСКИЕ ОСОБЕННОСТИ ТЕЧЕНИЯ БЕРЕМЕННОСТИ И РОДОВ У ЖЕНЩИН ПОСЛЕ ПОВТОРНОГО КЕСАРЕВА СЕЧЕНИЯ И СОВРЕМЕННЫЕ ПОДХОДЫ К ПРОФИЛАКТИКЕ ОСЛОЖНЕНИЙ**

**Аннотация:** Увеличение частоты кесарева сечения в последние десятилетия привело к росту числа женщин с рубцом на матке, что определяет особенности течения последующих беременностей и родов. В статье представлен обзор клинико-патогенетических особенностей течения беременности у женщин после повторного кесарева сечения, а также современных подходов к профилактике осложнений. Рассматриваются риски, связанные с несостоятельностью рубца, плацентарной патологией, преждевременными родами и акушерскими кровотечениями. Особое внимание уделено диагностике состояния рубца, мониторингу беременности и выбору оптимальной тактики родоразрешения.

**Ключевые слова:** кесарево сечение, рубец на матке, беременность, осложнения, плацентация, профилактика

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## **CLINICAL AND PATHOGENETIC FEATURES OF PREGNANCY AND LABOR IN WOMEN AFTER REPEAT CESAREAN SECTION AND MODERN APPROACHES TO PREVENTION OF COMPLICATIONS**

**Abstract.** The increasing rate of cesarean section worldwide has led to a growing number of women with uterine scars, which significantly affects the course of subsequent pregnancies and deliveries. This review article discusses the clinical

*and pathogenetic features of pregnancy and childbirth in women after repeated cesarean section, as well as modern approaches to the prevention of complications. Particular attention is paid to uterine scar integrity, placental abnormalities, preterm birth, and obstetric hemorrhage. Diagnostic strategies, pregnancy monitoring, and optimal delivery planning are also addressed.*

**Keywords:** cesarean section, uterine scar, pregnancy, complications, placentation, prevention

**Введение.** В последние годы наблюдается устойчивая тенденция к увеличению частоты кесарева сечения, что обусловлено как медицинскими, так и социальными факторами. Повторные кесаревы сечения становятся все более распространёнными, формируя особую группу беременных высокого риска [1]. Наличие рубца на матке определяет клинические особенности течения беременности и родов, а также повышает вероятность развития осложнений.

Клинико-патогенетические особенности.

Беременность после повторного кесарева сечения сопровождается рядом патогенетических изменений:

Несостоятельность рубца на матке — формирование истончённой зоны миометрия, что повышает риск разрыва матки;

Нарушение плацентации — повышенный риск предлежания плаценты, placenta accreta spectrum;

Изменения сократительной активности матки;

Хроническая плацентарная недостаточность [2].

Патогенез осложнений связан с нарушением процессов регенерации тканей и изменением васкуляризации в области рубца.

Особенности течения беременности. У женщин после повторного кесарева сечения чаще наблюдаются: угроза прерывания беременности; преждевременные роды; гипоксия плода; задержка роста плода; анемия беременных [3]. Клиническое течение требует более тщательного наблюдения и динамического контроля.

Наиболее значимыми осложнениями в родах являются: разрыв матки по рубцу; аномалии родовой деятельности; массивные акушерские кровотечения; травматизация соседних органов [4]. Риск осложнений возрастает с увеличением числа кесаревых сечений в анамнезе.

Диагностика и мониторинг. Основные методы оценки состояния беременной:

Ультразвуковое исследование — определение толщины и структуры рубца;

Допплерометрия — оценка маточно-плацентарного кровотока;

КТГ — мониторинг состояния плода;

МРТ — при подозрении на патологическую плацентацию [5].

Регулярный мониторинг позволяет своевременно выявить осложнения.

Современные подходы к профилактике осложнений

Профилактика включает: рациональное планирование беременности; соблюдение оптимального интервала между родами (не менее 2 лет); коррекцию анемии и соматических заболеваний; использование современных хирургических техник при первичном кесаревом сечении; индивидуальный выбор метода родоразрешения [6]. В отдельных случаях возможно проведение родов через естественные родовые пути (VBAC) при строгом отборе пациенток.

Выбор метода родоразрешения зависит от: состояния рубца; количества предыдущих операций; наличия осложнений; состояния плода. Плановое кесарево сечение выполняется в 38–39 недель при наличии показаний [7].

**Заключение.** Беременность после повторного кесарева сечения требует комплексного и индивидуализированного подхода. Своевременная диагностика, мониторинг и профилактика осложнений позволяют снизить риски для матери и плода. Современные стратегии ведения направлены на улучшение перинатальных исходов и снижение частоты осложнений.

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## **МНОГОВОДИЕ И МАЛОВОДИЕ В АКУШЕРСКОЙ ПРАКТИКЕ: СОВРЕМЕННЫЕ ПОДХОДЫ К ВЕДЕНИЮ БЕРЕМЕННОСТИ И ПРОФИЛАКТИКЕ ОСЛОЖНЕНИЙ**

**Аннотация.** Нарушения объёма амниотической жидкости, представленные многоводием и маловодием, являются значимыми маркерами фетоплацентарной дисфункции и ассоциированы с высоким риском неблагоприятных перинатальных исходов. Целью настоящего обзора является систематизация современных представлений о патогенетических механизмах, диагностических критериях и принципах ведения беременности при дисбалансе околоплодных вод. Установлено, что ключевую роль в развитии многоводия и маловодия играют нарушения фетоплацентарного обмена, а также сопутствующая соматическая и акушерская патология. Обоснована необходимость персонифицированного подхода к ведению беременных с учётом гестационного срока, степени выраженности патологического процесса и состояния плода.

**Ключевые слова:** многоводие, маловодие, амниотическая жидкость, фетоплацентарная недостаточность, перинатальные исходы, акушерская тактика.

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## **POLYHYDRAMNIOS AND OLIGOHYDRAMNIOS IN OBSTETRIC PRACTICE: MODERN APPROACHES TO PREGNANCY MANAGEMENT AND PREVENTION OF COMPLICATIONS**

**Abstract.** Abnormalities in amniotic fluid volume, including polyhydramnios and oligohydramnios, represent significant indicators of fetoplacental dysfunction

*and are associated with an increased risk of adverse perinatal outcomes. The purpose of this review is to systematize current knowledge regarding pathogenetic mechanisms, diagnostic criteria, and management strategies for pregnancies complicated by amniotic fluid imbalance. The importance of a personalized management approach based on gestational age, severity of pathology, and fetal condition is emphasized.*

**Keywords:** *polyhydramnios, oligohydramnios, amniotic fluid, fetoplacental insufficiency, perinatal outcomes, obstetric management.*

**Введение.** Амниотическая жидкость играет ключевую роль в обеспечении нормального развития плода, участвуя в обменных процессах, защите от механических воздействий и поддержании гомеостаза. Нарушения её объема, такие как многоводие и маловодие, являются значимыми маркерами акушерской патологии и требуют тщательного наблюдения [1].

Этиология и патогенез

**Многоводие** (polyhydramnios) характеризуется избыточным количеством амниотической жидкости и может быть обусловлено: сахарным диабетом у матери; внутриутробными инфекциями; пороками развития плода (особенно ЖКТ и ЦНС); резус-конфликтом; многоплодной беременностью [2]. Патогенез связан с нарушением баланса между продукцией и резорбцией амниотической жидкости.

**Маловодие** (oligohydramnios) характеризуется снижением объема амниотической жидкости и развивается при: плацентарной недостаточности; врожденных аномалиях почек плода; перенашивании беременности; преждевременном излитии околоплодных вод [3]. В основе лежит снижение продукции мочи плодом или повышенная потеря жидкости.

Основным методом диагностики является ультразвуковое исследование:

Индекс амниотической жидкости (AFI);

максимальный вертикальный карман (MVP).

Критерии: многоводие — AFI > 24 см; маловодие — AFI < 5 см [4].

Дополнительно применяются: доплерометрия; кардиотокография (КТГ); лабораторные методы при подозрении на инфекцию.

Осложнения при многоводии: преждевременные роды; слабость родовой деятельности; отслойка плаценты; кровотечения.

При маловодии: гипоксия плода; задержка роста плода; деформации плода; внутриутробная гибель [5].

Современные подходы к ведению беременности

Тактика при многоводии заключается в лечении основного заболевания; контроль уровня гликемии; амниоредукция (при тяжелых формах); медикаментозная терапия (по показаниям) [6].

Тактика при маловодии состоит из следующих госпитализация при выраженных формах; инфузионная терапия; улучшение маточно-плацентарного кровотока; динамическое наблюдение за плодом [7].



Для профилактики осложнений необходимы ранняя постановка на учет; скрининговые УЗИ; контроль хронических заболеваний матери; своевременная диагностика и своевременное лечение инфекций; мониторинг состояния плода.

Выбор метода родоразрешения зависит от степени выраженности патологии и состояния плода: при стабильном состоянии — пролонгирование беременности; при ухудшении — досрочное родоразрешение; кесарево сечение — при наличии показаний [8].

**Заключение.** Многоводие и маловодие являются важными маркерами осложненного течения беременности. Современные методы диагностики и мониторинга позволяют своевременно выявить данные состояния и минимизировать риски. Индивидуализированный подход к ведению беременности является ключевым фактором улучшения перинатальных исходов.

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## **КЛИНИКО-ПРОГНОСТИЧЕСКИЕ АСПЕКТЫ РАЗВИТИЯ ЭНДОМЕТРИОЗА ПОСЛЕ МЕДИЦИНСКОГО АБОРТА И СОВРЕМЕННЫЕ ПОДХОДЫ К ОЦЕНКЕ РИСКА**

***Аннотация.** Эндометриоз является хроническим эстрогензависимым заболеванием, характеризующимся наличием эндометриоподобной ткани за пределами полости матки. В последние годы особое внимание уделяется изучению факторов, способствующих развитию эндометриоза после медицинского аборта. В статье представлен обзор клинико-прогностических аспектов формирования заболевания, а также современных подходов к оценке риска. Рассматриваются патогенетические механизмы, включая ретроградную менструацию, воспалительные реакции и иммунные нарушения. Особое внимание уделено диагностике, факторам риска и возможностям ранней профилактики.*

***Ключевые слова:** эндометриоз, медицинский аборт, факторы риска, прогнозирование, воспаление, иммунные нарушения*

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## **CLINICAL AND PROGNOSTIC ASPECTS OF ENDOMETRIOSIS DEVELOPMENT AFTER MEDICAL ABORTION AND MODERN APPROACHES TO RISK ASSESSMENT**

***Abstract.** Endometriosis is a chronic estrogen-dependent disease characterized by the presence of endometrial-like tissue outside the uterine cavity. In recent years, increasing attention has been paid to the factors contributing to the development of endometriosis following medical abortion. This review discusses*

*clinical and prognostic aspects of disease development, as well as modern approaches to risk assessment. Pathogenetic mechanisms including retrograde menstruation, inflammation, and immune dysfunction are analyzed. Special emphasis is placed on diagnostics, risk factors, and early prevention strategies.*

**Keywords:** *endometriosis, medical abortion, risk factors, prognosis, inflammation, immune dysfunction*

**Введение.** Эндометриоз является одной из наиболее распространённых гинекологических патологий у женщин репродуктивного возраста, встречаясь у 10–15% пациенток [1]. Заболевание характеризуется хроническим течением, болевым синдромом и нарушением репродуктивной функции. В последние годы обсуждается роль медицинского аборта как одного из возможных триггерных факторов развития эндометриоза [2].

Патогенетические механизмы развития эндометриоза. Классическая теория ретроградной менструации предполагает попадание клеток эндометрия в брюшную полость через маточные трубы с последующей имплантацией [3]. После медицинского аборта возможны изменения сократительной активности матки и нарушение эвакуации эндометрия, что способствует усилению ретроградного заброса клеток.

Дополнительные механизмы включают:

воспалительные процессы — повышение уровня цитокинов (IL-6, TNF- $\alpha$ );

иммунные нарушения — снижение активности NK-клеток;

ангиогенез — активное формирование сосудов в очагах эндометриоза [4].

Клиническая картина эндометриоза после медицинского аборта может включать: хроническую тазовую боль; дисменорею; диспареунию; нарушения менструального цикла; бесплодие.

Диагностика основана на: ультразвуковом исследовании; МРТ органов малого таза; лапароскопии (золотой стандарт) [5].

Факторы риска развития эндометриоза после медицинского аборта: повторные аборты; гормональные нарушения; раннее менархе; короткий менструальный цикл; хронические воспалительные заболевания; генетическая предрасположенность [6]. Медицинский аборт может выступать триггером при наличии предрасполагающих факторов.

Оценка риска развития эндометриоза включает комплексный подход:

Клинические шкалы и модели

Используются для стратификации пациенток по степени риска на основе анамнеза и симптомов.

Биомаркеры

Перспективными считаются:

СА-125;

цитокины (IL-6, IL-8);

микроРНК [7].

## Инструментальные методы

Ранняя диагностика возможна с применением УЗИ с высоким разрешением и МРТ.

## Профилактика и раннее выявление

Ключевые направления профилактики: рациональное планирование беременности; снижение числа абортов; своевременное лечение воспалительных заболеваний; гормональная коррекция после аборта.

Заключение. Эндометриоз после медицинского аборта является многофакторным заболеванием, развитие которого зависит от сочетания гормональных, иммунных и воспалительных механизмов. Ранняя оценка риска и применение современных диагностических методов позволяют своевременно выявить заболевание и улучшить прогноз. Индивидуализированный подход к ведению пациенток является основой эффективной профилактики и лечения.

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## ПРИМЕНЕНИЕ СИНХРОННЫХ ГЕНЕРАТОРОВ В МИКРО- ГИДРОЭЛЕКТРОСТАНЦИЯХ

***Аннотация.** В данной статье рассматриваются особенности применения синхронных генераторов в микро-гидроэлектростанциях (микро-ГЭС). Проведен анализ их преимуществ и недостатков по сравнению с асинхронными генераторами. Исследованы режимы работы, вопросы возбуждения, устойчивости напряжения и частоты, а также влияние гидравлических параметров на работу генератора. Представлены математические модели и рекомендации по повышению эффективности работы микро-ГЭС.*

***Ключевые слова:** микро-ГЭС, синхронный генератор, возбуждение, напряжение, частота, гидротурбина, автономная система, реактивная мощность*

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## APPLICATION OF SYNCHRONOUS GENERATORS IN MICRO- HYDROPOWER PLANTS

***Abstract.** This article examines the features of using synchronous generators in micro-hydropower plants (micro-HPPs). An analysis of their advantages and disadvantages compared to asynchronous generators is carried out. The operating modes, excitation systems, voltage and frequency stability, as well as the influence of hydraulic parameters on generator performance are investigated. Mathematical models and recommendations for improving the efficiency of micro-hydropower plants are presented.*

***Keywords:** micro-HPP, synchronous generator, excitation, voltage, frequency, hydroturbine, autonomous system, reactive power*

### **Введение**

В условиях растущего энергопотребления и необходимости обеспечения устойчивого электроснабжения удаленных районов особую актуальность приобретает использование возобновляемых источников энергии. Одним из перспективных направлений является развитие микро-

гидроэлектростанций (микро-ГЭС), которые позволяют эффективно использовать энергетический потенциал малых водотоков. Ключевым элементом любой микро-ГЭС является электрический генератор. В настоящее время широко применяются как асинхронные, так и синхронные генераторы. Однако использование синхронных генераторов обладает рядом особенностей, которые требуют детального анализа. Целью данной работы является исследование особенностей применения синхронных генераторов в микро-ГЭС, анализ их преимуществ и разработка рекомендаций по повышению эффективности их работы.

### **Методы исследования**

В работе использованы следующие методы исследования:

- теоретический анализ электромеханических процессов;
- математическое моделирование режимов работы генератора;
- сравнительный анализ синхронных и асинхронных генераторов;
- анализ устойчивости энергетических систем.

Основой исследования являются классические уравнения электромеханики и теории электрических машин.

Мощность, вырабатываемая микро-ГЭС, определяется выражением:

$$P = \rho g Q H \eta$$

где:

- $\rho$  — плотность воды,
- $g$  — ускорение свободного падения,
- $Q$  — расход воды,
- $H$  — напор,
- $\eta$  — коэффициент полезного действия.

Для синхронного генератора важным параметром является частота вращения, связанная с частотой сети:

$$n = \frac{60f}{p}$$

где:

- $f$  — частота,
- $p$  — число пар полюсов.

Результаты исследования

### **1. Особенности синхронных генераторов**

Синхронный генератор представляет собой электрическую машину, в которой скорость вращения ротора строго соответствует частоте генерируемого напряжения. Это позволяет обеспечить высокое качество электроэнергии.

Основные преимущества синхронных генераторов:

- независимость напряжения от нагрузки;
- возможность регулирования реактивной мощности;
- высокая стабильность частоты;
- высокий КПД.

Недостатки:



- сложность системы возбуждения;
- более высокая стоимость;
  - необходимость точного регулирования.

## **2. Система возбуждения**

Одной из ключевых особенностей синхронного генератора является необходимость наличия системы возбуждения.

В микро-ГЭС применяются следующие типы возбуждения:

- независимое возбуждение;
- самовозбуждение;
- бесщеточные системы.

Напряжение генератора определяется выражением:

$$E = 4.44 f w \Phi$$

где:

w — число витков,

$\Phi$  — магнитный поток.

Регулирование возбуждения позволяет стабилизировать напряжение при изменении нагрузки.

## **3. Устойчивость работы**

Стабильность работы синхронного генератора определяется углом нагрузки:

$$P = \frac{EU}{X} \sin$$

где:

$\delta$  — угол нагрузки.

При превышении критического значения происходит потеря синхронизма.

В микро-ГЭС это особенно важно из-за:

- переменного расхода воды;
- нестабильной нагрузки.

## **4. Влияние гидравлических параметров**

Работа генератора напрямую зависит от параметров потока воды:

изменение расхода Q;

изменение напора H.

Это приводит к:

- изменению скорости вращения;
- отклонению частоты;
- колебаниям напряжения.

## 5. Сравнение с асинхронными генераторами

| Параметр                 | Синхронный  | Асинхронный           |
|--------------------------|-------------|-----------------------|
| Регулирование напряжения | Есть        | Ограничено            |
| Реактивная мощность      | Управляется | Требуется компенсации |
| Сложность                | Высокая     | Низкая                |
| Стоимость                | Выше        | Ниже                  |

Синхронные генераторы более предпочтительны в системах, где требуется высокая стабильность.

## 6. Применение в автономных системах

В автономных микро-ГЭС синхронные генераторы обеспечивают:

- стабильное напряжение;
- независимость от сети;
- возможность работы в изолированном режиме.

Однако требуется:

- система автоматического регулирования;
- контроль частоты.

## 7. Повышение эффективности

Для повышения эффективности предлагаются:

- использование автоматических регуляторов возбуждения (AVR);
- внедрение цифровых систем управления;
- применение адаптивных алгоритмов.

## Заключение

В результате проведенного исследования установлено, что синхронные генераторы являются эффективным решением для микро-гидроэлектростанций, особенно в автономных энергетических системах.

Основные выводы:

- обеспечивают высокое качество электроэнергии;
- позволяют регулировать напряжение и реактивную мощность;
- требуют более сложной системы управления.

Перспективным направлением является разработка интеллектуальных систем управления, обеспечивающих устойчивую работу микро-ГЭС в условиях изменяющихся гидрологических параметров.

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## **ФОРМЫ ПРОЯВЛЕНИЯ ТВОРЧЕСКОЙ ДЕЯТЕЛЬНОСТИ ПРЕПОДАВАТЕЛЯ ТЕХНИЧЕСКОГО ВУЗА**

**Аннотация:** В статье рассматриваются основные формы проявления творческой деятельности преподавателя технического вуза в условиях модернизации высшего образования. Анализируются педагогические, методические и научно-исследовательские аспекты творчества преподавателя, а также их влияние на формирование профессиональных и личностных компетенций студентов. Выделяются ключевые направления развития творческого потенциала преподавателя и предлагаются практические подходы к их реализации.

**Ключевые слова:** творческая деятельность, преподаватель, технический вуз, инновации, педагогическое творчество, образовательный процесс.

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## **FORMS OF CREATIVE ENGAGEMENT OF A TECHNICAL UNIVERSITY LECTURER**

**Abstract:** The article examines the main forms of creative activity of a teacher in a technical university in the context of higher education modernization. Pedagogical, methodological and research aspects of teacher creativity are analyzed, as well as their impact on the development of students' professional and personal competencies. Key directions for the development of a teacher's creative potential are identified and practical approaches to their implementation are proposed.

**Keywords:** creative activity, teacher, technical university, innovation, pedagogical creativity, educational process.

Современная система высшего технического образования предъявляет повышенные требования к личности преподавателя. В условиях цифровизации, глобализации

и постоянного обновления знаний особую значимость приобретает творческая деятельность преподавателя, выступающая важнейшим фактором повышения качества образования [4]. Она обеспечивает не только трансляцию знаний, но и формирование у студентов навыков критического мышления, самостоятельного анализа и способности

к инновационному подходу при решении профессиональных задач [2].

Творческая деятельность преподавателя технического вуза выходит за рамки традиционного преподавания и включает в себя разработку новых образовательных технологий, адаптацию содержания дисциплин к требованиям рынка труда, а также формирование у студентов навыков нестандартного мышления [3]. Особую роль играет умение преподавателя сочетать педагогические, методические и исследовательские подходы, интегрируя научные достижения в учебный процесс [2].

### **Теоретические основы творческой деятельности преподавателя**

Творческая деятельность преподавателя рассматривается как интегративное качество личности, включающее когнитивные, мотивационные и деятельностные компоненты [1]. Она проявляется в способности к генерации новых идей, поиску эффективных педагогических решений и постоянному профессиональному самосовершенствованию [4].

В педагогической науке выделяются следующие ключевые характеристики творческой деятельности преподавателя:

*новизна педагогических решений* — способность создавать оригинальные подходы к обучению [2];

*гибкость мышления* — умение адаптироваться к изменениям и применять междисциплинарные знания [3];

*способность к рефлексии* — систематический анализ собственной деятельности и её эффективности [1];

*ориентация на развитие личности студента* — формирование у студентов навыков критического и творческого мышления, инициативности и самостоятельности [2].

Таким образом, творческая деятельность преподавателя технического вуза выступает не только как личностное качество, но и как стратегический ресурс, напрямую влияющий на эффективность образовательного процесса. Она формирует у студентов способность к нестандартному мышлению, мотивирует к самостоятельному освоению знаний и стимулирует профессиональное развитие как преподавателя, так и обучающихся.

Для более глубокого понимания структуры и проявлений творческой активности преподавателя необходимо рассмотреть конкретные формы его деятельности. Именно систематизация этих форм позволяет выявить, каким образом творческий потенциал педагога реализуется в практике преподавания, методической работе, научно-исследовательской активности и

инновационных подходах к обучению. Следующий раздел статьи посвящён основным формам проявления творческой деятельности преподавателя технического вуза, где подробно анализируются педагогическое, методическое, научно-исследовательское, инновационное и коммуникативное творчество, а также их влияние на модернизацию образовательного процесса и формирование профессиональных компетенций студентов.

**Основные формы проявления творческой деятельности.** Развитие творческой активности преподавателя является ключевым аспектом повышения качества образовательного процесса в технических вузах. В контексте статьи «Формы проявления творческой деятельности преподавателя технического вуза» особое внимание уделяется систематизации и анализу различных видов творческой активности, которые реализуются в педагогической, методической, научно-исследовательской и инновационной сферах.

Представленные далее разделы подробно раскрывают основные формы проявления творческой деятельности преподавателя, демонстрируя, как каждая из них влияет на формирование профессиональных компетенций студентов и развитие образовательного процесса в целом. Плавный переход от педагогической практики к *методической, научной и инновационной* деятельности позволяет показать целостную картину творческого потенциала преподавателя и его роль в модернизации технического образования.

**Педагогическое творчество.** Педагогическое творчество представляет собой фундаментальную форму профессиональной активности преподавателя, направленную на создание и внедрение новых подходов к обучению [4]. Оно проявляется в разработке инновационных методик, использовании интерактивных технологий, кейс-методов, проектного обучения, игровых форм и цифровых инструментов, способствующих активизации учебного процесса. Преподаватель, обладающий педагогическим творчеством, умеет адаптировать сложный технический материал в доступную и увлекательную форму, что способствует повышению мотивации студентов, формированию у них критического мышления и навыков самостоятельного решения практических задач [2]. Кроме того, педагогическое творчество включает в себя организацию лабораторных работ, проведение семинаров в формате дискуссий и круглых столов, а также использование виртуальных лабораторий и симуляторов, что позволяет моделировать реальные производственные ситуации и развивать профессиональные компетенции студентов [3].

Педагогическое творчество также подразумевает постоянную рефлексию преподавателя над результатами своей деятельности, корректировку методов обучения и внедрение элементов индивидуализации и дифференциации в образовательный процесс, что повышает эффективность



усвоения знаний и способствует формированию творческой личности студента.

При этом эффективность педагогического творчества во многом определяется технологичностью образовательного процесса, предполагающей его проектирование, управляемость и воспроизводимость результатов обучения [6].

Методическое творчество. Методическое творчество связано с разработкой авторских программ, учебно-методических комплексов, электронных курсов и образовательных платформ, что позволяет преподавателю выступать в роли конструктора образовательного процесса. Данная форма творчества требует системного подхода, инновационного мышления и способности к интеграции междисциплинарных знаний [3].

К формам методического творчества относятся:

- создание цифровых образовательных ресурсов [4];
- разработка междисциплинарных курсов [3];
- внедрение компетентного подхода [1].

**Таблица 1. Формы методического творчества преподавателя**

| Форма                                      | Пример реализации                                                                                                                                                                                                          | Влияние на студентов                              |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Создание цифровых образовательных ресурсов | Разработка электронных учебников, интерактивных презентаций, онлайн-тестов и мультимедийных курсов, которые обеспечивают доступность и интерактивность обучения                                                            | Повышение интерактивности и доступности знаний    |
| Разработка междисциплинарных курсов        | Создание учебных программ, объединяющих несколько дисциплин, что способствует формированию у студентов целостного представления о профессиональной сфере и развитию системного мышления. Курсы, объединяющие механику и ИИ | Формирование широкого профессионального кругозора |
| Внедрение компетентного подхода            | Проектирование учебных заданий и практических кейсов, направленных на развитие ключевых профессиональных и личностных компетенций, включая критическое мышление, способность к инновациям и командную работу               | Развитие навыков критического мышления            |

Данные направления соответствуют современной дидактической парадигме, ориентированной на проектирование образовательной среды и развитие субъектной позиции обучающегося [7]. Методическое творчество также включает анализ и систематизацию педагогического опыта, обмен методическими наработками с коллегами, участие в разработке стандартов и рекомендаций для образовательных программ, что обеспечивает повышение качества

учебного процесса и соответствие его современным требованиям рынка труда.

Научно-исследовательская деятельность. Следующим логическим шагом

в раскрытии творческого потенциала преподавателя является научно-исследовательская деятельность. Участие в научных проектах, публикационная активность и внедрение результатов исследований в учебный процесс способствуют повышению качества подготовки специалистов [2]. Научно-исследовательская деятельность включает проведение фундаментальных и прикладных исследований, публикацию научных статей в профессиональных журналах, участие в конференциях, грантовых проектах и совместных исследованиях с промышленными предприятиями. Такая активность способствует формированию у студентов навыков исследовательской работы, умения анализировать данные, делать выводы и применять теоретические знания на практике.

#### **Научно-исследовательская активность преподавателей в Узбекистане (2024–2026 гг.)**

Для наглядной демонстрации вовлечённости преподавателей технических вузов Узбекистана в научно-исследовательскую деятельность в период 2024–2026 гг. использованы данные мониторинга публикационной активности и участия в научных проектах, представленные университетами и государственными источниками.

#### **График 1. Участие преподавателей в научных проектах Узбекистана (2024–2026 гг., % от общего числа)**

| Год       | 2024 | 2025 | 2026 |
|-----------|------|------|------|
| % участия | 62%  | 68%  | 73%  |

*Примечание:* Данные представлены на основе открытых источников: рост числа публикаций и участия преподавателей в научно-исследовательских проектах, включая Scopus и Web of Science. (Nature Index 2024–2025, TSUOS 2024–2025) [5].

Такая динамика иллюстрирует успешную интеграцию научной и педагогической деятельности и служит основанием для развития инновационных подходов в образовательном процессе, включая внедрение современных методов обучения и проектной работы студентов.

Инновационная деятельность. Логически следуя из научно-исследовательской практики, инновационная деятельность преподавателя направлена на практическое внедрение идей и технологий в образовательный процесс. Она демонстрирует, как научные достижения могут

трансформироваться в новые методики обучения, создавая современную образовательную среду.

Инновационная деятельность включает разработку и адаптацию методических решений, использование цифровых лабораторий, искусственного интеллекта и онлайн-платформ. Это позволяет формировать у студентов навыки работы с новыми технологиями, критического анализа и инновационного мышления, а также способствует оптимизации и повышению эффективности учебного процесса.

Коммуникативное творчество. Завершая анализ основных форм творческой деятельности преподавателя, особое место занимает коммуникативное творчество. Оно органично связывает все предыдущие уровни активности и обеспечивает эффективность взаимодействия преподавателя со студентами, коллегами и профессиональным сообществом.

Коммуникативное творчество проявляется в проведении мастер-классов, семинаров, дискуссий и развитии сетевых образовательных сообществ. Преподаватель, выступающий как фасилитатор образовательного процесса, создает условия для активного обмена знаниями, коллективного решения задач и генерации новых идей [2]. Такая форма творчества обеспечивает целостность образовательного процесса, способствует мотивации студентов и развитию профессиональной компетентности преподавателя.

Рассмотрение основных форм проявления творческой деятельности преподавателя позволяет выявить, каким образом его профессиональные навыки и личностные качества реализуются на практике. Однако эффективность реализации этих форм во многом зависит от внешних и институциональных условий, создаваемых в образовательной среде. Именно наличие поддерживающей среды, систем повышения квалификации, стимулирующих программ и академической свободы обеспечивает преподавателю возможность полностью раскрывать свой творческий потенциал [3]. Следующий раздел посвящён условиям развития творческой деятельности преподавателя, которые формируют базу для реализации педагогического, методического, научного и инновационного творчества и являются ключевыми для повышения качества образовательного процесса и формирования конкурентоспособных специалистов.

#### **Условия развития творческой деятельности преподавателя**

Развитие творческого потенциала преподавателя технического вуза напрямую зависит от условий, создаваемых образовательной организацией и системой профессионального сопровождения. Анализ педагогической практики и научных исследований показывает, что раскрытие творческого потенциала невозможно без сочетания индивидуальных и институциональных факторов.

К ключевым условиям, способствующим развитию творческой активности преподавателя, относятся:

**наличие академической свободы**, позволяющей экспериментировать с методами преподавания и подходами к образовательному процессу;

**поддержка инноваций со стороны вуза**, включая внедрение современных технологий, проектных форм обучения и цифровых образовательных платформ;

**система повышения квалификации**, предоставляющая возможности для освоения новых педагогических и научных методов;

**стимулирование научной активности**, включая грантовую поддержку, участие в конференциях и публикации в международных журналах;

**благоприятная профессиональная среда**, где коллегиальное взаимодействие

и обмен опытом создают условия для реализации творческих инициатив.

Соблюдение этих условий формирует основу для продуктивной творческой деятельности преподавателя, обеспечивая гармоничное сочетание педагогических, методических и научных компонентов, что позволяет реализовать потенциал преподавателя в полной мере и интегрировать его достижения в образовательный процесс.

После подробного анализа основных форм проявления творческой деятельности преподавателя технического вуза становится очевидным, что эти формы взаимосвязаны и дополняют друг друга. Педагогическое и методическое творчество создают основу для эффективного обучения и развития студентов, научно-исследовательская деятельность обеспечивает углубление профессиональных компетенций, а инновационная и коммуникативная активность позволяет интегрировать новые технологии и подходы в образовательный процесс.

Важным условием также является переход от традиционной модели обучения к дидактическим системам нового типа, ориентированным на индивидуальные образовательные траектории студентов [7].

Таким образом, системное развитие всех направлений творческой деятельности преподавателя не только повышает качество образовательного процесса, но и формирует у студентов способность к самостоятельному, критическому и творческому мышлению.

На основе этих выводов логично подвести итог и обозначить перспективы дальнейших исследований в данной области.

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## **ОСОБЕННОСТИ ЛЕСНОГО КОМПЛЕКСА КАК ОБЪЕКТА ПРАВОВОГО РЕГУЛИРОВАНИЯ**

***Аннотация:** в условиях истощения возможностей экстенсивного роста лесного сектора экономики особую научную и практическую значимость приобретает исследование лесного комплекса как специфического объекта правового регулирования. Настоящая статья посвящена анализу правовой природы лесного комплекса, его элементов, особенностей правового режима лесов, а также проблем, связанных с отсутствием четкой основы лесного законодательства Российской Федерации.*

***Ключевые слова:** лесной комплекс, лесное хозяйство, лесная промышленность, лесное законодательство.*

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## **FEATURES OF THE FOREST COMPLEX AS AN OBJECT OF LEGAL REGULATION**

***Abstract:** As the possibilities for extensive growth in the forest sector are becoming exhausted, the study of the forest complex as a specific object of legal regulation acquires particular scientific and practical significance. This article analyzes the legal nature of the forest complex, its structural elements, the features of the legal regime of forests, as well as problems associated with the lack of a clear conceptual framework for forest legislation of the Russian Federation.*

***Keywords:** forest complex, forestry, forest industry, forest legislation.*

Лесной комплекс занимает особое место в системе природопользования Российской Федерации, что обусловлено как масштабами лесного покрова страны, так и многофункциональной ролью лесов в обеспечении экологической устойчивости, социального благополучия и экономического развития. Россия традиционно является крупнейшей лесной державой мира, располагая значительной долей мировых запасов древесины и уникальными лесными экосистемами.



Вместе с тем, как отмечает Ю.И. Шуплецова, «в условиях истощения возможностей экономического роста России, основанного на экстенсивной эксплуатации сырьевых ресурсов, на фоне формирования цифровой экономики и появления ограниченной группы стран-лидеров, обладающих новыми производственными технологиями и ориентированных на использование возобновляемых ресурсов, актуально проведение правовых исследований целевого и эффективного использования таких природных богатств России, как леса» [4].

Законодательное закрепление понятия «лесной комплекс» было осуществлено введением в Лесной кодекс Российской Федерации статьи 12.1. В соответствии с ч. 1 указанной статьи, лесной комплекс представляет собой совокупность видов экономической и иной деятельности, относящихся к лесному хозяйству и лесной промышленности [2].

При этом законодатель разграничивает два компонента лесного комплекса. Лесное хозяйство определяется как виды экономической и иной деятельности по использованию и сохранению лесов, а также по лесоустройству и управлению в области лесных отношений [2].

Лесная промышленность, в свою очередь, представляет собой совокупность отраслей промышленности, связанных с заготовкой, вывозом из леса и хранением древесины, первичной и последующей обработкой древесины, производством продукции переработки древесины на объектах лесоперерабатывающей инфраструктуры [2].

Специфика лесного комплекса как объекта правового регулирования определяется прежде всего особой природой леса как такового. Леса являются одним из важных элементов окружающей среды, разновидностью природных ресурсов, при этом, как отмечают Р.А. Иксанов, И.А. Владимиров, «их правовой статус качественно отличается от правового статуса объектов, созданных человеком, и характеризуется особым правовым режимом вне зависимости от того, выступают ли они в качестве объекта права собственности, использования или охраны» [1].

Лес выступает одновременно и как экологическая система, и как природный ресурс, что порождает двойственность правового регулирования. В действующем лесном законодательстве не определено, какие именно насаждения являются лесом и какие правовые последствия влечёт отнесение тех или иных территорий к лесам, что существенно затрудняет правоприменение и позволяет развиваться теневому лесному бизнесу.

М.Т. Лукьянова, З.А. Залилов, отмечают, что законодательство в области лесного хозяйства направлено на «обеспечение управления лесным хозяйством, защите и воспроизводству лесных экосистем, повышения экологического потенциала и ресурсов лесов, а также удовлетворение потребностей общества в лесных ресурсах на основе научного и разностороннего управления лесами» [3].

В Российской Федерации в настоящее время сформирована система нормативного регулирования деятельности лесного комплекса, включающая

конституционные нормы, Лесной кодекс Российской Федерации, иные федеральные законы, подзаконные акты федерального уровня, а также законодательство субъектов Российской Федерации. Лесной кодекс Российской Федерации является основным нормативно-правовым документом в области функционирования лесного комплекса и отражает ключевые принципы лесопользования, такие как сохранение полезных функций лесов, обеспечение рационального и неистощительного лесопользования, охрана и защита лесного массива.

Между тем, как указывает Ю.И. Шуплецов, несмотря на разветвлённую нормативную базу, «основная проблема современного лесного законодательства России – отсутствие чёткой и ясной концепции правового регулирования лесных отношений, следствием чего является бессистемность вносимых изменений и, соответственно, возникновение правовых рисков утраты лесами выполняемой ими экологической функции» [4].

Важным аспектом правового регулирования лесного комплекса является вопрос о соотношении лесного и земельного законодательства при определении приоритетов использования территорий, на которых расположены леса. В советской юридической науке существовали диаметрально противоположные позиции по данному вопросу. Согласно одной из них «правовой режим земель, покрытых лесами, должен ставиться в зависимость от правового режима лесов, расположенных на них» [4], тогда как сторонники иной точки зрения полагали, что использование и охрана лесов находятся в прямой зависимости от состояния земель, на которых они расположены. В современных условиях данная дискуссия не утратила актуальности. С учётом тенденций развития лесного законодательства приоритет отраслей при регулировании отношений, связанных с использованием лесов, будет определяться приоритетом сохранения лесов над иными видами использования земельных участков.

Важной является и проблема охраны лесов как элемента правового регулирования лесного комплекса. Правовой механизм охраны лесов представляет собой, как отмечают Р.А. Иксанов, И.А. Владимиров, «сложное и неоднородное правовое явление» [1], проявляющееся в различных правовых формах, сочетающих элементы экономического и административного регулирования. К числу субъектов правовой охраны лесов относятся граждане, юридические лица, а также органы публичной власти, включая правоохранительные органы.

Развитие правового регулирования лесного комплекса осуществляется в рамках программно-стратегического подхода. На региональном уровне принимаются также стратегические документы. В частности, в Республике Башкортостан реализуется Стратегия развития лесного комплекса республики до 2030 года, предусматривающая три возможных сценария развития – интенсивный промышленный, экологически ориентированный и компромиссный.

Таким образом, лесной комплекс представляет собой сложный объект правового регулирования, объединяющий природоохранную, производственную и управленческую составляющие, что обуславливает межотраслевой характер его правового регулирования.

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**БЛИЗОСТЬ К КЛИЕНТАМ И СОЗДАНИЕ ЦЕННОСТИ:  
ОПЫТ КРУПНОЙ КИТАЙСКОЙ КОМПАНИИ**

**Аннотация.** «Ценностный» подход к управлению предпринимательской деятельностью в реальной практике производителей имеет множество интерпретаций. Компании реального сектора экономики нередко пытаются реализовать концепции «цепочки создания ценности», «бережливого производства», «управления, базирующегося на ценности» – каждую из них по отдельности, или интегрированно. Одна из проблем практического применения этих концепций связана с дистанцией, объективно существующей между компанией, ее подразделениями, и ведущими внешними стейкхолдерами – потребителями. Наличие значительной дистанции затрудняет обратную связь, создает барьеры в коммуникациях, взаимодействии, вызывает временной разрыв между проактивным и реактивным действием сторон. Особенно важно это в процессе разработки новых продуктов и услуг, осуществлении инновационной деятельности. Эмпирические исследования в этом направлении позволяют изучить лучшие корпоративные практики, нацеленные на обеспечение результативного контакта с потребителями. В статье предпринята попытка изучения и обобщения опыта крупной китайской компании Haier, сформировавшей особую организационную структуру, ориентированную на стимулирование предпринимательской инициативы, развитие инноваций, активное взаимодействие с потребителями.

**Ключевые слова:** ценность, цепочки, клиенты, лучшие практики, организационная структура, Haier

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**CUSTOMER PROXIMITY AND VALUE CREATION:  
EXPERIENCE OF A LARGE CHINESE COMPANY**

**Abstract.** *The "value" approach to managing entrepreneurial activity in the real practice of manufacturers has many interpretations. Companies in the real sector of the economy often try to implement the concepts of "value chain", "lean manufacturing", "value-based management" - each of them separately or integrated. One of the problems of practical application of these concepts is associated with the distance that objectively exists between the company, its divisions, and the leading external stakeholders - consumers. The presence of a significant distance complicates feedback, creates barriers in communication and interaction, causes a time gap between the proactive and reactive actions of the parties. This is especially important in the process of developing new products and services, implementing innovative activities. Empirical studies allow us to study the best corporate practices aimed at ensuring effective contact with consumers. The article attempts to study and generalize the experience of a large Chinese company Haier, which has formed a special organizational structure focused on stimulating entrepreneurial initiative, developing innovations, and active interaction with consumers.*

**Keywords:** *value, chains, customers, best practices, organizational structure, Haier.*

Во второй половине XX-го века, и в настоящее время, широкое распространение в менеджменте получил «ценностный» подход к управлению коммерческой деятельностью. В своей основе он имеет две концепции: цепочку создания ценности и управление, базирующееся на ценности бизнеса.

Цепочка создания ценности (англ. Value Chain) – это концепция, предложенная Майклом Портером, описывающая комплекс взаимосвязанных действий – от разработки, создания продукта, до его реализации и обслуживания [9]. Эта концепция позволяет компаниям осуществлять декомпозицию процессов, оптимизировать их, разграничивать этапы создания ценности для потребителей, изучая соответствующие затраты и прирост стоимости (поэтапно).

С другой стороны, управление, базирующееся на ценности (англ. Value-Based Management – VBM) это стратегический подход, направленный на максимизацию долгосрочной ценности бизнеса, в том числе – путем управления клиентской базой. VBM предполагает принятие решений на основе анализа динамики стоимости компании, а не только показателей рентабельности [2].

Новая ценность для потребителя – результат усилий множества заинтересованных лиц, внутренних и внешних по отношению к компании-производителю. Так, А.В. Апатова утверждает: «Парадигма совместного создания ценности на бизнес-рынках в настоящее время прочно утвердилась в маркетинговой литературе». Она исследовала «..базовые возможности, необходимые для реализации ценности в B2B-системах, акцентируя устойчивую целенаправленную вовлеченность, которая лежит в основе

способности организаций совместно создавать. А.В. Апатова констатирует: «Достижение совместного создания ценности требует нахождения структурного соответствия между деятельностью клиента и деятельностью продавца» [1].

Е.Н. Старков утверждает, что «..организации внедряют новое поколение маркетинговых систем, которые обеспечивают беспрецедентный уровень близости к клиентам, целевого взаимодействия, точного воздействия. Применяя новые подходы к сбору данных, принятию решений и доставке, компании создают индивидуальные, контекстуализированные и динамические комплексные решения для конкретных клиентов» [6].

А.А. Ахметгареева предложила рассматривать структуру фирмы как «главный организационный детерминант, который оказывает значительное влияние на соответствие между организацией и административными инновациями..». Следовательно, утверждает автор, необходимо исследовать «влияние организационной структуры на сложность VBM» [2].

Ю.В. Лыщикова, ссылаясь на работы Джеда Эмерсона, исследовала концепцию «комбинированной (смешанной) стоимости в системе целей, источников финансирования и подходов к управлению ценностью различных типов организаций». Эта концепция, по мнению автора статьи, представляет собой «..комплексный интегрированный подход, который позволяет сбалансировать коммерческую и некоммерческую деятельность компании, компенсировать возможные отрицательные внешние эффекты, обеспечивает устойчивое сочетание создания стоимости в финансовом, экологическом и социальном измерениях. Ю.В. Лыщикова также выявила типичные барьеры, препятствия в распространении концепции комбинированной стоимости [5].

А.П. Тяпухин детально исследовал содержание интегрированной концепции управления цепями ценностей, предложил авторскую классификацию вариантов управления цепями при создании ценностей для конечных потребителей. Автор особо выделил «цепи формализации, потребления и обобщения ценности». А.П. Тяпухин попытался выявить «..эффект, получаемый за счет рационального распределения функций, полномочий, ответственности между исполнителями, а также за счет устранения межфункциональных барьеров» [7].

Э.Д. Гиамфи, Д.П. Овусу обобщили результаты исследования ряда российских и зарубежных авторов, и утверждают, что «потребительская ценность представляет собой набор воспринимаемых и ожидаемых потребителем свойств товара, а также получаемых нематериальных выгод от взаимоотношений с производителем/поставщиком/продавцом». Авторы обратили особое внимание на проблему поиска «управленческих механизмов, обеспечивающих эффективность предпринимательской деятельности средних и крупных высокотехнологичных компаний» в рамках «ценностного» подхода к управлению [3].

Эмпирические исследования в этом направлении необходимо проводить в том числе методом кейс-стади, изучая передовые практики



управления цепочками ценности на корпоративном уровне. Одна из современных крупных китайских компаний реального сектора – Haier – пытается создать свою, во многом уникальную систему взаимодействия подразделений и потребителей, обеспечивающую предпринимательскую инициативу и близость к потребителю.

Еще в 2005 году топ-менеджмент Haier осознал, что прогнозирование и планирование объемов производства, продаж по видам продукции – особенно новым – зачастую оказывается неточным, приводит к негативным последствиям двух типов. Первый из них связан с дефицитом востребованного рынком продукта. Зачастую успешный маркетинг на этапе «раскрутки» инновационного товара давал настолько хорошие результаты, что производство не успевало удовлетворить потребности оптовых и розничных продаж. Предварительная запись и дефицит товара вызывали негативную реакцию потребителей, в том числе лояльных. Второй тип трудностей, наоборот, был связан с избыточными запасами продукции в корпоративной логистической системе, когда прогноз продаж оказывался завышенным по сравнению с реальным спросом. Это приводило к отвлечению капитала, ресурсов, дополнительным издержкам. Замедленная оборачиваемость товарных запасов, готовой продукции в таких условиях вызывала снижение рентабельности [4].

Для преодоления этих недостатков Haier провела реорганизацию, создав структуру, основанную на самоорганизующихся подразделениях, называемых ZZJYT (независимая операционная единица, сокр.). Маркетинг, дизайн и производство таких подразделений ориентировано непосредственно на клиентов. Инфраструктурные корпоративные единицы стали поставщиками услуг, предоставляя необходимые ресурсы и услуги – на возмездной основе, с механизмом участия в добавленной стоимости [8].

Это сделало компанию более отзывчивой к новым потребностям рынка. Каждая группа – обособленное структурное подразделение компании – обычно от одного до двух десятков сотрудников – исполняет различные функциональные роли. Они объединяются для выполнения конкретной задачи, проекта, продукта, неся ответственность за финансовые результаты. У них сокращенный бухгалтерский учет, и автономия в вопросах найма, увольнения сотрудников, установления внутренних правил, распределения доходов, а также принятия операционных и инновационных решений [4].

За счет этого в Haier время информационного обмена между клиентом и производителем сведено к минимуму. Специалисты в области исследований, разработок, маркетинга зачастую работают в одних и тех же подразделениях (или в одной проектной команде), и часто встречаются, особенно при разработке и внедрении новых продуктов, а также поддерживают тесный рабочий контакт с клиентами, поэтому могут оценивать количество заказов с меньшим отклонением, чем если бы они полагались только на прогнозы. Как только продукция готова к отправке, она

сначала отправляется лояльным клиентам из списка ожидания, и только затем в другие каналы реализации [8].

Таким образом, Haier оптимизирует уровень запасов, что обеспечивает экономию затрат, ускоряет оборачиваемость рабочего капитала. Проведенный анализ показывает, что «цепочка создания ценности» здесь дополнена механизмами предпринимательской инициативы и инструментами ЛМ («бережливого производства»), что позволяет повысить экономическую эффективность использования ограниченных ресурсов компании.

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## **METABOLIC ACTIVITY OF LACTIC ACID BACTERIA IN TRADITIONAL FERMENTED DAIRY PRODUCTS AND ITS ROLE IN PROBIOTIC FUNCTIONALITY**

**Abstract:** *Traditional fermented dairy products represent complex microbial ecosystems in which lactic acid bacteria (LAB) play a central role in determining product quality, safety, and potential health benefits. These products, including region-specific varieties such as qatiq, chakki, chalob, and qurtob, are produced through spontaneous or semi-controlled fermentation processes that promote diverse and metabolically active microbial communities. While previous studies have largely focused on the taxonomic composition of LAB in fermented dairy systems, increasing attention is being directed toward their metabolic activity and its functional implications.*

*This review examines the metabolic processes of LAB in traditional fermented dairy products, with emphasis on carbohydrate fermentation, organic acid production, exopolysaccharide synthesis, antimicrobial compound formation, and flavour-related metabolism. These biochemical activities contribute to key technological outcomes, including acidification, preservation, texture development, and sensory characteristics. At the same time, they are closely linked to probiotic-associated traits such as pathogen inhibition, gastrointestinal survival, and potential modulation of host microbiota.*

*Furthermore, traditional fermented dairy products serve as important reservoirs of diverse LAB strains with functional and technological potential. However, probiotic effects remain strain-specific and require careful evaluation through mechanistic and clinical studies. A deeper understanding of LAB metabolism within these traditional systems may support the development of improved functional foods and novel probiotic applications.*

**Keywords:** *Lactic acid bacteria, Fermented dairy products, Traditional fermentation, Probiotic functionality, Metabolic activity, Exopolysaccharides, Bacteriocins*

## Introduction

Fermented dairy products have been an integral component of human nutrition for centuries, serving both as a method of preservation and as a source of enhanced sensory and nutritional qualities. Across diverse geographical regions, traditional products such as yogurt, kefir, qatiq, chakki, chalob, and qurtob are produced through spontaneous or semi-controlled fermentation processes involving complex microbial communities [1,2]. These products are characterized by unique textures, flavours, and extended shelf life, which are largely determined by the metabolic activity of lactic acid bacteria (LAB) [3].

Lactic acid bacteria represent a diverse group of Gram-positive, acid-tolerant microorganisms that play a central role in milk fermentation. Their primary metabolic function involves the conversion of carbohydrates, particularly lactose, into lactic acid, resulting in rapid acidification of the dairy matrix [3,4]. This acidification inhibits spoilage organisms and pathogenic bacteria while promoting protein coagulation and contributing to desirable organoleptic properties [1,5]. In addition to organic acid production, LAB are capable of synthesizing a wide range of metabolites, including exopolysaccharides, bacteriocins, and flavour-active compounds, which collectively influence product quality and safety [4,5].

Traditional fermented dairy systems often rely on natural fermentation or back-slopping practices, leading to highly diverse and dynamic microbial populations shaped by environmental conditions, raw materials, and local production methods [2,6]. These artisanal systems are increasingly recognized as important reservoirs of functionally significant LAB strains with both technological and probiotic potential [7]. Such diversity is particularly evident in underexplored regional products, including those from Central Asia, where traditional fermentation practices remain largely unstandardized yet biologically rich.

Despite extensive research on fermented dairy microbiota, much of the existing literature has focused on identifying the microbial composition of these products rather than understanding the functional implications of microbial activity [2]. However, the technological and health-related properties of fermented dairy products are primarily determined by the metabolic processes carried out by LAB [8,4]. These processes generate compounds that influence preservation, texture, flavour development, and interactions with the host gastrointestinal environment [8,9]. This review examines how the metabolic activity of lactic acid bacteria in

traditional fermented dairy products contributes to both fermentation processes and probiotic functionality.

## 2. Lactic Acid Bacteria in Traditional Fermented Dairy

Lactic acid bacteria (LAB) are the dominant microbial group involved in the fermentation of dairy products and play a central role in determining their quality, safety, and functional properties. Common genera associated with fermented dairy systems include *Lactobacillus* (recently reclassified into genera such as *Lacticaseibacillus*), *Lactococcus*, *Streptococcus*, and *Leuconostoc*, each contributing distinct metabolic capabilities that influence the fermentation process [3,6]. These microorganisms are widely distributed across a range of traditional and industrial dairy products, including yogurt, kefir, dahi, suzma, and various artisanal cheeses [1,3].

Traditional fermented dairy products are typically produced through spontaneous fermentation or back-slopping methods, in which a portion of a previously fermented product is used to inoculate fresh milk. Unlike controlled industrial fermentations that rely on defined starter cultures, these traditional processes allow for the development of complex and dynamic microbial communities [1,2]. As a result, the composition of LAB populations can vary significantly depending on environmental conditions such as temperature, milk source, hygiene practices, and fermentation duration [2,6]. This variability contributes to the rich microbial diversity observed in traditional dairy systems, particularly in region-specific products such as qatıq, chakki, chalob, and qurtob (Figure 1). These products, often produced under artisanal conditions, represent unique ecological niches in which diverse LAB strains coexist and interact. Such environments promote the selection of microorganisms that are well adapted to local conditions, including tolerance to acidity, osmotic stress, and nutrient limitations [6,7].

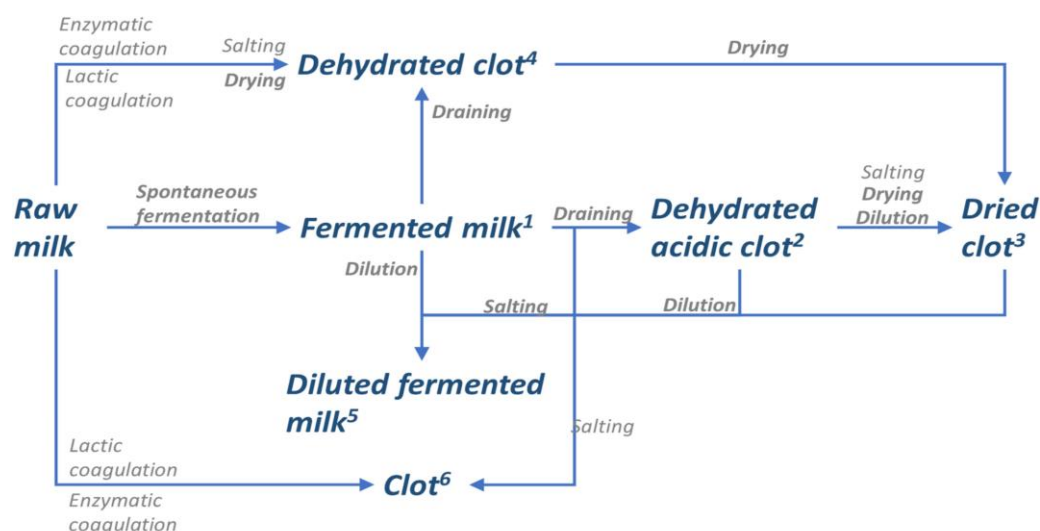


**Figure 1. Processing relationships among traditional fermented dairy products in Central Asia.** Listed products are: 1, ayran, tarag, shubat or qymyz; 2, qatıq; 3, qurt; 4, suzbe or syzma; 5, tan, chal or shalap; 6, irimshik. Adapted from [1].

The environment in which fermentation occurs plays a critical role in shaping microbial composition and activity. Factors such as raw milk microbiota, fermentation vessels, and repeated back-slopping cycles can influence both the diversity and stability of LAB populations over time [1,6]. This ecological complexity is particularly important in traditional systems, where microbial interactions contribute not only to product characteristics but also to the emergence of strains with desirable technological and functional traits [7]. Consequently, traditional fermented dairy products are increasingly recognized as valuable reservoirs of LAB with potential applications in food technology and probiotic development. However, the functional significance of these bacteria depends more on their metabolic activity than on their taxonomic identity alone. While the presence of specific genera provides useful information, it is ultimately the biochemical processes carried out by these microorganisms that determine their contribution to fermentation outcomes and probiotic-associated functionality [8,9]. The major LAB genera associated with traditional fermented dairy products and their general functional roles are summarized in **Table 1**.

**Table 1. Major lactic acid bacteria genera associated with traditional fermented dairy products and their general functional roles.**

| Genus                                             | Examples of associated products                               | General functional role                                                   |
|---------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------|
| <i>Lactobacillus</i><br><i>Lacticaseibacillus</i> | Kefir, yogurt, qatiq, suzma                                   | Acid production, stress tolerance, contribution to fermentation stability |
| <i>Lactococcus</i>                                | Cheese, cultured milk products                                | Rapid acidification, possible bacteriocin production                      |
| <i>Streptococcus</i>                              | Yogurt, fermented milk products                               | Fast fermentation and acid production                                     |
| <i>Leuconostoc</i>                                | Traditional fermented dairy products, artisanal dairy systems | Flavour development, heterofermentation, exopolysaccharide production     |



### 3. Metabolic Activities of LAB in Dairy Fermentation

#### 3.1 Carbohydrate metabolism and lactic acid production

The central metabolic role of lactic acid bacteria (LAB) in dairy fermentation is the conversion of lactose, the main sugar in milk, into organic acids, primarily lactic acid. Lactose is first hydrolysed into glucose and galactose, which then enter glycolytic pathways and are metabolised to pyruvate. Under fermentative conditions, pyruvate is mainly reduced to lactic acid, allowing LAB to generate energy while regenerating NAD<sup>+</sup> required for continued glycolysis [10,11]. This process is the biochemical basis of dairy fermentation and is one of the defining functional traits of LAB.

LAB may be broadly classified as homofermentative or heterofermentative according to their carbohydrate metabolism. Homofermentative LAB convert most of the available sugar into lactic acid, leading to rapid acidification of the dairy matrix. In contrast, heterofermentative LAB produce lactic acid together with other metabolites such as acetic acid, ethanol, and carbon dioxide [10,12]. This distinction is important because it influences not only the rate of acid production but also the final sensory and structural properties of fermented dairy products. Homofermentative bacteria are particularly important in products where rapid pH reduction is needed, whereas heterofermentative organisms may contribute more strongly to flavour complexity and gas formation in certain traditional products [10,12].

The accumulation of lactic acid causes a decrease in pH, which is one of the most important technological consequences of LAB metabolism. Acidification inhibits the growth of many spoilage organisms and foodborne pathogens, thereby improving the microbiological safety and shelf life of fermented milk products [4,5]. At the same time, the drop in pH promotes destabilization and coagulation of milk proteins, especially caseins, which is essential for the formation of yogurt-like gels and other fermented dairy textures [13]. In practical terms, acid production transforms milk from a highly perishable raw material into a more stable and organoleptically distinctive food.

Acidification not only stabilizes the product but also creates selective pressure that shapes microbial succession. As pH falls during fermentation, acid-tolerant microorganisms become more competitive, whereas many non-adapted bacteria are progressively excluded [1,6]. This helps explain why traditional fermented dairy systems often become dominated by specific LAB populations over time, even when fermentation begins with a much more diverse microbial community. In this way, carbohydrate metabolism is not merely a source of energy for LAB but also a major ecological force structuring the fermentation environment [1,10].

#### 3.2 Proteolysis and peptide formation

Although milk is rich in protein, many LAB cannot directly utilize intact casein molecules and therefore depend on proteolytic systems to access nitrogen sources required for growth. These systems typically involve extracellular or cell-envelope proteinases that hydrolyse caseins into oligopeptides, followed by peptide

transport into the cell and further degradation by intracellular peptidases into smaller peptides and amino acids [11,14]. This proteolytic activity is essential in milk because the concentration of free amino acids is relatively low, making protein breakdown a necessary adaptation for bacterial growth in dairy environments. The products of proteolysis serve more than a nutritional role. Released peptides and amino acids support microbial growth and also act as precursors for additional metabolic pathways involved in flavour formation and functional activity [11,15]. Amino acids derived from casein degradation may be further converted into aldehydes, alcohols, acids, and sulfur-containing compounds that contribute to the sensory profile of fermented dairy products [15]. In this way, proteolysis links nutritional metabolism with technological quality.

Proteolysis has also attracted attention because some peptides released during milk fermentation may possess bioactive properties. Certain milk-derived peptides have been associated in the literature with antihypertensive, antimicrobial, antioxidant, or immunomodulatory effects, although these activities are often demonstrated under experimental conditions and should not automatically be interpreted as clinically proven benefits in humans [16]. For this reason, it is more accurate to state that LAB proteolysis may contribute to the release of potentially bioactive peptides rather than making broad health claims. Overall, proteolytic metabolism is fundamental to LAB survival in milk and significantly contributes to the nutritional and sensory complexity of fermented dairy products [11,16].

### **3.3 Exopolysaccharide (EPS) production**

Some LAB synthesize exopolysaccharides (EPS), which are extracellular carbohydrate polymers released into the surrounding matrix during growth. In fermented dairy products, EPS production is particularly important because it directly affects rheological properties such as viscosity, texture, and mouthfeel [17,18]. When produced in situ during milk fermentation, EPS can act as natural biothickeners, improving product consistency and reducing syneresis, or whey separation, which is a common quality issue in fermented milk products [17].

From a technological perspective, EPS-producing LAB are valuable because they can improve texture without the need for added stabilizers. This is especially relevant in yogurt and other cultured dairy products, where consumer preference often depends on creaminess, smoothness, and water-holding capacity [17,18]. EPS can therefore enhance both product quality and consumer acceptance while supporting cleaner-label formulations. Their production is strain-dependent and influenced by fermentation conditions, substrate availability, and the composition of the dairy matrix [18].

Beyond texture, EPS may also have functional biological significance. Several studies suggest that EPS can contribute to bacterial stress tolerance by forming a protective layer around the cell, which may reduce the impact of acid, osmotic stress, or other environmental challenges [18,19]. EPS have also been discussed in relation to host interaction, including possible roles in adhesion, immune modulation, and prebiotic-like effects, although these properties vary considerably depending on the structure of the polymer and the producing strain

[18,19]. Therefore, as with other probiotic-associated traits, the significance of EPS should be interpreted cautiously and at the strain level rather than generalized across all LAB. Even so, EPS production remains one of the most important examples of how microbial metabolism can simultaneously influence food technology and potential biological functionality [17,19].

### **3.4 Bacteriocins and antimicrobial metabolites**

In addition to lactic acid, LAB produce a variety of antimicrobial compounds that help suppress competing microorganisms during fermentation. Among the most studied of these are bacteriocins, which are ribosomally synthesized antimicrobial peptides produced by certain bacterial strains [4,20]. Bacteriocins can inhibit closely related bacteria and, in some cases, important foodborne pathogens, making them highly relevant to food preservation and safety [20,21].

LAB-mediated antimicrobial activity is not limited to bacteriocins alone. Organic acids such as lactic acid lower environmental pH and disrupt microbial homeostasis, while other metabolites such as hydrogen peroxide may further inhibit sensitive microorganisms [4,5]. The combined action of low pH, reduced redox potential, and antimicrobial molecules can create a strong barrier against spoilage organisms and pathogens in fermented dairy products [5,21]. This is one of the reasons why fermented milk products often show improved microbiological stability compared with raw milk.

Bacteriocin-producing LAB have attracted particular attention as natural bioprotective cultures in dairy systems. Their use may reduce reliance on chemical preservatives while enhancing product safety in cheeses, cultured milks, and other fermented products [20,21]. However, the antimicrobial spectrum of bacteriocins is highly variable, and not all LAB strains produce them. Moreover, the effectiveness of a bacteriocin in a food matrix depends on environmental factors such as pH, salt concentration, temperature, and the composition of the product [20]. From a functional perspective, antimicrobial metabolite production is also relevant to probiotic-associated activity, since the ability to inhibit pathogens is often considered a desirable trait in candidate probiotic strains [8,9]. Still, it is important to distinguish between antimicrobial effects observed in vitro and confirmed health benefits in vivo. Within dairy fermentation, the most immediate importance of bacteriocins and related metabolites lies in their contribution to microbial competition, product safety, and preservation [4,20].

### **3.5 Flavor and aroma compound production**

LAB also contribute significantly to the flavour and aroma of fermented dairy products through the production of volatile and non-volatile metabolites. Important compounds include diacetyl, acetaldehyde, acetoin, organic acids, and other aroma-active molecules derived from pyruvate, citrate, and amino acid metabolism [15]. These metabolites are essential for the characteristic sensory profiles of many fermented dairy foods. For example, acetaldehyde is a key aroma compound in yogurt, while diacetyl contributes buttery notes in cultured dairy products [13,15]. Citrate metabolism and amino acid catabolism are especially important in flavour development. Through these pathways, LAB generate compounds that contribute to

freshness, creaminess, buttery aroma, and overall complexity [15]. In mixed-culture fermentations, interactions between strains can further influence flavour formation by altering precursor availability and metabolic balance [15]. This helps explain why traditional products produced under artisanal conditions often develop more complex flavour profiles than highly standardized industrial products. The sensory consequences of LAB metabolism are not trivial. Flavour and aroma strongly influence consumer acceptance, which in turn affects the practical success of fermented dairy as a functional food. Even the most nutritionally promising product is unlikely to be consumed regularly if its texture or flavour is poor. For that reason, flavour-related metabolism should be understood as a major component of LAB functionality in dairy fermentation rather than a secondary aesthetic feature [13,15]. The principal metabolic activities of LAB in dairy fermentation and their corresponding technological and probiotic-associated roles are summarized in Table 2.

**Table 2. Metabolic activities of lactic acid bacteria and their functional roles in fermented dairy products.**

| Activity                     | Main products                                          | Role in fermented dairy products                                | Probiotic-associated relevance                                        |
|------------------------------|--------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------|
| Lactose fermentation         | Lactic acid                                            | Reduces pH, promotes preservation, supports protein coagulation | Inhibits pathogens and spoilage organisms                             |
| Proteolysis                  | Peptides, amino acids                                  | Contributes to flavour development and nutritional modification | May generate potentially bioactive peptides                           |
| Exopolysaccharide production | Polysaccharides                                        | Improves viscosity, texture, and water retention                | May enhance stress protection and host interaction                    |
| Bacteriocin production       | Antimicrobial peptides                                 | Improves food safety and microbiological stability              | Supports antagonistic activity against undesirable microorganisms     |
| Flavour and aroma metabolism | Diacetyl, acetaldehyde, acetoin, other aroma compounds | Enhances sensory quality and product acceptability              | Indirectly supports regular consumption of functional fermented foods |

#### 4. Stress Adaptation and Survival

For lactic acid bacteria (LAB) to exert probiotic-associated effects after consumption, they must survive passage through the gastrointestinal tract, where they are exposed first to gastric acidity and then to bile salts in the small intestine. Gastric acid can reduce intracellular pH, denature proteins, and disrupt essential metabolic processes, whereas bile salts act as detergents that damage cell membranes and can also trigger protein and DNA stress. Survival under these conditions is therefore a major functional requirement for LAB intended for probiotic use. Reviews on probiotic mechanisms and fermented dairy functionality consistently treat acid and bile tolerance as key selection criteria for candidate strains.

LAB use several acid tolerance systems to maintain viability in low-pH environments. One important mechanism is the F<sub>0</sub>F<sub>1</sub>-ATPase proton pump, which expels excess protons from the cytoplasm and helps maintain intracellular pH homeostasis. In addition, acid stress responses involve the synthesis of stress proteins and chaperones that protect or refold damaged proteins, as well as broader adjustments in cellular metabolism that reduce acid-induced injury. These responses are strain-dependent, which is why tolerance observed in one LAB strain cannot be assumed for another, even within the same species. Bile tolerance depends on a partly different set of mechanisms. Because bile salts disrupt membrane integrity, LAB often respond through changes in membrane composition, including altered fatty acid profiles and surface-associated structures that reduce membrane damage. Another important mechanism is bile salt hydrolase (BSH) activity, which deconjugates bile salts and may decrease their toxicity for some strains. Reviews of bile resistance in lactobacilli also describe transport systems, proton or solute efflux, and protein quality-control pathways as part of the adaptive response to bile exposure.

The food matrix also matters. Fermented dairy products can improve LAB survival during gastrointestinal transit because milk proteins, fat, and the viscous fermented structure may buffer acidity and provide physical protection against harsh digestive conditions. This protective effect does not replace intrinsic stress tolerance, but it can enhance survival compared with delivery in less protective matrices. These adaptations are critical for the transition from a food-associated environment to the gastrointestinal tract.

#### 5. Linking Metabolism to Probiotic Functionality

The metabolic activity of lactic acid bacteria (LAB) is closely linked to the probiotic-associated properties often attributed to fermented dairy products. These links are not theoretical. They arise from specific biochemical processes that affect microbial survival, pathogen inhibition, digestion-related functions, and possible interactions with the host environment. In this context, metabolism provides the mechanistic basis for understanding why some LAB strains are functionally relevant beyond their role in fermentation [8,9]. One of the clearest examples is the relationship between acid production, bacteriocin synthesis, and antimicrobial activity. During fermentation, LAB convert lactose into lactic acid, causing a



reduction in pH that inhibits many spoilage organisms and pathogenic bacteria [4,5]. In some strains, this effect is reinforced by the production of bacteriocins and other antimicrobial metabolites, which further suppress competing microorganisms [20,21]. Together, acidification and antimicrobial peptide production contribute not only to food preservation but also to one of the main probiotic-associated traits of LAB, namely antagonism against undesirable microbes [7,8].

LAB metabolism may also support digestion-related functions. Their enzymatic activities, including carbohydrate metabolism and proteolysis, contribute to the breakdown of milk components and the release of smaller peptides and metabolites [11,14]. This can improve the digestibility of fermented dairy products and may support lactose utilization in individuals with reduced lactase activity, particularly when viable cultures remain active in the product [3,9]. In addition, peptides generated during fermentation have been studied for potential bioactive properties, although these effects should be interpreted cautiously unless confirmed in vivo [16]. Exopolysaccharide (EPS) production represents another important link between metabolism and probiotic functionality. EPS can improve product texture, but it may also support bacterial persistence by protecting cells against environmental stress and by influencing surface interactions [17,18]. Some studies have suggested roles for EPS in adhesion and host interaction, although these effects depend heavily on polymer structure and strain background [18,19]. Similarly, stress adaptation mechanisms such as acid resistance, membrane remodeling, and bile salt hydrolase activity improve the likelihood that LAB survive transit through the gastrointestinal tract [22,23].

These adaptations are central to probiotic performance because survival is a prerequisite for any downstream effect. However, probiotic functionality is strain-specific and cannot be generalized across all lactic acid bacteria. The presence of a LAB species in a fermented dairy product does not by itself guarantee antimicrobial activity, gastrointestinal survival, or measurable health benefit. Functional interpretation must therefore be based on strain-level evidence, metabolic characteristics, and, ideally, validation beyond in vitro assays [8,24].

## 6. Future Perspectives

Future research on LAB in traditional fermented dairy products should move beyond genus- or species-level description and focus more consistently on strain-level analysis. Closely related strains may differ substantially in acidification rate, exopolysaccharide production, bacteriocin synthesis, stress tolerance, and host-related functional traits. For this reason, taxonomic identification alone is not sufficient to predict technological or probiotic value [7,8].

A stronger integration of genomics and metabolomics is also needed. Genomic data can identify genes involved in carbohydrate utilization, proteolysis, bacteriocin production, and bile resistance, while metabolomic approaches can show which compounds are actually produced under fermentation conditions. Together, these tools would provide a more precise understanding of how LAB function in real food systems rather than only under simplified laboratory conditions [10,18].



Traditional dairy products remain especially important because many of them are still underexplored microbial ecosystems. Products such as qatiq, suzma, chakki, chalob, and qurtob may contain locally adapted LAB strains with valuable technological and functional characteristics that are not represented in commercial starter cultures [1,2]. However, promising in vitro results should not be overinterpreted. More in vivo validation is needed to determine whether metabolic traits observed during fermentation or laboratory testing translate into consistent health-related effects in the host [8,9].

## 7. Conclusion

Lactic acid bacteria are central to the transformation of milk into fermented dairy products because their metabolism drives the main biochemical changes that define these foods. Through carbohydrate fermentation, LAB acidify the dairy matrix and promote preservation. Through proteolysis, exopolysaccharide production, antimicrobial compound synthesis, and flavour metabolism, they contribute to texture, safety, and sensory quality [10,11,15,17,20]. In this sense, fermentation outcomes are direct consequences of microbial metabolic activity rather than the simple presence of bacteria. The same metabolic processes also explain why certain LAB strains may show probiotic-associated potential. Acid and bacteriocin production can inhibit undesirable microorganisms, enzymatic activity can support digestion-related functions, EPS may contribute to protection and interaction, and stress adaptation mechanisms can improve survival under gastrointestinal conditions [8,18,22]. However, these functional traits are not universal. Their expression depends on the individual strain, the food matrix, and the conditions under which fermentation and consumption occur [8,24]. Traditional fermented dairy products are therefore valuable not only as foods but also as reservoirs of metabolically diverse LAB with possible technological and probiotic applications. At the same time, more rigorous strain-level characterization, integrated omics approaches, and in vivo studies are needed to distinguish genuine functional potential from broad generalization. A clearer understanding of LAB metabolism will strengthen both the scientific evaluation of traditional dairy microbiota and the future development of functional fermented foods [1,7,10].

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## ХИМИЧЕСКИЙ СОСТАВ И ПРИМЕНЕНИЕ ТАБЛЕТОК АНДИПАЛ

**Аннотация:** Андипал — комбинированный лекарственный препарат с анальгезирующим и спазмолитическим действием, содержащий четыре активных компонента: метамизол натрия (анальгин), фенobarбитал, бендазол (дибазол) и папаверина гидрохлорид. Синергетическое действие этих веществ не только облегчает болевой синдром, но и снимает сосудистый спазм, а также способствует незначительному снижению артериального давления.

Андипал часто назначают при головной боли, мигрени, болях, связанных со спазмами сердечно-сосудистой системы, а также при состояниях, сопровождающихся повышением артериального давления. Одним из основных компонентов препарата является метамизол, обладающий выраженными анальгезирующими и жаропонижающими свойствами. Однако из-за риска серьезных побочных эффектов, таких как лейкопения и агранулоцитоз, применение Андипала рекомендуется только в течение короткого времени и под контролем врача.

**Ключевые слова:** Андипал, метамизол натрия, папаверин, бендазол, фенobarбитал, анальгетик, спазмолитик, артериальное давление, мигрень.

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## CHEMICAL COMPOSITION AND APPLICATION OF ANDIPAL TABLETS

**Abstract** Andipal is a combined medication with analgesic and antispasmodic effects containing four active components: metamizole sodium (Analgin), phenobarbital, bendazole (dibazole), and papaverine hydrochloride. The synergistic action of these substances not only relieves pain but also relaxes vascular spasms and slightly reduces blood pressure. Andipal is commonly prescribed for headaches, migraines, pain associated with cardiovascular spasms,

*and conditions related to elevated blood pressure. One of the main components, metamizole, has strong analgesic and antipyretic properties and acts through mechanisms. However, due to the risk of serious side effects associated with metamizole, such as leukopenia and agranulocytosis, the use of Andipal is recommended only for short periods and under medical supervision.*

**Keywords:** *Andipal, metamizole sodium, papaverine, bendazole, phenobarbital, analgesic, antispasmodic, blood pressure, migraine.*

**Введение:** Андипал — комбинированный лекарственный препарат, обладающий выраженным анальгезирующим, спазмолитическим и сосудорасширяющим действием, широко распространённый преимущественно в странах СНГ. Он был разработан в России в 1980–1990-х годах и применяется для лечения головной боли (особенно связанной со спазмом сосудов), мигрени, а также болевых синдромов, обусловленных спазмами периферических сосудов [1;2].

Метамизол (анальгин), входящий в состав препарата, является мощным анальгетиком и жаропонижающим средством, применяемым в клинической практике с 1920-х годов [3]. Комбинация активных веществ в составе Андипала оказывает комплексное воздействие на организм. Анальгезирующие компоненты снижают интенсивность болевых импульсов, а спазмолитические вещества способствуют расслаблению гладкой мускулатуры.

Кроме того, препарат содержит компонент, воздействующий на центральную нервную систему, который уменьшает рефлекторные реакции организма и оказывает седативное действие. В результате уменьшается сосудистый спазм, улучшается кровообращение и ослабляются болевые ощущения.

В настоящее время в фармакологии и фармации изучение химического состава комбинированных препаратов, их взаимодействий и механизмов действия на организм является одним из актуальных научных направлений [4;5]. Андипал также относится к числу таких препаратов, и его состав, фармакологические свойства и клиническое применение имеют важное значение в медицинской и фармацевтической практике.

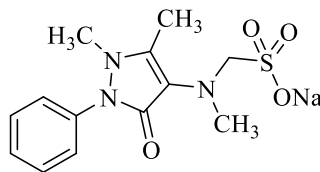
В связи с этим изучение химического состава таблеток Андипал, их фармакологических свойств и областей применения представляет собой актуальную научную и практическую задачу.

#### **Химический состав:**

Таблетка Андипал содержит четыре активных вещества. В одной таблетке присутствуют следующие компоненты:

**1. Метамизол натрия (Анальгин)** — 250 мг [6;7]. Данное вещество обладает выраженным анальгезирующим и жаропонижающим действием, подавляет активность фермента циклооксигеназы и снижает синтез простагландинов.

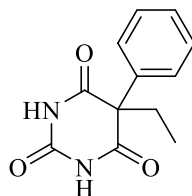
Структурная формула:



natrij ((1,5-dimetil-3-oxo-2-fenil-2,3-digidro-1*H*-pirazol-4-il)(metil)amino)metansulfonat

**2. Фенобарбитал** — 20 мг [6;7]. Фенобарбитал обычно используется как седативное (успокаивающее) и противосудорожное средство. В составе Андипала он способствует уменьшению болевых ощущений и оказывает успокаивающее действие [8].

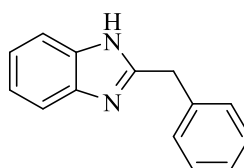
Структурная формула:



5-etil-5-fenilpirimidin-2,4,6(1*H*,3*H*,5*H*)-trion

**3. Бендазол (Дибазол)** — 20 мг [6;7]. Бендазол является выраженным сосудорасширяющим и спазмолитическим средством. Он расширяет сосудистую стенку и способствует расслаблению мышц. Применяется для устранения спазмов периферических сосудов, что способствует снижению давления при гипертензивных состояниях.

Структурная формула:

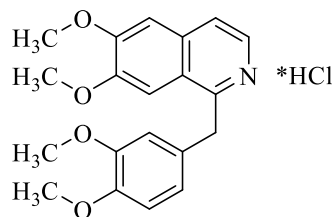


2-benzil-1*H*-benzo[*d*]imidazol

**4. Папаверина гидрохлорид** — 20 мг [6;7]. Папаверин также является сильным спазмолитиком, уменьшающим спазмы кишечника и других гладких мышц. Кроме того, он расслабляет кровеносные сосуды и оказывает гипотензивное действие.



Структурная формула:



1-(3,4-dimetoksibenzil)-6,7-dimetoksixinolin gidrokslorid

В качестве вспомогательных веществ используются крахмал, тальк, стеарат кальция и другие компоненты. Все активные вещества в совокупности обеспечивают общее фармакологическое действие препарата [9;10].

#### **Фармакологические свойства:**

Препарат Андипал обладает комплексным фармакологическим действием. Метамизол, входящий в его состав, проявляет анальгезирующие и жаропонижающие свойства, а также в определённой степени способствует снижению спастических проявлений.

Фенобарбитал снижает тонус гладкой мускулатуры желудочно-кишечного тракта и угнетает центральную нервную систему, тем самым усиливая седативный эффект препарата.

Бендазол (дибазол) и папаверин оказывают миорелаксирующее и сосудорасширяющее действие, расширяя периферические и центральные сосуды. В результате Андипал не только устраняет болевой синдром, но и способствует незначительному снижению артериального давления, а также оказывает успокаивающее воздействие на нервную систему.

Поскольку препарат является комбинированным, его синергетическая эффективность выше по сравнению с отдельным применением анальгетических и спазмолитических средств [6].

#### **Показания к применению:**

Андипал применяется в следующих случаях:

##### **1. Вазоспастическая головная боль и мигрень**

Препарат назначается для облегчения головной боли и некоторых форм мигрени, связанных со спазмом сосудов [6].

##### **2. Болевые синдромы, сопровождающиеся сосудистыми спазмами**

Например, боли, возникающие вследствие спазмов периферических артерий, сосудов сердечно-сосудистой системы, а также некоторых нарушений со стороны желудочно-кишечного тракта. В таких случаях спазмолитическое действие препарата используется как лечебный фактор [6].

##### **3. Умеренная артериальная гипертензия**

Благодаря способности расширять периферические сосуды Андипал может применяться при лёгких формах повышения артериального давления [5;6].

#### **4. Кишечные спазмы и другие состояния, сопровождающиеся спазмом гладкой мускулатуры**

Препарат может быть полезен пациентам при кишечных коликах и других состояниях, связанных со спазмами гладких мышц.

##### **Способ применения и дозировка:**

Таблетки Андипал принимаются внутрь.

Для взрослых и детей старше 8 лет начальная доза составляет по 1 таблетке 2–3 раза в сутки (что соответствует 500–750 мг метамизола в сутки).

Максимальная суточная доза не должна превышать 3 таблеток (750 мг метамизола).

Препарат, как правило, применяется коротким курсом — в течение 2–3 дней, поскольку длительное использование связано с повышенным риском побочных эффектов.

После приёма внутрь действие обычно начинается через 20–40 минут и достигает максимума примерно через 2 часа.

Коррекцию дозировки рекомендуется проводить по назначению врача с учётом состояния пациента.

##### **Противопоказания и предостережения:**

Применение Андипала категорически не рекомендуется в следующих случаях:

##### **1. Аллергия на метамизол или фенобарбитал**

При наличии повышенной чувствительности к препаратам пиразолонового ряда (анальгин, антипирин и др.), а также при ранее перенесённых токсических реакциях.

##### **2. Заболевания, сопровождающиеся угнетением функции костного мозга**

При подозрении или наличии лейкопении, агранулоцитоза, апластической анемии и других заболеваний крови препарат не применяется из-за риска, связанного с метамизолом [9].

##### **3. Сердечная, почечная или печёночная недостаточность**

У пациентов с тяжёлыми сердечно-сосудистыми, печёночными или почечными заболеваниями возможно накопление компонентов препарата и развитие токсических эффектов.

##### **4. Глаукома и гиперплазия предстательной железы**

Из-за расслабляющего действия на гладкую мускулатуру препарат не рекомендуется пациентам с закрытоугольной глаукомой или доброкачественной гиперплазией предстательной железы (ДГПЖ).

##### **5. Беременность и период лактации**

Метамизол и фенобарбитал легко проникают через плацентарный барьер.

Приём Андипала противопоказан в первом триместре беременности и в период грудного вскармливания. Кроме того, фенобарбитал может вызывать сонливость и угнетение нервной системы у детей и беременных женщин.

### **Побочные эффекты:**

Во время применения Андипала могут наблюдаться следующие побочные реакции:

#### **1. Нарушения со стороны желудочно-кишечного тракта**

В редких случаях возможны тошнота и запор.

#### **2. Аллергические реакции**

Могут наблюдаться кожная сыпь, зуд, а в более тяжёлых случаях — даже анафилактические реакции.

#### **3. Нарушения со стороны системы крови**

При длительном применении метамизол может вызывать серьёзные гематологические осложнения, такие как лейкопения и агранулоцитоз.

#### **4. Седативный эффект**

Из-за содержания фенobarбитала возможны сонливость и головокружение. При применении в высоких дозах, а также в сочетании с препаратами, угнетающими центральную нервную систему, возможно выраженное седативное действие.

#### **5. Нарушения со стороны сердечно-сосудистой системы**

В редких случаях возможно резкое снижение артериального давления, сопровождающееся головокружением и общей слабостью.

### **Заключение**

Таким образом, Андипал представляет собой комбинированный лекарственный препарат, в состав которого входят метамизол натрия, фенobarбитал, бендазол и папаверин. Совместное действие этих компонентов обеспечивает выраженный анальгезирующий, спазмолитический и сосудорасширяющий эффект.

Препарат в основном эффективен при головной боли (особенно связанной со спазмами), мигрени, спазмах гладкой мускулатуры и состояниях, сопровождающихся лёгкой артериальной гипертензией.

Каждый из компонентов обладает собственным фармакологическим действием:

- метамизол — сильный анальгетик и жаропонижающее средство;
- бендазол и папаверин — миорелаксанты и вазодилататоры;
- фенobarбитал — оказывает мягкое седативное действие.

Вместе с тем наличие метамизола в составе препарата повышает риск развития серьёзных побочных эффектов, таких как агранулоцитоз. Поэтому применение Андипала должно осуществляться только под наблюдением специалиста и в течение короткого периода времени.

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## **НЕСТЕРОИДНЫЕ ПРОТИВОВОСПАЛИТЕЛЬНЫЕ ПРЕПАРАТЫ (НПВС): СРАВНИТЕЛЬНАЯ ХАРАКТЕРИСТИКА В КЛИНИЧЕСКОЙ ПРАКТИКЕ**

***Аннотация:** Нестероидные противовоспалительные препараты (НПВС) представляют собой одну из наиболее широко применяемых групп лекарственных средств в современной медицине. Они обладают противовоспалительным, анальгезирующим и жаропонижающим действием. Несмотря на сходный механизм действия, различные представители НПВС имеют различную селективность к изоформам циклооксигеназы, фармакокинетические свойства и профиль безопасности. В статье представлен сравнительный анализ традиционных и селективных НПВС, рассмотрены их клиническая эффективность, побочные эффекты, особенности применения у пациентов с сопутствующими заболеваниями, а также фармакоэкономические аспекты.*

***Ключевые слова:** НПВС, селективные ингибиторы ЦОГ-2, анальгезия, противовоспалительное действие, фармакология.*

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## **NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS): COMPARATIVE CHARACTERISTICS IN CLINICAL PRACTICE**

***Abstract:** Non-steroidal anti-inflammatory drugs (NSAIDs) are among the most widely used medications in modern clinical practice. They exhibit anti-inflammatory, analgesic, and antipyretic effects. Although sharing a common mechanism, different NSAIDs vary in cyclooxygenase isoform selectivity, pharmacokinetics, and safety profiles. This article presents a comparative analysis of traditional and selective NSAIDs, including clinical efficacy, adverse effects, use in patients with comorbidities, and pharmacoeconomic considerations.*

***Keywords:** NSAIDs, COX-2 inhibitors, analgesia, anti-inflammatory effect, pharmacology.*

### **Введение**

НПВС являются основной терапевтической группой при лечении воспалительных заболеваний, боли различной этиологии, ревматоидных и дегенеративных заболеваний суставов[1].

Классические НПВС ингибируют обе изоформы циклооксигеназы (ЦОГ-1 и ЦОГ-2), что обеспечивает выраженный противовоспалительный эффект, но может сопровождаться побочными эффектами со стороны ЖКТ[2].

Селективные ингибиторы ЦОГ-2 направлены на минимизацию гастропатий, сохраняя противовоспалительную активность[3].

Актуальность исследования определяется необходимостью выбора препарата с максимальной эффективностью и минимальными рисками побочных эффектов.

**Цель исследования.** Провести сравнительный анализ традиционных и селективных НПВС по эффективности, безопасности и применению в различных клинических ситуациях.

#### **Материалы и методы**

Анализ литературы включал:

- современные рекомендации EULAR, ACR и WHO;
- результаты рандомизированных клинических исследований;
- метаанализы и обзоры;
- фармакологические справочники[4].

Применялись методы сравнительной оценки, систематизации и анализа.

Основная часть

Механизм действия НПВС

НПВС ингибируют фермент циклооксигеназу, что приводит к снижению синтеза простагландинов, участвующих в воспалении, боли и терморегуляции[5].

• Традиционные НПВС: ингибируют ЦОГ-1 и ЦОГ-2, оказывая как противовоспалительный, так и гастротоксический эффект.

• Селективные ингибиторы ЦОГ-2: преимущественно блокируют ЦОГ-2, минимизируя повреждение слизистой ЖКТ.

Фармакологические свойства

Традиционные НПВС:

- ибупрофен, диклофенак, индометацин
- быстрый антиалгезирующий эффект
- выраженная противовоспалительная активность

Селективные НПВС:

- целекоксиб, эторикоксиб
- длительное действие
- минимальное влияние на ЖКТ
- подходящие для длительной терапии у пациентов с высоким риском язвенной болезни[6]

Клиническая эффективность



- Боль острого характера: оба типа эффективны; селективные могут быть предпочтительны при длительном применении.

- Хронические ревматические заболевания: снижение воспаления и болевого синдрома у пациентов с артритами.

- Снижение температуры: обе группы эффективны как жаропонижающие средства.

Побочные эффекты

Традиционные НПВС:

- язвенные поражения ЖКТ, кровотечения
- нефротоксичность при длительном применении
- повышение риска сердечно-сосудистых событий при некоторых препаратах[7]

Селективные НПВС:

- меньше побочных эффектов со стороны ЖКТ
- возможное повышение артериального давления
- осторожность при сердечно-сосудистых заболеваниях

Применение у особых категорий пациентов

- Пожилые пациенты: предпочтение селективных НПВС для снижения риска язвенной болезни.

- Пациенты с сердечно-сосудистыми заболеваниями: ограничение длительного применения селективных ЦОГ-2 ингибиторов[8].

- Больные с хронической почечной недостаточностью: осторожность при любом НПВС.

Фармакоэкономический аспект

Традиционные НПВС дешевле, но риск побочных эффектов может приводить к дополнительным затратам. Селективные НПВС дороже, но снижают риск осложнений ЖКТ, что важно при длительной терапии[9].

Современные тенденции

- Разработка НПВС нового поколения с минимальными побочными эффектами.

- Использование комбинированной терапии с ингибиторами протонной помпы для снижения риска гастропатий.

- Акцент на индивидуальный подбор препарата и дозировки.

**Результаты и обсуждение**

1. Сравнительная эффективность: традиционные и селективные НПВС схожи по анальгезирующей и противовоспалительной активности при кратковременном применении.

2. Побочные эффекты: селективные НПВС обладают лучшей переносимостью ЖКТ, но могут повышать риск сердечно-сосудистых осложнений при длительной терапии.

3. Применение в ревматологии: селективные НПВС предпочтительны при длительном применении у пациентов с высоким риском гастропатий, тогда как традиционные — при краткосрочной терапии острого болевого синдрома.

4. Фармакоэкономика: долгосрочная стоимость терапии с селективными НПВС может быть ниже за счёт снижения частоты госпитализаций и осложнений.

5. Индивидуальный подход: выбор препарата должен учитывать возраст пациента, сопутствующие заболевания, длительность терапии и риск побочных эффектов.

#### **Выводы**

1. НПВС — эффективные средства при воспалении, боли и лихорадке.
2. Традиционные НПВС обладают высокой антиалгезирующей активностью, но имеют больше побочных эффектов со стороны ЖКТ.
3. Селективные ингибиторы ЦОГ-2 безопаснее для ЖКТ, но требуют осторожности при сердечно-сосудистых заболеваниях.
4. Выбор препарата должен быть индивидуализирован.
5. Современные рекомендации акцентируют внимание на минимизации побочных эффектов и длительной безопасности терапии.

#### **Использованные источники:**

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## АНТИБИОТИКОРЕЗИСТЕНТНОСТЬ КАК ГЛОБАЛЬНАЯ ПРОБЛЕМА СОВРЕМЕННОЙ МЕДИЦИНЫ

**Аннотация:** Антибиотикорезистентность является одной из наиболее значимых проблем здравоохранения XXI века. Рост устойчивости микроорганизмов к антибактериальным препаратам приводит к снижению эффективности лечения инфекционных заболеваний, увеличению смертности и экономических затрат. В статье рассмотрены причины, механизмы развития антибиотикорезистентности, её клинические последствия и современные подходы к профилактике и контролю.

**Ключевые слова:** антибиотикорезистентность, фармакотерапия, устойчивость, антибиотики, клиническая фармакология.

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## ANTIBIOTIC RESISTANCE AS A GLOBAL PROBLEM OF MODERN MEDICINE

**Abstract:** Antimicrobial resistance is one of the most significant global health challenges of the 21st century. The increasing resistance of microorganisms to antibacterial drugs leads to reduced effectiveness of treatment, higher mortality rates, and increased healthcare costs. This article discusses the causes, mechanisms, clinical consequences of antimicrobial resistance, and modern strategies for its prevention and control.

**Keywords:** antimicrobial resistance, pharmacotherapy, antibiotics, drug resistance, clinical pharmacology.

### **Введение**

Антибиотики сыграли ключевую роль в снижении смертности от инфекционных заболеваний. Однако их широкое и зачастую нерациональное применение привело к формированию устойчивости микроорганизмов[1].

Антибиотикорезистентность определяется как способность бактерий выживать при воздействии антибактериальных препаратов, ранее эффективных для их уничтожения[2].

В настоящее время считается, что более 50% антибиотиков во многих странах используются ненадлежащим образом, например, для лечения вирусов, когда они лечат только бактериальные инфекции или используют неправильный (более широкого спектра) антибиотик, тем самым способствуя распространению устойчивости к противомикробным препаратам. Одной из наиболее актуальных проблем является распространение устойчивых грамотрицательных бактерий, включая *Acinetobacter*, *Escherichia coli*, *Ps.aeruginosae* и *Klebsiella pneumoniae*.

Там, где антибиотики для лечения людей можно приобрести без рецепта, возникновение и распространение устойчивости усугубляются. Аналогичным образом, в тех странах, где нет стандартных лечебных рекомендаций, антибиотики часто назначаются врачами избыточно и используются населением сверх меры[3].

**Цель исследования.** Изучить причины, механизмы развития антибиотикорезистентности и оценить её влияние на эффективность фармакотерапии.

**Материалы и методы.** Проведён анализ научной литературы, данных международных организаций (ВОЗ, CDC), а также клинических исследований последних лет. Использованы методы системного анализа, сравнения и обобщения данных.

Причины антибиотикорезистентности

К основным причинам относятся:

- нерациональное применение антибиотиков[4];
- самолечение пациентов;
- использование антибиотиков в сельском хозяйстве[5];
- недостаточный контроль инфекций.

Механизмы устойчивости

Основные механизмы включают:

- генетические мутации[6];
- горизонтальный перенос генов;
- инактивацию антибиотиков ферментами;
- изменение мишеней действия препарата.

Клинические последствия

Антибиотикорезистентность приводит к:

- увеличению длительности лечения[7];
- росту летальности;
- увеличению затрат на лечение;
- снижению эффективности стандартной терапии.

Глобальное распространение

По данным международных исследований, ежегодно миллионы случаев инфекций связаны с устойчивыми штаммами бактерий[8]. Прогнозируется дальнейший рост данной проблемы при отсутствии эффективных мер[9].

Роль клинической фармакологии

Клиническая фармакология обеспечивает:

- рациональный выбор терапии;
- контроль дозирования;
- профилактику побочных эффектов[10].

Пути решения проблемы

Основные направления:

- рациональное использование антибиотиков[11];
- разработка новых препаратов;
- усиление фармаконадзора;
- внедрение образовательных программ.

**Результаты и обсуждение.** Проведённый анализ показал, что антибиотикорезистентность обусловлена совокупностью факторов, ключевыми из которых являются неправильное применение антибиотиков и недостаточный контроль их использования.

Современные данные свидетельствуют о необходимости комплексного подхода к решению проблемы, включающего как клинические, так и организационные меры[12].

### **Выводы**

1. Антибиотикорезистентность является глобальной проблемой здравоохранения.
2. Основной причиной является нерациональное применение антибиотиков.
3. Рост устойчивости снижает эффективность лечения.
4. Необходим комплексный подход к решению проблемы.

### **Использованные источники:**

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## **ЭФФЕКТИВНОСТЬ МЕТАБОЛИЧЕСКОЙ КОРРЕКЦИИ ПНЕВМОНИИ У ДЕТЕЙ РАННЕГО ВОЗРАСТА НА ПОСТГОСПИТАЛЬНОМ ЭТАПЕ РЕАБИЛИТАЦИИ**

***Аннотация:** Пневмония у детей раннего возраста остается одной из ведущих причин госпитализации и последующего функционального неблагополучия в восстановительном периоде. После завершения стационарного лечения у значительной части детей сохраняются астеновегетативные проявления, остаточный кашель, снижение аппетита, нарушения сна и повышенная восприимчивость к повторным респираторным инфекциям. Проведено проспективное сравнительное клиническое исследование с участием 84 детей в возрасте от 3 месяцев до 3 лет, завершивших стационарное лечение внебольничной пневмонии. Основную группу составили 43 ребенка, получавшие стандартную постгоспитальную реабилитацию в сочетании с метаболической коррекцией, группу сравнения — 41 ребенок, получавший только стандартную реабилитацию. Оценивали динамику клинических симптомов, выраженность астенического синдрома, восстановление аппетита, сна и активности, частоту остаточного кашля, лабораторные показатели и частоту повторных респираторных эпизодов в течение 3 месяцев наблюдения.*

***Ключевые слова:** дети раннего возраста, пневмония, постгоспитальная реабилитация, метаболическая коррекция, астенический синдром, тканевая гипоксия, оксидативный стресс, восстановительное лечение, детская пульмонология, внебольничная пневмония.*

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## **EFFECTIVENESS OF METABOLIC CORRECTION OF PNEUMONIA IN YOUNG CHILDREN AT THE POST-HOSPITAL REHABILITATION STAGE**

***Abstract:** Pneumonia in young children remains one of the leading causes of hospitalization and subsequent functional impairment during the recovery period.*



*After completion of inpatient treatment, a significant proportion of children continue to experience asthenovegetative manifestations, residual cough, decreased appetite, sleep disturbances, and increased susceptibility to recurrent respiratory infections. A prospective comparative clinical study was conducted involving 84 children aged 3 months to 3 years who had completed inpatient treatment for community-acquired pneumonia. The main group consisted of 43 children who received standard post-hospital rehabilitation combined with metabolic correction; the comparison group comprised 41 children who received standard rehabilitation only. The dynamics of clinical symptoms, severity of asthenic syndrome, recovery of appetite, sleep and activity, frequency of residual cough, laboratory parameters, and frequency of recurrent respiratory episodes over a 3-month follow-up period were assessed.*

**Keywords:** *young children, pneumonia, post-hospital rehabilitation, metabolic correction, asthenic syndrome, tissue hypoxia, oxidative stress, recovery treatment, pediatric pulmonology, community-acquired pneumonia.*

**Введение.** Пневмония у детей раннего возраста остается одной из наиболее значимых проблем клинической педиатрии и детской пульмонологии, занимая ведущее место среди причин госпитализации, особенно в возрастной группе первых трех лет жизни. Несмотря на успехи в ранней диагностике, антибактериальной терапии и организации стационарной помощи, перенесенная пневмония у детей младшего возраста нередко сопровождается затяжным восстановительным периодом, что определяет необходимость разработки эффективных реабилитационных программ. (1)

Особенности течения пневмонии у детей раннего возраста обусловлены морфофункциональной незрелостью дыхательной системы, недостаточной зрелостью местных и системных механизмов иммунной защиты, высокой чувствительностью к гипоксии, склонностью к бронхообструктивным реакциям, а также выраженной зависимостью клинического состояния от преморбидного фона. Даже после завершения основного курса стационарного лечения у таких детей могут сохраняться остаточные аускультативные изменения, кашель, снижение толерантности к обычной активности, нарушения аппетита и сна, эмоциональная лабильность, астеновегетативные проявления и повышенная частота повторных респираторных эпизодов. (3,6,7)

Под метаболической коррекцией в педиатрической практике целесообразно понимать терапевтическое воздействие, направленное на оптимизацию энергетического обмена, улучшение утилизации кислорода, поддержку клеточного метаболизма и ускорение репаративных процессов в постинфекционном периоде. Однако, несмотря на патогенетическую обоснованность данного подхода, вопрос о его клинической эффективности у детей раннего возраста после перенесенной пневмонии остается недостаточно изученным. Имеющиеся данные фрагментарны, а публикации, посвященные именно постгоспитальному этапу реабилитации, немногочисленны. (8,10)

**Цель исследования** — оценить клиническую эффективность включения метаболической коррекции в программу постгоспитальной реабилитации детей раннего возраста после перенесенной пневмонии.

### **Материалы и методы**

Проведено проспективное сравнительное клиническое исследование на базе первого детского отделения Самаркандского филиала Республиканского научного центра экстренной медицинской помощи в период с января 2024 года по декабрь 2025 года.

В исследование включены 84 ребенка раннего возраста (от 3 месяцев до 36 месяцев), перенесших внебольничную пневмонию и завершивших стационарный этап лечения. Формирование выборки осуществлялось последовательно по мере выписки детей из стационара и соответствия критериям включения.

Основную группу составили 43 ребенка, которым на постгоспитальном этапе проводилась стандартная реабилитация в сочетании с метаболической коррекцией.

Группу сравнения составил 41 ребенок, получавший только стандартную постгоспитальную реабилитацию.

Группы были сопоставимы по возрасту, полу, тяжести перенесенной пневмонии, преморбидному фону, длительности стационарного лечения и основным клинико-анамнестическим характеристикам.

Метаболическая коррекция в основной группе проводилась как компонент комплексной реабилитации и была направлена на улучшение энергетического обмена, уменьшение последствий тканевой гипоксии и ускорение репаративных процессов. Программа включала комбинированную метаболическую поддержку с использованием L-карнитина в возрастной дозировке *per os* в течение 21 дня, а также витаминно-коферментной поддержки (водорастворимые витамины группы В и аскорбат в возрастных профилактико-реабилитационных дозах) на протяжении 14–21 дня. Выбор такой схемы был обусловлен ее патогенетической направленностью, допустимостью применения в раннем возрасте и хорошей переносимостью в педиатрической практике.

Назначение метаболической коррекции не рассматривалось как альтернатива базовой терапии и применялось исключительно как реабилитационный компонент после завершения острого инфекционного процесса.

**Результаты.** Средний возраст детей основной группы составил  $17,6 \pm 8,9$  месяца, группы сравнения —  $18,3 \pm 9,4$  месяца. Мальчики преобладали в обеих группах: 55,8% и 53,7% соответственно. Значимых различий по полу и возрасту не выявлено.

Неблагоприятный перинатальный анамнез отмечался у 39,5% детей основной группы и у 36,6% детей группы сравнения. Недоношенность в анамнезе регистрировалась у 16,3% и 14,6% детей соответственно. Искусственное или смешанное вскармливание в первые 6 месяцев жизни чаще

встречалось в обеих группах и составило около половины наблюдений. Фоновая анемия, рахитоподобные состояния, частые ОРИ, аллергическая предрасположенность и остаточные проявления перинатального поражения ЦНС встречались с сопоставимой частотой.

По тяжести перенесенной пневмонии большинство детей в обеих группах перенесли среднетяжелую форму заболевания. Тяжелая пневмония без необходимости длительной интенсивной терапии была зарегистрирована у 18,6% детей основной группы и 17,1% детей группы сравнения. Длительность стационарного лечения была сопоставимой и составила в среднем  $8,7 \pm 2,1$  дня и  $8,4 \pm 2,3$  дня соответственно.

Уже в первые 10–14 суток постгоспитального наблюдения у большинства детей отмечалась положительная динамика, однако темпы восстановления в исследуемых группах различались. У детей основной группы остаточный кашель сохранялся в среднем  $7,4 \pm 2,8$  дня, тогда как в группе сравнения —  $10,2 \pm 3,6$  дня ( $p = 0,001$ ). Аускультативные остаточные изменения в легких исчезали в среднем через  $6,1 \pm 2,4$  дня в основной группе и через  $8,5 \pm 2,9$  дня в группе сравнения ( $p < 0,001$ ).

Восстановление аппетита также происходило быстрее у детей, получавших метаболическую коррекцию: средний срок нормализации аппетита составил  $5,3 \pm 2,1$  дня против  $7,8 \pm 2,7$  дня в группе сравнения ( $p < 0,001$ ). Улучшение сна наступало через  $4,8 \pm 1,9$  дня против  $6,7 \pm 2,4$  дня соответственно ( $p < 0,001$ ), а восстановление обычной активности ребенка — через  $5,9 \pm 2,3$  дня и  $8,6 \pm 3,1$  дня ( $p < 0,001$ ). Особое внимание уделялось астеническому синдрому, который включал вялость, эмоциональную лабильность, снижение активности, повышенную утомляемость, ухудшение сна и аппетита. На 14-й день реабилитации клинически значимые астеновегетативные проявления сохранялись у 20,9% детей основной группы и у 46,3% детей группы сравнения ( $p = 0,013$ ).

Таким образом, включение метаболической коррекции сопровождалось более быстрым регрессом остаточных клинических проявлений и более ранним восстановлением общего состояния ребенка.

**Обсуждение.** Полученные данные патогенетически обоснованы. Пневмония у детей раннего возраста сопровождается не только локальным воспалительным процессом в легочной ткани, но и системной метаболической нагрузкой на организм. Даже после купирования острого инфекционного процесса у ребенка может сохраняться состояние относительной тканевой гипоксии, дисбаланса энергетического обмена, нарушения митохондриального обеспечения клеток, повышенной потребности в субстратах для репарации и восстановления. Эти процессы особенно значимы в раннем возрасте, когда интенсивность обмена веществ высока, а функциональные резервы организма ограничены. Одним из клинических проявлений постинфекционного метаболического неблагополучия у детей является астеновегетативный синдром, который в настоящем исследовании наблюдался достаточно часто. Он проявлялся

снижением активности, вялостью, нарушением сна, нестабильным аппетитом, эмоциональной лабильностью и более медленным восстановлением после завершения стационарного лечения. Включение метаболической поддержки способствовало более быстрому регрессу этих симптомов, что может быть связано с улучшением клеточного энергетического обеспечения, более эффективной утилизацией субстратов и снижением последствий гипоксического и воспалительного стресса.

**Заключение.** Таким образом, постгоспитальный период после перенесенной пневмонии у детей раннего возраста нередко сопровождается сохранением остаточных клинических проявлений, астеновегетативных нарушений и повышенной респираторной уязвимости. Включение метаболической коррекции в программу комплексной реабилитации способствует более быстрому клиническому восстановлению детей после пневмонии. На фоне метаболической коррекции отмечено достоверное сокращение сроков сохранения остаточного кашля, более раннее исчезновение аускультативных изменений и более быстрое восстановление аппетита, сна и двигательной активности.

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## ОСОБЕННОСТИ КОМПЛЕКСНОЙ ТЕРАПИИ ПЕЧЕНОЧНОЙ НЕДОСТАТОЧНОСТИ ПРИ ОЖОГОВОЙ БОЛЕЗНИ

**Резюме:** В данной статье анализируется патогенез и комплексные подходы к лечению печеночной недостаточности, развивающейся у пациентов с ожоговой болезнью. При тяжелых ожогах эндотоксинемия, гипоксия и нарушения обмена веществ приводят к дисфункции печени. Комплексная терапия включает инфузионную терапию, гепатопротекторы, антиоксиданты, методы детоксикации и оптимизацию питания. Ранняя диагностика и меры интенсивной терапии снижают вероятность развития печеночной недостаточности и повышают выживаемость пациентов. Результаты исследования демонстрируют клиническую эффективность комплексного подхода и подтверждают его важность в практике интенсивной терапии.

**Ключевые слова:** ожоговая болезнь, печеночная недостаточность, комплексная терапия, интенсивная терапия, детоксикация, гепатопротекторы, эндотоксинемия, гипоксия, инфузионная терапия, нарушение обмена веществ.

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## FEATURES OF COMPLEX THERAPY FOR LIVER FAILURE IN BURN DISEASE

**Abstract:** This article analyzes the pathogenesis and comprehensive approaches to treating liver failure developing in patients with burns. In severe burns, endotoxemia, hypoxia, and metabolic disorders lead to liver dysfunction. Comprehensive therapy includes infusion therapy, hepatoprotectors, antioxidants,



*detoxification methods, and nutritional optimization. Early diagnosis and intensive care measures reduce the likelihood of liver failure and improve patient survival. The study results demonstrate the clinical effectiveness of this comprehensive approach and confirm its importance in intensive care practice.*

**Keywords:** *burn disease, liver failure, comprehensive therapy, intensive care, detoxification, hepatoprotectors, endotoxemia, hypoxia, infusion therapy, metabolic disorders.*

**Введение:** Ожоговая болезнь — это тяжелый травматический процесс, приводящий к системной воспалительной реакции, гемодинамическим нарушениям и развитию полиорганной недостаточности. В частности, печень, как центральный метаболический и детоксикационный орган организма, является одним из органов, наиболее подверженных повреждениям в процессе ожога. При тяжелых ожогах гипоксия, эндотоксинемия, нарушения микроциркуляции и окислительный стресс вызывают повреждение клеток печени, что приводит к развитию печеночной недостаточности [1].

Современная литература отмечает, что дисфункция печени при ожоговой болезни часто связана с тяжелым течением заболевания и высокой смертностью. Цитокиновый каскад, особенно интерлейкин-6 и фактор некроза опухоли (ФНО- $\alpha$ ), играет важную роль в развитии печеночной недостаточности [2]. Кроме того, пост-ожоговый гиперметаболизм резко увеличивает нагрузку на печень, снижая ее функциональные резервы [3].

В последние годы принципы комплексной терапии направлены на предотвращение развития печеночной недостаточности и снижение ее тяжести. Важное значение имеют стабилизация гемодинамики с помощью инфузионной терапии, применение гепатопротекторных препаратов, использование антиоксидантов и методов детоксикации [3-4]. При этом раннее начало энтерального питания рекомендуется как эффективный метод сохранения функции печени [4]. Печеночная недостаточность при ожоговой болезни имеет сложные патогенетические механизмы, и ее лечение требует комплексного и индивидуального подхода.

**Цель исследования:** анализ особенностей развития печеночной недостаточности при ожоговой болезни и эффективности методов комплексной терапии.

**Материалы и методы:** Исследование носило экспериментальный характер, в качестве лабораторных животных использовались белые крысы (самцы, весом 180–220 г). Общее количество животных составило 120. Все животные содержались в стандартных условиях вивария (температура 22–24°C, 12-часовой световой режим, свободный доступ к пище и воде). Исследование проводилось в соответствии с правилами биоэтики.

Животные были разделены на 2 группы (n=60 в каждой группе):

Группа 1 – контрольная, ожог + стандартная интенсивная терапия;

Группа 2 – ожог + комплексная терапия (стандартное лечение + гепатопротекторы и антиоксиданты).

Модель ожога создавалась путем термического повреждения II–III степени, покрывающего 20–25% общей поверхности тела. Ожог вызывался путем воздействия на спину крыс водой температурой 95–100°C в течение 10 секунд с использованием стандартизированного метода. Перед процедурой животным проводили общую анестезию (кетамин 80 мг/кг и пропофол 10 мг/кг).

Стандартная интенсивная терапия включала инфузионную терапию (0,9% раствор хлорида натрия, 10 мл/кг/сутки), анальгезию и антибактериальную терапию. В группе комплексной терапии дополнительно применялись гепатопротекторные и антиоксидантные препараты (Эссенциале Н 250мг и Глутион 600 мг).

В ходе исследования у животных брали образцы крови на 1, 3, 7 и 14 дни, оценивали показатели функции печени (АЛТ, АСТ, общий билирубин). Также брали образцы биопсии печеночной ткани для гистологического исследования. Гистологические препараты окрашивали гематоксилином-эозином и исследовали под микроскопом.

Результаты статистически обрабатывали, рассчитывали среднее значение (M) и стандартную ошибку (m). Различия между группами оценивались с помощью t-критерия Стьюдента, при этом значение  $p < 0,05$  считалось статистически значимым.

**Результаты исследования:** Исследование показало, что эффект комбинированного лечения и терапии на функциональное состояние печени у пациентов с ожоговой болезнью был значительным.

На 1-й день (ожог + стандартная интенсивная терапия) отмечалось восстановление уровня ферментов печени – АЛТ и АСТ, а также общего билирубина. Это было связано с повреждением гепатоцитов в результате эндотоксинемии, гипоксии и метаболических процессов, происходящих у пациентов с ожогами. На 3–7-й дни показатели достигали максимума, а к 14-му дню наблюдалось частичное снижение, но они не достигали физиологической нормы ( $p < 0,05$ ).

В группе 2 (ожог + комбинированное лечение) было установлено, что восстановление функциональных показателей печени происходило значительно быстрее. Уровни АЛТ, АСТ и билирубина значительно снижались с 7-го дня и к 14-му дню были значительно ниже, чем в группе 1 ( $p < 0,05$ ). Это объясняется гепатопротекторным и антиоксидантным действием комбинированной терапии.

| Группы   | АЛТ         | АСТ          | Билирубин<br>(мкмоль/л) |
|----------|-------------|--------------|-------------------------|
| 1 группа | 102,3 ± 4,5 | 168,7 ± 6,2  | 17,9 ± 0,8              |
| 2 группа | 68,5 ± 3,1# | 112,4 ± 5,0# | 10,8 ± 0,6#             |

# Значительная разница по сравнению с группой 1 ( $p < 0,05$ )

*Результаты гистологического исследования*

В группе 1 в ткани печени сохранялись дистрофия гепатоцитов, вакуолизация, расширение синусоидов и воспалительная инфильтрация. В некоторых областях наблюдались некротические изменения.

В группе 2 наблюдалось восстановление структуры гепатоцитов, уменьшение воспалительной инфильтрации и улучшение микроциркуляции, с преобладанием регенеративных процессов в ткани печени.

### **Заключение**

Результаты исследования показали, что развитие печеночной недостаточности у пациентов с ожогами тесно связано со сложными патогенетическими механизмами – системным воспалительным ответом, эндотоксинемией, гипоксией и окислительным стрессом. Было установлено, что, хотя стандартная интенсивная терапия частично поддерживает функцию печени, она не может полностью устранить повреждение гепатоцитов, и показатели функции печени остаются на высоком уровне в течение длительного времени.

Комбинированная терапия (применение гепатопротекторов и антиоксидантов в дополнение к стандартному лечению) значительно снижает тяжесть печеночной недостаточности. Достоверное снижение биохимических показателей (АЛТ, АСТ, билирубин) и восстановление гистологической структуры подтверждают высокую эффективность этого подхода. В частности, восстановление стабильности мембран гепатоцитов, снижение активности свободных радикалов и активизация процессов регенерации были показаны как один из основных механизмов комбинированной терапии.

Результаты исследования также показали важность раннего выявления повреждения печени у пациентов с ожогами и своевременного начала патогенетически обоснованной терапии. Применение комплексного подхода на ранних стадиях позволяет ограничить развитие печеночной недостаточности, снизить риск полиорганной недостаточности и улучшить общий прогноз.

Таким образом, комбинированная терапия является эффективным и научно обоснованным подходом к профилактике и лечению печеночной недостаточности у пациентов с ожогами, и ее желательно широко внедрять в практику интенсивной терапии.

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## **МОРФОЛОГИЧЕСКИЕ ОСОБЕННОСТИ СЛИЗИСТОЙ ОБОЛОЧКИ ЖЕЛУДКА У БОЛЬНЫХ С ОЖГОВОЙ БОЛЕЗНЬЮ И ПУТИ СОВЕРШЕНСТВОВАНИЯ ИНТЕНСИВНОЙ ТЕРАПИИ (ОБЗОР ЛИТЕРАТУРЫ)**

**Резюме:** В данной статье анализируются морфологические изменения слизистой оболочки желудка у пациентов с ожогами и методы улучшения интенсивной терапии. При тяжелых ожогах системная воспалительная реакция, гипоксия, нарушения микроциркуляции и стрессовые факторы приводят к повреждению слизистой оболочки желудка. В результате развиваются эрозии, стрессовые язвы и воспалительная инфильтрация. Исследования показали, что эти изменения ухудшают общее состояние пациентов и повышают риск осложнений. Важную роль в защите слизистой оболочки желудка играют современные подходы к интенсивной терапии, включая ингибиторы протонной помпы, энтеральное питание, антиоксиданты и препараты, улучшающие микроциркуляцию. Морфологические исследования являются одним из основных критериев оценки эффективности лечения. Комплексный подход ускоряет восстановление слизистой оболочки желудка и улучшает клинические результаты.

**Ключевые слова:** ожоги, слизистая оболочка желудка, морфологические изменения, стрессовые язвы, интенсивная терапия, ингибиторы протонной помпы, микроциркуляция, энтеральное питание, окислительный стресс, детоксикация

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## **MORPHOLOGICAL FEATURES OF THE GASTRIC MUCOSA IN PATIENTS WITH BURN DISEASE AND WAYS TO IMPROVE INTENSIVE CARE**

**Abstract:** *This article analyzes morphological changes in the gastric mucosa in burn patients and methods for improving intensive care. In severe burns, a systemic inflammatory response, hypoxia, microcirculatory disorders, and stress factors lead to damage to the gastric mucosa. This results in the development of erosions, stress ulcers, and inflammatory infiltration. Studies have shown that these changes worsen the general condition of patients and increase the risk of complications. Modern approaches to intensive care, including proton pump inhibitors, enteral nutrition, antioxidants, and drugs that improve microcirculation, play an important role in protecting the gastric mucosa. Morphological studies are one of the main criteria for assessing treatment effectiveness. A comprehensive approach accelerates gastric mucosal recovery and improves clinical outcomes.*

**Keywords:** *burns, gastric mucosa, morphological changes, stress ulcers, intensive care, proton pump inhibitors, microcirculation, enteral nutrition, oxidative stress, detoxification.*

**Введение.** Ожоги — это тяжелые травматические процессы, приводящие к глубоким системным изменениям в организме, включая развитие синдрома системного воспалительного ответа (ССВО), гиперметаболизма и полиорганной недостаточности. В пост-ожоговый период желудочно-кишечная система, особенно слизистая оболочка желудка, является одной из наиболее чувствительных структур. Повреждение внутренних органов, особенно желудочно-кишечного тракта, во время ожогов оказывает значительное влияние на прогноз пациента [1].

В норме слизистая оболочка желудка защищена слизистым барьером, секрецией бикарбоната и адекватным кровообращением. Однако при ожогах эти защитные механизмы нарушаются. Пост-ожоговое гиперметаболическое состояние и гипоперфузия внутренних органов являются основными факторами повреждения слизистой оболочки [2]. Считается, что в результате централизации кровообращения уменьшается приток крови к стенке желудка, что приводит к гипоксии и нарушению клеточной энергии.

Кроме того, реперфузионное повреждение и окислительный стресс играют важную роль при ожоговых заболеваниях. Повышенное образование свободных радикалов увеличивает перекисное окисление липидов, приводя к повреждению клеточных мембран. Этот процесс вызывает развитие эрозий и некротических изменений в слизистой оболочке желудка [3].

Воспалительные медиаторы также играют важную роль. Цитокины, в частности ФНО- $\alpha$  и интерлейкины, усиливают воспалительную инфильтрацию в слизистой оболочке и замедляют процессы регенерации. Развитие стрессовых язв в условиях интенсивной терапии связано с этими патогенетическими факторами [3-4].

Клинически эти изменения проявляются в виде стрессовых язв (язв Керлинга), желудочно-кишечного кровотечения и нарушений пищеварения.



Эти осложнения связаны с высокой смертностью при тяжелых ожогах и представляют собой серьезную проблему в отделениях интенсивной терапии.

Защита слизистой оболочки желудка является одним из основных направлений современной интенсивной терапии. Раннее энтеральное питание улучшает трофику слизистой оболочки и ускоряет ее регенерацию. Кроме того, ингибиторы протонной помпы и блокаторы H<sub>2</sub>-рецепторов защищают слизистую оболочку, снижая секрецию кислоты [5].

Слизистая оболочка желудка является важной защитной системой организма, ее целостность обеспечивается секрецией слизи, быстрой регенерацией эпителиальных клеток и адекватной микроциркуляцией. Однако при ожоговых заболеваниях эти механизмы нарушаются. Гиперметаболизм и стрессовая реакция, возникающие в организме в постреабилитационный период, резко нарушают трофику слизистой оболочки желудка [6].

Нарушение спланхического кровообращения является одним из основных патогенетических факторов при ожоговых заболеваниях. В случаях сильного стресса кровоток к внутренним органам снижается, что сопровождается гипоксией [7]. В результате гипоксии эпителиальные клетки испытывают дефицит энергии, что приводит к их функциональному и структурному повреждению.

Кроме того, важны также изменения, происходящие на уровне микроциркуляции. Нарушения микроциркуляции приводят к резкому снижению поступления кислорода к тканям, что усиливает некротические процессы в слизистой оболочке желудка. Одновременно элементы застоя и тромбоза на капиллярном уровне нарушают защитную функцию слизистой оболочки [8].

Окислительный стресс также является одним из ведущих факторов повреждения слизистой оболочки желудка. Дисбаланс между свободными радикалами и антиоксидантной системой повреждает липидные компоненты клеточных мембран [9]. Это снижает стабильность эпителиального слоя, создавая основу для образования эрозий и язв.

Активация нейроэндокринной системы также играет важную роль в развитии ожоговой болезни. Повышение уровня гормонов стресса – кортизола и катехоламинов – увеличивает секрецию желудочной кислоты и оказывает агрессивное воздействие на слизистую оболочку [10]. Дисфункция, возникающая в желудочно-кишечной системе во время стресса, была оценена как важный компонент развития полиорганной недостаточности. В клинической практике повреждение слизистой оболочки желудка у пациентов с ожогами часто проявляется стрессовыми язвами и желудочно-кишечным кровотечением. Эти состояния ухудшают состояние пациентов в реанимации и снижают эффективность лечения. Желудочно-кишечные осложнения являются независимым фактором, повышающим смертность у тяжелообожженных пациентов [11].

Одно из главных направлений современной интенсивной терапии — защита слизистой оболочки желудка и уменьшение ее повреждений. Широко используются ингибиторы протонной помпы, которые снижают секрецию желудочной кислоты и защищают слизистую оболочку от агрессивной среды.

Кроме того, раннее начало энтерального питания важно для поддержания функции желудочно-кишечной системы. Питание улучшает трофику слизистой оболочки, восстанавливает барьерную функцию кишечника и снижает риск бактериальной транслокации. В то же время адекватная инфузионная терапия и гемодинамическая стабилизация могут восстановить кровообращение в висцеральных органах.

Таким образом, морфологические изменения слизистой оболочки желудка у пациентов с ожогами имеют многофакторный патогенез, связанный с гипоксией, нарушениями микроциркуляции, окислительным стрессом и воспалительными процессами [12]. Углубленное изучение этих изменений и совершенствование методов интенсивной терапии имеют большое значение в клинической практике.

**Заключение.** Повреждение слизистой оболочки желудка у пациентов с ожогами развивается в результате сложных и многофакторных патогенетических механизмов. В основе этого процесса лежат гипоперфузия внутренних органов, гипоксия тканей, нарушения микроциркуляции, окислительный стресс и системная воспалительная реакция. В совокупности эти факторы нарушают защитную функцию слизистой оболочки, приводя к развитию дистрофии эпителиальных клеток, эрозий, стрессовых язв и некротических изменений.

Морфологические изменения слизистой оболочки желудка имеют клинически важное значение и напрямую связаны с тяжестью общего состояния пациентов, развитием осложнений и уровнем летальности. Поэтому раннее выявление этих изменений и их устранение с помощью патогенетически обоснованного лечения являются одним из важных направлений интенсивной терапии. Стандартной интенсивной терапии недостаточно для полного устранения повреждения слизистой оболочки желудка. Поэтому необходимо применять комплексный подход, направленный на снижение секреции желудочной кислоты, улучшение микроциркуляции, уменьшение окислительного стресса и стимуляцию регенерации слизистой оболочки.

Также важную роль в восстановлении слизистой оболочки желудка играют раннее энтеральное питание, адекватная инфузионная терапия и стабилизация гемодинамики. Эти меры улучшают трофику слизистой оболочки, восстанавливают ее защитные свойства и снижают риск осложнений.

Применение комплексной интенсивной терапии с учетом морфологических изменений слизистой оболочки желудка у пациентов с ожогами позволяет улучшить клинические результаты, снизить риск

осложнений и оптимизировать общий прогноз. Дальнейшие исследования в этой области помогут разработать индивидуальные стратегии лечения.

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## **КАЧЕСТВО ЖИЗНИ ЖЕНЩИН ПРИ ВОСПАЛИТЕЛЬНЫХ ЗАБОЛЕВАНИЯХ ГЕНИТАЛИЙ**

***Аннотация:** Воспалительные заболевания гениталий у женщин сохраняют высокую распространенность в структуре гинекологической патологии и представляют собой значимую клиническую и медико-социальную проблему. Проведено одномоментное сравнительное клинико-социологическое исследование с участием 124 женщин в возрасте от 18 до 45 лет. Основную группу составили 84 пациентки с воспалительными заболеваниями нижних и/или верхних отделов половых путей, группу сравнения — 40 практически здоровых женщин без признаков активной гинекологической патологии. Для оценки качества жизни использованы опросник SF-36. Дополнительно анализировались интенсивность боли по визуально-аналоговой шкале, наличие диспареунии, частота рецидивов, эмоциональные нарушения и особенности репродуктивных планов.*

***Ключевые слова:** воспалительные заболевания гениталий, воспалительные заболевания органов малого таза, качество жизни, SF-36, хроническая тазовая боль, диспареуния, сексуальное здоровье, репродуктивное здоровье, рецидивирующее течение.*

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## **QUALITY OF LIFE IN WOMEN WITH INFLAMMATORY DISEASES OF THE GENITALIA**

***Abstract:** Inflammatory diseases of the genitalia in women remain highly prevalent in the structure of gynecological pathology and represent a significant clinical, medical, and social problem. A cross-sectional comparative clinical-sociological study was conducted involving 124 women aged 18 to 45 years. The main group consisted of 84 patients with inflammatory diseases of the lower and/or upper genital tract; the comparison group comprised 40 practically healthy women with no signs of active gynecological pathology. The SF-36 questionnaire was used*

*to assess quality of life. Additionally, pain intensity was analyzed using a visual analog scale, the presence of dyspareunia, frequency of recurrences, emotional disturbances, and reproductive plans were assessed.*

**Keywords:** *inflammatory diseases of the genitalia, pelvic inflammatory disease, quality of life, SF-36, chronic pelvic pain, dyspareunia, sexual health, reproductive health, recurrent course.*

**Введение.** Воспалительные заболевания гениталий у женщин занимают одно из ведущих мест в структуре гинекологической заболеваемости и включают широкий спектр инфекционно-воспалительных поражений нижних и верхних отделов половых путей. К ним относятся вульвовагиниты, цервициты, хронический эндометрит, сальпингоофорит и воспалительные заболевания органов малого таза. Высокая распространенность данной патологии определяется сочетанием инфекционных, поведенческих, микробиологических и иммунологических факторов, а клиническая значимость связана не только с острым воспалительным процессом, но и с его отсроченными последствиями. (1)

Особое место в современной гинекологии занимает проблема хронического и рецидивирующего течения воспалительных заболеваний. Даже после проведения этиотропной и патогенетической терапии у части пациенток сохраняются тазовая боль, ощущение дискомфорта, нарушения половой жизни, тревожность, астенизация и снижение социальной активности. Длительное существование симптомов формирует устойчивое субъективное ощущение неблагополучия, влияет на профессиональную и семейную сферу, а у женщин репродуктивного возраста сопряжено с опасениями относительно фертильности, течения будущей беременности и риска повторных эпизодов заболевания. (4,5)

В современной литературе имеются данные о связи воспалительных заболеваний органов малого таза, хронической тазовой боли и рецидивирующих инфекций нижних отделов половых путей со снижением качества жизни. Однако большинство работ посвящено либо отдельным нозологическим формам, либо преимущественно инфекционно-клиническим аспектам заболевания без комплексной оценки физического, психологического, сексуального и социального функционирования. Недостаточно изучено влияние длительности заболевания, частоты рецидивов и выраженности болевого синдрома на интегральные показатели качества жизни, что ограничивает возможности разработки пациент-ориентированных программ наблюдения и реабилитации. (5,6)

**Цель исследования** — оценить качество жизни женщин репродуктивного возраста при воспалительных заболеваниях гениталий и определить клинико-anamnestические факторы, ассоциированные с его снижением.

**Материалы и методы.** Работа проводилась на базе консультативно-диагностического отделения и гинекологического отделения



многопрофильной клинике СамГМУ в период с января 2024 года по декабрь 2025 года. В исследование включены 124 женщины репродуктивного возраста от 18 до 45 лет. Основную группу составили 84 пациентки с клинически и лабораторно подтвержденными воспалительными заболеваниями гениталий. В группу сравнения вошли 40 практически здоровых женщин, проходивших профилактический гинекологический осмотр и не имевших признаков активной воспалительной, эндокринной или выраженной структурной патологии органов репродуктивной системы. Средний возраст обследованных составил  $30,9 \pm 6,1$  года. В основной группе он был равен  $31,4 \pm 5,9$  года, в группе сравнения —  $29,8 \pm 6,3$  года; статистически значимых различий по возрасту между группами не выявлено.

В структуре воспалительной патологии учитывались вульвовагинит, вагинит, цервицит, хронический эндометрит, сальпингоофорит и воспалительные заболевания органов малого таза смешанной локализации. У части пациенток имелось сочетанное поражение нижних и верхних отделов половых путей, что соответствовало реальной клинической картине.

Диагностический алгоритм включал гинекологический осмотр в зеркалах, бимануальное исследование, микроскопию мазков из влагалища, цервикального канала и уретры, бактериологическое исследование отделяемого по показаниям, ПЦР-диагностику инфекций, передаваемых половым путем, ультразвуковое исследование органов малого таза, а также общеклинические лабораторные методы.

Оценка качества жизни проводилась с использованием русскоязычной валидизированной версии опросника SF-36, включающего шкалы физического функционирования, ролевого функционирования, обусловленного физическим состоянием, боли, общего состояния здоровья, жизненной активности, социального функционирования, ролевого эмоционального функционирования и психического здоровья. Баллы по каждой шкале варьировали от 0 до 100, при этом более высокие значения соответствовали лучшему качеству жизни. Дополнительно рассчитывались физический и психический компоненты здоровья.

**Результаты.** Клинико-анамнестическая характеристика обследованных показала, что женщины основной группы и группы сравнения были сопоставимы по возрасту, индексу массы тела, семейному положению, уровню образования и основным социально-демографическим параметрам. Средний возраст в основной группе составил  $31,4 \pm 5,9$  года, в группе сравнения —  $29,8 \pm 6,3$  года. Индекс массы тела был равен  $24,7 \pm 3,8$  кг/м<sup>2</sup> и  $23,9 \pm 3,5$  кг/м<sup>2</sup> соответственно. В стабильных отношениях состояли 66,7% пациенток основной группы и 70,0% женщин группы сравнения. Высшее или неоконченное высшее образование имели 58,3% и 65,0% обследованных соответственно. Беременности в анамнезе отмечались у 59,5% пациенток основной группы и у 62,5% женщин группы сравнения. Частота бесплодия была выше в основной группе и составила 16,7% против 5,0%, однако различие носило пограничный характер.



Нарушения менструальной функции выявлены у 28,6% пациенток с воспалительными заболеваниями гениталий и у 12,5% женщин группы сравнения, что свидетельствовало о более частом вовлечении менструальной функции при хроническом воспалительном процессе. Патологические выделения из половых путей в основной группе регистрировались у 72,6% женщин, боли внизу живота и в малом тазу — у 63,1%, хроническая тазовая боль продолжительностью более шести месяцев — у 36,9%, диспареуния — у 40,5%, дизурические жалобы — у 22,6%. Жалобы на тревожность, раздражительность или эмоциональную нестабильность предъявляли 56,0% пациенток основной группы, нарушения сна — 34,5%. В группе сравнения аналогичные показатели были статистически значимо ниже.

При анализе структуры воспалительных заболеваний установлено, что изолированное поражение нижних отделов половых путей имелось у 41,7% пациенток основной группы, тогда как признаки вовлечения верхних отделов половых путей или смешанные формы воспалительного процесса отмечались у 58,3% обследованных. Средняя длительность заболевания составила  $18,6 \pm 11,2$  месяца. Рецидивирующее течение с двумя и более эпизодами за последние 12 месяцев зарегистрировано у 54,8% пациенток, хроническое течение с периодами клинической манифестации — у 34,5%, впервые выявленный эпизод — у 10,7%.

Средняя интенсивность боли по визуально-аналоговой шкале в основной группе составила  $4,8 \pm 2,1$  балла, а среди пациенток с хронической тазовой болью достигала  $6,1 \pm 1,4$  балла. Почти половина женщин основной группы, а именно 45,2%, сообщали о выраженных опасениях относительно возможного влияния заболевания на репродуктивную функцию, наступление беременности и риск осложнений в дальнейшем.

Для наглядности основные клинико-анамнестические различия можно представить в текстовом табличном формате. Средний возраст составлял  $31,4 \pm 5,9$  года в основной группе и  $29,8 \pm 6,3$  года в группе сравнения,  $p = 0,184$ . Индекс массы тела —  $24,7 \pm 3,8$  и  $23,9 \pm 3,5$  кг/м<sup>2</sup>,  $p = 0,271$ . Нарушения менструальной функции встречались у 28,6% и 12,5% женщин соответственно,  $p = 0,041$ . Патологические выделения — у 72,6% и 10,0%,  $p < 0,001$ . Боль внизу живота — у 63,1% и 15,0%,  $p < 0,001$ . Хроническая тазовая боль — у 36,9% и 5,0%,  $p < 0,001$ . Диспареуния — у 40,5% и 12,5%,  $p = 0,002$ . Жалобы на тревожность или раздражительность — у 56,0% и 22,5%,  $p < 0,001$ .

Сравнительный анализ качества жизни по шкалам SF-36 показал статистически значимое снижение большинства параметров у пациенток с воспалительными заболеваниями гениталий. Физическое функционирование в основной группе составило  $74,8 \pm 15,2$  балла, тогда как в группе сравнения —  $88,6 \pm 10,4$  балла,  $p < 0,001$ . Рольное функционирование, обусловленное физическим состоянием, составило  $58,7 \pm 24,9$  против  $84,1 \pm 18,3$  балла,  $p < 0,001$ . Показатель боли был равен  $52,9 \pm 18,6$  против  $79,4 \pm 13,8$  балла,  $p < 0,001$ . Общее состояние здоровья оценивалось в  $56,4 \pm 14,7$  и  $70,8 \pm 12,6$  балла соответственно,  $p < 0,001$ .

Жизненная активность у пациенток основной группы была снижена до  $48,1 \pm 15,9$  балла по сравнению с  $66,7 \pm 12,4$  балла в группе сравнения,  $p < 0,001$ . Социальное функционирование составило  $61,3 \pm 18,1$  против  $82,6 \pm 13,5$  балла,  $p < 0,001$ . Ролевое эмоциональное функционирование —  $60,7 \pm 26,2$  против  $83,5 \pm 19,1$  балла,  $p < 0,001$ . Психическое здоровье было ниже у пациенток основной группы и составило  $55,8 \pm 14,3$  балла против  $71,0 \pm 11,7$  балла в группе сравнения,  $p < 0,001$ . Интегральный физический компонент здоровья равнялся  $57,1 \pm 11,8$  балла против  $72,8 \pm 9,6$  балла, а психический компонент —  $54,3 \pm 12,1$  против  $69,7 \pm 10,8$  балла; в обоих случаях различия были статистически значимыми при  $p < 0,001$ .

Психоземональные и социальные последствия заболевания были выражены достаточно отчетливо. Повышенную тревожность, раздражительность или эмоциональную нестабильность отмечали 56,0% пациенток основной группы, нарушения сна — 34,5%, снижение работоспособности — 39,3%, ограничение социальной активности — 32,1%, пропуски работы или учебы, связанные с обострениями или болевым синдромом, — 26,2%. Нарушение интимных отношений в связи с заболеванием отмечали 42,9% пациенток. Среди женщин, планировавших беременность в ближайшие один-два года, показатели тревожности и неудовлетворенности здоровьем были выше, чем у пациенток без актуальных репродуктивных планов, что указывает на дополнительное негативное влияние репродуктивной тревоги на психологический компонент качества жизни.

**Обсуждение.** Проведенное исследование показало, что воспалительные заболевания гениталий сопровождаются клинически значимым снижением качества жизни женщин репродуктивного возраста. Полученные данные свидетельствуют о том, что данная патология выходит далеко за пределы локального инфекционно-воспалительного процесса и оказывает системное влияние на физическое состояние, психоземональное благополучие, сексуальное здоровье, социальную активность и репродуктивное поведение.

Наиболее выраженные различия между пациентками основной группы и женщинами без активной гинекологической патологии были выявлены по шкалам боли, жизненной активности, ролевого физического и эмоционального функционирования, социального функционирования и психического здоровья. Это позволяет рассматривать качество жизни как чувствительный интегральный показатель бремени заболевания, отражающий не только его клинические проявления, но и степень нарушения повседневного функционирования.

**Выводы.** Таким образом, результаты исследования демонстрируют многокомпонентное влияние воспалительных заболеваний гениталий на повседневную жизнь женщины. Наиболее значимыми факторами снижения качества жизни оказались хроническая тазовая боль, диспареуния, длительное и рецидивирующее течение заболевания, а также вовлечение верхних отделов половых путей.

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## **ГЕНДЕРНО - ВОЗРАСТНЫЕ И СОМАТОТИПИЧЕСКИЕ ОСОБЕННОСТИ ГЕПАТОБИЛИАРНОЙ СИСТЕМЫ ЧЕЛОВЕКА (ОБЗОР ЛИТЕРАТУРЫ)**

**Резюме:** В работе проведён комплексный анализ анатомо-физиологических особенностей гепатобилиарной системы с учётом гендерных, возрастных и соматотипических факторов. Представлены современные данные о морфометрических параметрах печени, поджелудочной железы, желчных протоков и селезёнки у различных групп пациентов. Рассмотрены нормативные показатели размеров органов, их вариации при изменении возраста, пола и телосложения. Особое внимание уделено возможностям ультразвуковой диагностики как основного метода неинвазивной визуализации структурных изменений гепатобилиарной системы. Обоснована значимость комплексной оценки индивидуальных анатомических параметров при интерпретации УЗИ-данных и ранней диагностике различных патологий.

**Ключевые слова:** гепатобилиарная система, печень, поджелудочная железа, селезёнка, возраст, пол, соматотип, ультразвуковая диагностика.

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## GENDER, AGE AND SOMATOTYPICAL CHARACTERISTICS OF THE HEPATOBILIARY SYSTEM (LITERATURE REVIEW)

**Abstract:** *This article presents a comprehensive analysis of the anatomical and physiological features of the hepatobiliary system, considering gender, age, and somatotypic factors. Current data on the morphometric parameters of the liver, pancreas, bile ducts, and spleen in various patient groups are discussed. Normative organ size indicators and their variations depending on age, gender, and body type are reviewed. Special attention is given to the capabilities of ultrasound diagnostics as the primary non-invasive method for visualizing structural changes in the hepatobiliary system. The importance of individualized anatomical assessment in interpreting ultrasound data and in early diagnosis of various pathologies is emphasized.*

**Keywords:** *hepatobiliary system, liver, pancreas, spleen, age, gender, somatotype, ultrasound diagnostics.*

**Введение.** Гепатобилиарная система, включая печень, поджелудочную железу, желчные и печеночные протоки, подвержена значительным изменениям в зависимости от пола и возраста. Эти особенности имеют важное значение для клинической диагностики и интерпретации ультразвуковых данных.

В норме размеры органов гепатобилиарной системы варьируют в зависимости от возраста. У детей и подростков размеры печени, поджелудочной железы и селезенки растут в соответствии с физическим развитием, достигая максимальных значений к 18-20 годам. Согласно данным исследований, у детей от 1 года до 5 лет длина правой доли печени колеблется от 6 до 9 см, а левой доли — от 3 до 5 см. К 10-12 годам эти параметры увеличиваются до 9-12 см и 5-7 см соответственно [1-5].

У взрослых здоровых людей размер правой доли печени в среднем составляет 13-15 см, а левой — 7-10 см. В пожилом возрасте, начиная с 60-65 лет, возможно незначительное увеличение размеров печени, что связано с накоплением жировых и коллагеновых включений. Однако это не всегда является патологией и рассматривается как возрастная норма, если не наблюдаются другие отклонения в структуре или функции печени [9-14].

Размеры желчных и внутripеченочных протоков варьируются в зависимости от возраста, пола и телосложения пациента, что необходимо учитывать при ультразвуковой диагностике. У детей до 10 лет диаметр общего печеночного протока составляет в среднем 2,5-3 мм, постепенно увеличиваясь к 15-18 годам и достигая взрослой нормы в 4-6 мм. У взрослых диаметр общего печеночного протока варьируется от 4 до 6 мм, а после 60 лет диаметр может достигать 7-8 мм без признаков патологии, что связано с возрастными изменениями [18-21].



Внутрипеченочные протоки, которые в норме менее заметны на УЗИ, имеют средний диаметр около 2 мм у взрослых. Расширение этих протоков у здоровых людей наблюдается редко и может возникать в ответ на повышение нагрузки при увеличении физической активности или изменениях в рационе. Однако в норме диаметр внутрипеченочных протоков не должен превышать 3 мм, и любые отклонения от этой нормы обычно требуют дополнительного обследования для исключения патологий [5-9].

Поджелудочная железа у детей имеет небольшие размеры, постепенно увеличиваясь до нормальных значений к периоду полового созревания. У взрослых размеры головки поджелудочной железы составляют 2,5–3,5 см, тела – 1,5–2,5 см, хвоста – до 3 см. У пожилых людей также возможны незначительные изменения размеров и эхогенности поджелудочной железы, которые являются нормой, если не сопровождаются изменениями в структуре тканей [11-13].

Селезенка у детей от 1 года до 5 лет имеет длину около 6-7 см и ширину 2-3 см. К 10 годам длина селезенки достигает 8-9 см, а к 18 годам — 10-12 см, что соответствует размерам у взрослых. В среднем у взрослого человека длина селезенки составляет 11-13 см, ширина — 5-6 см, а толщина — около 3-4 см. У пожилых людей размеры селезенки могут немного уменьшаться, что связано с возрастными изменениями в кровоснабжении и тканевой структуре органа [23].

Исследования показывают, что у мужчин и женщин имеются различия в структуре и функции органов гепатобилиарной системы. В частности, печень у мужчин в среднем больше по размерам, что связано с большей массой тела и более высоким уровнем метаболической активности. Эхогенность печени также может колебаться в зависимости от половых гормонов: у женщин, например, уровень эстрогенов может способствовать отложению жиров в печени, что увеличивает вероятность развития жирового гепатоза, особенно в постменопаузальном периоде [13-17].

У женщин чаще встречаются заболевания желчного пузыря, такие как холецистит и желчнокаменная болезнь, что связано с влиянием эстрогенов на метаболизм холестерина и желчных кислот. У мужчин, напротив, чаще регистрируются алкогольные поражения печени и более высокий риск развития цирроза. Эти половые различия важны для определения групп риска и разработки профилактических мер [22].

С возрастом происходит ряд изменений в структуре и функции органов гепатобилиарной системы. Ультразвуковые исследования показывают, что размеры печени могут увеличиваться с возрастом, что связано с накоплением жировых и коллагеновых отложений. Эластичность ткани печени уменьшается, что увеличивает риск фиброзных изменений и цирроза. Снижение кровотока и отложение жиров могут также приводить к жировому гепатозу у пожилых пациентов, особенно при наличии метаболического синдрома и диабета [7-12].



У пожилых людей также возрастает вероятность развития заболеваний желчного пузыря. Исследования показывают, что риск холецистита и образования камней в желчном пузыре возрастает после 60 лет. Кроме того, снижается функциональная активность поджелудочной железы, что может быть связано с атрофическими процессами и кальцификацией. Эти возрастные изменения увеличивают риск нарушений пищеварения и обмена веществ у пожилых людей, требуя более частого наблюдения и скрининговых обследований [8-15].

Соматотипические особенности, включающие эктоморфный, мезоморфный и эндоморфный типы телосложения, играют значительную роль в формировании ультразвуковых параметров органов гепатобилиарной системы.

Эктоморфный соматотип характеризуется тонкой, удлинённой формой тела, с низким процентом жировой массы. У людей с эктоморфным типом телосложения обычно наблюдаются меньшие размеры печени и поджелудочной железы, что может объясняться низким содержанием жировых отложений и общим снижением метаболической нагрузки на гепатобилиарную систему. Исследования показывают, что у эктоморфов реже развиваются жировой гепатоз и метаболические заболевания печени, что связано с более низким индексом массы тела [22]. Печень у эктоморфов обычно не превышает 14 см в длину правой доли, что связано с низким уровнем жировых накоплений. Это также отражается на меньшем размере поджелудочной железы и менее выраженной эхогенности печени [13-19].

Мезоморфы имеют среднее телосложение с преобладанием мышечной массы. Для данной группы характерен умеренный риск метаболических заболеваний печени, однако они подвержены риску нарушений, связанных с избыточным питанием или переизбытком белков в рационе. Исследования показывают, что у людей с мезоморфным телосложением чаще развиваются функциональные расстройства желчного пузыря, что требует профилактического наблюдения за параметрами липидного обмена и биохимическими показателями печени [7-9].

Люди с мезоморфным телосложением имеют более развитую мышечную массу и умеренное содержание жира, что отражается на размерах гепатобилиарных органов. Размеры печени у мезоморфов составляют 13-15 см для правой доли и 6-8 см для левой. Желчные протоки у данной категории пациентов также могут быть несколько шире из-за более высокого уровня метаболической активности и потребности в более интенсивном пищеварении, что может объяснять незначительное расширение желчных протоков у физически активных лиц с мезоморфным телосложением [14-20].

Эндоморфный тип характеризуется широким телосложением, с высоким уровнем жировых отложений. Люди с эндоморфным типом телосложения имеют более высокий риск развития жирового гепатоза и других метаболических нарушений печени, особенно при наличии ожирения. Эхогенность печени у таких пациентов часто повышена, что связано с

отложением липидов. В исследовании была выявлена корреляция между ИМТ и степенью экзогенности печени, что подчеркивает важность мониторинга за состоянием гепатобилиарной системы у людей с эндоморфным телосложением [13-15].

Эндоморфное телосложение, характеризующееся широким телом и высоким содержанием жира, сопровождается увеличенными размерами печени и повышенной экзогенностью, особенно при высоком индексе массы тела. У эндоморфов размеры печени могут превышать 15 см, что связано с отложением жира в гепатоцитах даже при отсутствии жирового гепатоза. Желчные протоки у эндоморфов также могут иметь немного больший диаметр, что требует учета при интерпретации результатов ультразвуковых исследований [19-22].

Многочисленные исследования подтверждают важность учёта половых, возрастных и соматотипических факторов при диагностике и лечении заболеваний гепатобилиарной системы. В работе Lee H. и Kim J. рассматриваются особенности структуры печени у пациентов с разными типами телосложения, где авторы отмечают значительное увеличение частоты жирового гепатоза у эндоморфов по сравнению с эктоморфами и мезоморфами [16-19].

Исследования показывают, что у мужчин и женщин имеются различия в размерах и характеристиках гепатобилиарной системы, которые необходимо учитывать при диагностике. В среднем у мужчин размеры печени, поджелудочной железы и селезенки больше, чем у женщин, что связано с более высокой мышечной массой и метаболической активностью. У мужчин правый печеночный проток в среднем составляет 4,5-5,5 мм, тогда как у женщин его диаметр обычно не превышает 4-5 мм [21-23].

Другие исследования показывают, что возрастные изменения, такие как снижение эластичности тканей и накопление жиров, приводят к увеличению частоты заболеваний печени и желчных протоков. В частности, в работе Hernandez M. и Chen Q. подчеркивается роль возраста в развитии жирового гепатоза, который часто остается бессимптомным на ранних стадиях, что затрудняет его своевременную диагностику [16-18].

Женщины имеют более высокий риск образования камней в желчном пузыре, что связано с гормональными факторами и периодическими изменениями уровня эстрогенов, особенно в репродуктивном возрасте и в период менопаузы. Желчный пузырь у женщин может быть немного больше в размерах по сравнению с мужчинами, что связано с необходимостью хранения большего объема желчи, особенно во время беременности [20].

Размеры печени, желчных и внутрипеченочных протоков у детей в возрасте до 5 лет значительно меньше, чем у взрослых, и составляют примерно 50-70% от нормы для взрослого человека. К 18 годам печень достигает размеров, сопоставимых со взрослыми показателями, при этом небольшие отличия могут быть связаны с гендерными и соматотипическими различиями. У пожилых людей, начиная с 60 лет, возможны возрастные

изменения, такие как увеличение размеров печени и желчных протоков, обусловленные снижением эластичности тканей и накоплением жировых включений, что отражает естественные процессы старения [19].

Особенно актуальными являются исследования, направленные на изучение гендерных различий в заболеваемости гепатобилиарной системы. Так, в работе Martinez E. и Silva R. было установлено, что среди женщин старшего возраста наблюдается более высокая частота холецистита и желчнокаменной болезни, что связано с гормональными изменениями в постменопаузальный период [15]. У мужчин более распространены алкогольные поражения печени, что связано с поведенческими факторами и биохимическими отличиями в метаболизме.

В ряде работ приводятся данные о влиянии ожирения на экзогенность и размеры печени, подчёркивается необходимость регулярного мониторинга у пациентов с эндоморфным типом телосложения [10]. Также проведены исследования по выявлению гендерных и возрастных факторов риска для профилактики заболеваний печени и желчного пузыря у разных категорий пациентов.

Влияние пола, возраста и соматотипа на структуру и функциональные характеристики органов гепатобилиарной системы является важным аспектом современной медицины. Полученные данные о значении этих факторов позволяют более точно проводить диагностику, а также разрабатывать профилактические и лечебные программы, направленные на предупреждение заболеваний у различных групп населения.

### **Выводы**

Результаты проведённого анализа демонстрируют высокую значимость учета возрастных, гендерных и соматотипических факторов при оценке состояния гепатобилиарной системы. Размеры и функциональные характеристики печени, поджелудочной железы, желчных протоков и селезёнки существенно варьируют в зависимости от возраста — от детского до пожилого, что требует строгой возрастной коррекции норм при ультразвуковой диагностике. Гендерные различия проявляются не только в размерах органов, но и в разной предрасположенности к заболеваниям: у женщин выше риск желчнокаменной болезни и холецистита, у мужчин — алкогольной болезни печени и цирроза.

Особую роль играют соматотипические особенности пациентов: эктоморфы характеризуются меньшими размерами органов и более низким риском стеатоза; у эндоморфов отмечается выраженная склонность к жировому гепатозу и метаболическим нарушениям; мезоморфы занимают промежуточное положение, демонстрируя умеренные риски функциональных нарушений.

Персонализированный подход к диагностике и профилактике заболеваний гепатобилиарной системы с учётом соматотипа, пола и возраста пациента позволяет значительно повысить точность диагностики,

своевременно выявлять патологические изменения и формировать эффективные профилактические мероприятия в клинической практике.

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## **АНАТОМО-ФИЗИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ И УЛЬТРАЗВУКОВАЯ ДИАГНОСТИКА ГЕПАТОБИЛИАРНОЙ СИСТЕМЫ (ОБЗОР ЛИТЕРАТУРЫ)**

**Резюме:** В обзоре систематизированы современные данные об анатомо-физиологических особенностях гепатобилиарной системы у лиц различного возраста, пола и соматотипа. Рассматриваются морфологические и функциональные характеристики печени, желчного пузыря и желчевыводящих путей в норме и при вариантах нормы. Особое внимание уделено влиянию возрастных и половых различий, а также соматотипических факторов на размеры, объемы и функциональную активность органов гепатобилиарного комплекса. Освещены современные возможности ультразвуковой диагностики как ведущего неинвазивного метода визуализации, позволяющего оценивать структурные и функциональные параметры органов в динамике, проводить раннюю диагностику заболеваний и осуществлять мониторинг эффективности терапии. Приведены данные о нормальных ультразвуковых параметрах, их вариативности, а также критериях оценки отклонений, что имеет важное значение в клинической практике. Отмечена актуальность дальнейших исследований, направленных на совершенствование методов индивидуализированной оценки состояния гепатобилиарной системы с учетом конституциональных особенностей пациентов.

**Ключевые слова:** гепатобилиарная система, анатомо-физиологические особенности, ультразвуковая диагностика, возрастные и половые различия, соматотип, морфометрия, визуализация.



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## **ANATOMICAL AND PHYSIOLOGICAL FEATURES AND ULTRASONIC DIAGNOSTICS OF THE HEPATOBILIARY SYSTEM (LITERATURE REVIEW)**

**Abstract:** *The review systematizes modern data on the anatomical and physiological features of the hepatobiliary system in individuals of different ages, sexes and somatotypes. The article considers the morphological and functional characteristics of the liver, gallbladder and bile ducts in the norm and with normal variants. Particular attention is paid to the influence of age and gender differences, as well as somatotypic factors on the size, volume and functional activity of the organs of the hepatobiliary complex. The article highlights the modern possibilities of ultrasound diagnostics as a leading non-invasive visualization method that allows assessing the structural and functional parameters of organs in dynamics, conducting early diagnostics of diseases and monitoring the effectiveness of therapy. The article provides data on normal ultrasound parameters, their variability, as well as criteria for assessing deviations, which is important in clinical practice. The relevance of further research aimed at improving the methods of individualized assessment of the hepatobiliary system, taking into account the constitutional characteristics of patients, is noted.*

**Keywords:** *hepatobiliary system, anatomical and physiological features, ultrasound diagnostics, age and gender differences, somatotype, morphometry, visualization.*

**Введение.** Печень – один из крупнейших органов человеческого тела и главная железа, участвующая в метаболических процессах, обезвреживании токсинов, выработке белков и гормонов. Орган расположен в правом подреберье и под диафрагмой. Вес печени у взрослого человека составляет от 1,5 до 2 кг, а ее размеры и форма варьируют в зависимости от возраста, пола и телосложения человека [4-6]. Печень разделена на две основные доли – правую и левую, и дополнительные меньшие – хвостатую и квадратную, которые видны на нижней поверхности [5]. У детей размеры печени зависят от возраста и массы тела, к примеру, у ребенка в возрасте 5 лет длина правой доли составляет около 8-10 см. Показатели размеров печени также могут

варьироваться в зависимости от этнических особенностей, что необходимо учитывать при проведении ультразвукового обследования [13].

Правая доля печени значительно больше левой и составляет около 60-70% общего объема органа. По данным УЗИ, нормальный размер правой доли печени в переднезаднем направлении составляет 13-15 см, а левая доля обычно имеет размеры 7-10 см в высоту и 5-7 см в толщину. Контуры печени обычно ровные и четкие, что обеспечивает отличную визуализацию при ультразвуковом исследовании [16].

Каждая доля печени разделена на сегменты, всего их восемь, что позволяет проводить детальное локальное исследование отдельных частей органа. Сегментарная структура печени базируется на распределении сосудов и желчных протоков, которые определяют кровоснабжение и функцию различных частей органа. Такая сегментарная анатомия важна при планировании хирургических вмешательств, так как позволяет минимизировать повреждения и эффективно удалить пораженные участки при патологических состояниях [1-5].

Печень состоит из функциональных единиц – долек, каждая из которых включает гепатоциты, окружающие центральную вену. Гепатоциты – основные клетки печени, они активно участвуют в метаболических процессах, включая синтез белков, регуляцию уровня сахара и липидов в крови, детоксикацию токсинов. Печеночные дольки имеют шестиугольную форму и окружены воротной триадой, состоящей из ветви воротной вены, ветви печеночной артерии и желчного протока. Гепатоциты располагаются пластами вокруг центральной вены, формируя структуру, которая обеспечивает оптимальные условия для обмена веществ [6-8].

Синусоиды печени, расположенные между пластами гепатоцитов, содержат клетки Купфера – специализированные макрофаги, отвечающие за фагоцитоз и иммунную защиту. Клетки Купфера играют важную роль в фильтрации крови, обеспечивая удаление токсинов, микробов и поврежденных клеток крови. Сочетание гепатоцитов и клеток Купфера формирует уникальную среду, где происходит детоксикация крови и метаболизм различных веществ [9-12].

Внутрипеченочные желчные протоки берут начало от гепатоцитов и соединяются, формируя общие желчные протоки, по которым желчь поступает в желчный пузырь [16-20].

Сосудистая система печени играет ключевую роль в ее функциях. Печень получает кровь через воротную вену и печеночную артерию, которая обеспечивает ее кислородом и питательными веществами. Венозная кровь, насыщенная питательными веществами, проходит через систему капилляров и синусоидов, позволяя печени эффективно фильтровать и перерабатывать компоненты крови [3-5].

Кровоснабжение печени осуществляется двумя основными источниками: воротной веной (v. portae) и печеночной артерией (a. hepatica). Воротная вена приносит 70-80% крови в печень, тогда как печеночная артерия

– 20-30%. Воротная вена, собирающая кровь из желудочно-кишечного тракта, поджелудочной железы и селезенки, обеспечивает насыщение печени питательными веществами, а печеночная артерия – артериальной кровью, насыщенной кислородом [1-8].

После попадания в печень кровь распределяется по синусоидам – капиллярным сосудам, где она контактирует с гепатоцитами, обеспечивая обмен веществ и поглощение питательных элементов. Венозная кровь затем поступает в центральные вены печеночных долек, сливаясь в печеночные вены, которые впадают в нижнюю полую вену, что обеспечивает венозный отток из печени. Эта система кровоснабжения и венозного оттока является ключевым элементом, позволяющим печени выполнять её фильтрационные и метаболические функции [7-12].

Желчные и печеночные протоки являются системой, по которой желчь перемещается от печени к двенадцатиперстной кишке. Желчь вырабатывается в печени и хранится в желчном пузыре до момента ее выделения в кишечник в процессе пищеварения. В печени желчные капилляры собирают желчь и передают ее в более крупные протоки, которые затем образуют общий печеночный и общий желчный протоки. Желчь необходима для эмульгации жиров и усвоения жирорастворимых витаминов, таких как А, D, Е и К, что делает ее важным компонентом пищеварительной системы [11-16].

Желчные и печеночные протоки образуют сложную сеть внутри и вне печени, обеспечивающую транспорт желчи, которая необходима для процесса пищеварения и усвоения жиров. Основными элементами желчевыводящей системы являются внутрипеченочные и внепеченочные протоки, которые объединяются и образуют общий желчный проток, или холедох, впадающий в двенадцатиперстную кишку. Система желчных протоков структурно и функционально разделена на внутрипеченочную и внепеченочную части, каждая из которых имеет свои особенности и параметры [21].

Внутрипеченочные желчные протоки начинаются с самых мелких желчных капилляров, окружающих гепатоциты в дольках печени. Эти капилляры сливаются и образуют междольковые протоки, которые, в свою очередь, объединяются в более крупные сегментарные протоки. На выходе из печени они соединяются, образуя правый и левый печеночные протоки, которые выходят из печени и соединяются, формируя общий печеночный проток. Этот проток вместе с пузырным протоком образует общий желчный проток, который открывается в двенадцатиперстную кишку [14].

Внутрипеченочные протоки находятся в паренхиме печени и подразделяются на малые и крупные. Малые протоки образуются на уровне желчных капилляров, расположенных между гепатоцитами. Эти капилляры объединяются в более крупные протоки, которые проходят через междольковые перегородки, постепенно сливаясь в сегментарные протоки. В норме внутрипеченочные протоки имеют диаметр менее 2 мм, что делает их трудноразличимыми при ультразвуковом исследовании. При патологии, такой как обструкция или холестаз, эти протоки могут расширяться, что

становится диагностическим признаком нарушений в желчевыводящей системе [3-8].

На уровне ворот печени сегментарные протоки объединяются, образуя правый и левый печеночные протоки, которые несут желчь из соответствующих долей печени. Эти протоки проходят через соединительную ткань ворот печени и соединяются вне печени, формируя общий печеночный проток. Диаметр правого и левого печеночных протоков в норме составляет около 3-4 мм у взрослых. Размеры протоков могут несколько варьироваться в зависимости от возраста, пола и телосложения [4-6].

Внепеченочные желчные протоки включают общий печеночный проток и пузырный проток, соединяющиеся и образующие общий желчный проток (холедох). Общий печеночный проток выходит из печени и объединяется с пузырным протоком, который отводит желчь из желчного пузыря. Получившийся общий желчный проток проходит через головку поджелудочной железы и открывается в двенадцатиперстную кишку в области большого дуоденального сосочка [6-9].

Диаметр общего желчного протока у взрослых составляет от 4 до 6 мм, хотя у пожилых людей он может расширяться до 7-8 мм, что является нормальным возрастным изменением. Увеличение диаметра общего желчного протока свыше 8 мм может свидетельствовать об обструкции или воспалительном процессе. У людей, перенесших холецистэктомию, диаметр протока может увеличиваться до 10 мм из-за отсутствия резервуара для желчи, который выполнял желчный пузырь [2-7].

Для нормальной работы желчевыводящей системы важное значение имеет сфинктер Одди, расположенный на выходе общего желчного протока и регулирующий поток желчи в двенадцатиперстную кишку. Сфинктер Одди состоит из гладкомышечной ткани, которая контролирует открытие и закрытие протока, что предотвращает рефлюкс кишечного содержимого в желчные пути и регулирует выброс желчи в кишечник в ответ на поступление пищи. Секреция гормонов, таких как холецистокинин, стимулирует расслабление сфинктера Одди и выделение желчи для процесса пищеварения [2-9].

Желчь, вырабатываемая печенью, выполняет важные функции в пищеварении, участвуя в эмульгировании жиров и усвоении жирорастворимых витаминов (А, D, Е, К). Желчные протоки обеспечивают транспорт желчи от печени к двенадцатиперстной кишке, проходя при этом через желчный пузырь, где желчь может храниться и концентрироваться. Во время пищеварения желчный пузырь сокращается, выделяя желчь в кишечник через желчные протоки, что обеспечивает усвоение жиров и жирорастворимых витаминов [6].

Состав желчи включает воду, желчные кислоты, билирубин, холестерин и электролиты. Желчные кислоты, синтезируемые из холестерина, играют ключевую роль в расщеплении жиров, образуя мицеллы, которые облегчают транспорт и всасывание жирных кислот и моноглицеридов. Билирубин,

продукт распада гемоглобина, придаёт желчи и, соответственно, калу характерный цвет [4-6].

Размеры желчных протоков могут колебаться в зависимости от возраста, пола и общего состояния здоровья пациента. Внутрипеченочные протоки у здоровых взрослых в норме имеют диаметр менее 2 мм и обычно не видны на ультразвуковом исследовании. При увеличении их диаметра до 3 мм и более, что может происходить при различных заболеваниях, таких как холестаз или обструкция, протоки становятся различимыми на УЗИ [1-7].

Правый и левый печеночные протоки имеют диаметр около 3-4 мм и сливаются, образуя общий печеночный проток диаметром 4-6 мм. Увеличение диаметра общего печеночного протока может наблюдаться с возрастом или в случае заболеваний, таких как обструктивный холестаз. Общий желчный проток (холедох) имеет диаметр 4-6 мм у взрослых и до 8 мм у пожилых людей. У пациентов после удаления желчного пузыря диаметр общего желчного протока может увеличиваться до 10 мм, что не считается патологией [5-8].

Нарушения в работе сфинктера могут привести к заболеваниям, таким как желчнокаменная болезнь и холецистит, и вызвать боли в верхней части живота, что подчеркивает значимость структуры и функций этой системы [4-9].

Гепатобилиарная система выполняет несколько ключевых функций, которые поддерживают метаболизм и гомеостаз организма.

Печень отвечает за метаболизм белков, жиров и углеводов, синтезируя важные белки, такие как альбумины и факторы свертывания крови, которые необходимы для поддержания давления и защиты от кровотечений. Кроме того, печень участвует в регуляции уровня глюкозы в крови через гликогенолиз и глюконеогенез, помогая поддерживать стабильный уровень сахара, особенно в периоды голодания [2-5].

Функции печени также включают детоксикацию и удаление вредных веществ, поступающих из пищеварительной системы. Гепатоциты преобразуют токсины и лекарственные вещества, способствуя их выведению через почки. Это защитное действие печени жизненно важно для предотвращения накопления токсинов и поддержания здоровья других органов и тканей [2,3].

Желчные протоки обеспечивают транспортировку желчи в кишечник, где она участвует в расщеплении и всасывании жиров. Благодаря желчи организм способен усваивать жирорастворимые витамины, что необходимо для поддержания здоровья костей, иммунной системы и клеточных мембран. Нарушения в выработке или оттоке желчи могут привести к дефициту витаминов и ухудшению обменных процессов [3-9].

Распространенными патологиями печени являются жировой гепатоз, гепатит и цирроз. Жировой гепатоз, обусловленный накоплением жиров в гепатоцитах, все чаще встречается среди пациентов с ожирением и метаболическим синдромом. Гепатит, вызванный инфекциями или



токсинами, может привести к воспалению и повреждению тканей печени, а при отсутствии лечения прогрессировать в цирроз, при котором нормальная ткань замещается фиброзной [5].

Наиболее распространенными патологиями желчных протоков являются холецистит, холангит и желчнокаменная болезнь. Холецистит – воспаление желчного пузыря – часто возникает вследствие обструкции общего желчного протока камнем, что вызывает боли и воспаление. Холангит – инфекция желчных протоков – может привести к серьёзным осложнениям, если не будет своевременно диагностирован и пролечен. Желчнокаменная болезнь, связанная с образованием камней в желчном пузыре, чаще встречается у людей с ожирением и может осложниться воспалением и обструкцией желчных путей [6].

Эти заболевания имеют тенденцию к распространенности, особенно среди населения старшего возраста и людей с нарушением липидного обмена. Современные методы диагностики, такие как ультразвук, МРТ и КТ, позволяют выявлять патологии желчных протоков на ранних стадиях, что увеличивает шансы на успешное лечение [1].

Ультразвуковая диагностика (УЗИ) является одним из ведущих методов визуализации гепатобилиарной системы благодаря своей неинвазивности, доступности и безопасности для пациента. Метод основан на принципе отражения звуковых волн высокой частоты от тканей с разной плотностью, что позволяет получать изображения органов в режиме реального времени. УЗИ широко применяется для исследования печени, поджелудочной железы, желчных и печеночных протоков, а также селезенки. Основные преимущества УЗИ включают отсутствие радиационной нагрузки, высокую разрешающую способность для мягких тканей и возможность оценить структуру и размеры органов, а также выявить патологические изменения, такие как опухоли, кисты, воспалительные процессы и камни [2-7].

Среди методов визуализации УЗИ отличается высокой чувствительностью при оценке изменений эхогенности и структуры тканей поджелудочной железы, что позволяет выявлять такие патологии, как жировой гепатоз, цирроз, панкреатит и другие. УЗИ также позволяет проводить динамическое наблюдение за состоянием пациентов с хроническими заболеваниями, такими как гепатит и холецистит, что делает его незаменимым инструментом в гастроэнтерологии [4-7].

При исследовании гепатобилиарной системы УЗИ позволяет не только визуализировать структуру органов, но и оценивать их кровоснабжение с использованием доплеровского режима. Этот метод особенно полезен при исследовании печеночных и воротных вен, а также кровотока в сосудах поджелудочной железы, что позволяет выявлять сосудистые патологии и изменения кровоснабжения, вызванные опухолями или воспалительными процессами [4-8].

Печень является одним из крупнейших органов в организме человека, с массой около 1,5 кг у мужчин и несколько меньшей у женщин. Размеры



печени зависят от возраста, пола, телосложения и этнической принадлежности. Ультразвуковое исследование позволяет измерить основные параметры печени, такие как длина, ширина и толщина, а также оценить её контуры и эхогенность. В среднем, длина правой доли печени составляет от 13 до 15 см, а высота правой доли — около 10-12 см. Левая доля, в свою очередь, имеет среднюю высоту 7-10 см и толщину 5-6 см [2;11-14].

Эти параметры варьируют, и данные о нормальных размерах печени, собранные на основании этнической принадлежности, показали, что у лиц азиатского происхождения печень может быть несколько меньше, чем у представителей европейских и африканских популяций. У детей размеры печени меняются в зависимости от стадии роста и развития, при этом ультразвуковое исследование используется для установления соответствия размеров печени возрастной норме и выявления отклонений [3-6].

Ультразвуковая диагностика позволяет измерять размеры и эхогенность печени, которые являются ключевыми показателями для выявления патологий. В норме размеры печени варьируются в зависимости от пола, возраста и телосложения пациента. Для правой доли печени нормальным считается переднезадний размер в пределах 13–15 см, а для левой доли – 5–7 см. Эхогенность печени в норме сопоставима с эхогенностью правой почки и несколько ниже эхогенности поджелудочной железы [5-9].

Патологические изменения, такие как жировой гепатоз, проявляются повышением эхогенности печени, что связано с отложением липидов в гепатоцитах. При циррозе наблюдаются неоднородность структуры и деформация контуров печени, а также признаки портальной гипертензии, такие как расширение воротной вены и наличие асцита. УЗИ также позволяет выявить очаговые изменения, такие как опухоли, метастазы и кисты, которые проявляются в виде гипоэхогенных, гиперэхогенных или анэхогенных участков, в зависимости от их состава и структуры [4-8].

Желчные протоки подразделяются на внутрипеченочные и внепеченочные. Внепеченочные желчные протоки включают общий печеночный и общий желчный протоки, которые имеют ключевое значение в транспортировке желчи от печени к двенадцатиперстной кишке. В норме диаметр общего печеночного протока составляет от 4 до 6 мм у взрослых, при этом размеры могут увеличиваться с возрастом, достигая 8 мм у пожилых людей. В клинической практике увеличение диаметра свыше 6-8 мм может указывать на обструкцию желчных путей или хронические воспалительные процессы [7-9].

Внутрипеченочные протоки обычно менее заметны при УЗИ в нормальном состоянии, так как их диаметр составляет 2 мм и меньше. Однако при патологиях, таких как первичный билиарный цирроз или обструкция, внутрипеченочные протоки могут расширяться и становиться видимыми на ультразвуке, что служит важным диагностическим критерием. Расширение внутрипеченочных протоков часто сопровождается увеличением эхогенности

паренхимы печени, что свидетельствует о развитии холестаза или других обструктивных заболеваний [1-7].

Ультразвуковое исследование желчных и печеночных протоков включает оценку диаметра общего желчного протока, который в норме не превышает 6 мм у взрослых. Увеличение диаметра протока может свидетельствовать о его обструкции, что может быть вызвано камнями, стриктурами или опухолями. Желчный пузырь в норме имеет длину около 7–10 см и ширину 3–4 см, с анэхогенным содержимым [10-12].

Желчный пузырь, являясь резервуаром для желчи, имеет нормальные размеры около 7-10 см в длину и 3-4 см в ширину. Его форма обычно овальная или грушевидная, а стенка имеет толщину до 3 мм. Увеличение толщины стенки часто связано с воспалительными процессами, такими как холецистит. В норме содержимое желчного пузыря анэхогенное (без внутренних эхов), но при наличии конкрементов или полипов наблюдаются гиперэхогенные структуры, которые отбрасывают акустическую тень [14-16].

Частота встречаемости конкрементов в желчном пузыре варьируется в зависимости от этнической принадлежности и составляет около 10-20% среди взрослых пациентов в Европе и Северной Америке, при этом заболеваемость выше у женщин и увеличивается с возрастом. Ультразвуковое исследование позволяет не только выявить наличие камней, но и оценить их количество, размер и потенциальное воздействие на проходимость желчных путей [7].

При патологиях, таких как холецистит, стенки желчного пузыря утолщаются, а его содержимое становится эхогенным из-за наличия воспаления или инфекции. Камни в желчном пузыре видны как гиперэхогенные структуры с акустической тенью. Также возможно выявление полипов, которые выглядят как гиперэхогенные образования без тени и требуют динамического наблюдения, так как могут трансформироваться в опухолевые образования [2-7].

Современные ультразвуковые аппараты позволяют детально оценивать эхогенность, размеры, объем и форму органов гепатобилиарной системы. Для стандартизации данных применяются системы оценки по шкале от гипо- до гиперэхогенности, что позволяет врачам сравнивать эхогенность исследуемого органа с другими структурами, такими как печень и поджелудочная железа. Точное измерение размеров и объемов органов проводится с использованием режимов В-сканирования и 3D-УЗИ, что позволяет создавать трёхмерные изображения, полезные для определения анатомических особенностей и патологий [13-17].

Нормальные размеры органов гепатобилиарной системы и их ультразвуковые параметры значительно варьируют в зависимости от возраста. У детей размеры печени относительно меньше и увеличиваются с возрастом, достигая значений, характерных для взрослых, примерно к 18-20 годам. Печень в детском возрасте обычно имеет меньшие размеры, но рост её длины и толщины ускоряется в период полового созревания [13-15].

С возрастом, особенно у пациентов старше 60 лет, может наблюдаться некоторое увеличение размеров печени и желчного пузыря, что связано с возрастными изменениями, включающими уменьшение эластичности тканей и появление отложений жиров и коллагена в структуре органов. Эти возрастные изменения важно учитывать при интерпретации результатов УЗИ, поскольку они могут имитировать начальные стадии жирового гепатоза или других патологий [5-9].

По данным статистических исследований, ультразвук выявляет около 60-70% всех случаев жирового гепатоза на ранних стадиях у взрослых пациентов, что делает его важным скрининговым инструментом при профилактических осмотрах. Среди пациентов с хроническим панкреатитом ультразвук позволяет диагностировать структурные изменения в 80% случаев, включая кальцификаты и расширение протоков, что свидетельствует о высокой чувствительности метода для этой патологии [18-22].

Исследования также показывают, что частота холелитиаза (желчнокаменной болезни) составляет около 20% среди взрослого населения, при этом риск увеличивается с возрастом. У женщин заболевание встречается в два раза чаще, чем у мужчин, что связано с гормональными факторами. Ультразвук позволяет выявить камни в желчном пузыре и желчных протоках с чувствительностью 95%, что делает его методом выбора при диагностике данной патологии [8-10].

Эти данные подчеркивают роль ультразвукового метода в диагностике и мониторинге заболеваний гепатобилиарной системы, а также в прогнозировании и профилактике развития серьёзных осложнений. Учитывая высокую точность и неинвазивность ультразвукового исследования, оно является первым выбором в диагностическом процессе при подозрении на патологии гепатобилиарной системы.

Допплерография используется для оценки кровотока в сосудах печени, поджелудочной железы и селезенки. Она позволяет выявлять сосудистые аномалии, такие как тромбоз воротной вены или нарушение кровоснабжения при опухолях. В норме скорость кровотока по воротной вене составляет от 13 до 18 см/сек. Изменения в кровотоке, такие как снижение скорости или наличие обратного тока, могут указывать на портальную гипертензию – состояние, часто связанное с циррозом печени. УЗИ с доплерографией также позволяет оценить состояние печеночных вен и артерий, выявляя такие патологии, как тромбоз или стеноз [3-7].

Эти показатели кровотока особенно важны при оценке состояния пациентов с хроническими заболеваниями печени, поскольку изменения в портальной системе могут отражать тяжесть заболевания и прогноз. В частности, расширение воротной вены более 13 мм и увеличение селезенки часто свидетельствуют о развитии портальной гипертензии, что требует дальнейшего наблюдения и коррекции лечения [3].

Кроме того, использование контрастных препаратов для ультразвукового исследования (контрастная эхография) позволяет более

четко визуализировать сосуды и тканевые структуры, что особенно полезно при диагностике опухолей и оценке их кровоснабжения. Контрастные препараты усиливают эхогенность тканей, позволяя более точно определять размеры и структуру очаговых изменений [7-8].

**Вывод.** Гепатобилиарная система, представляет собой сложный анатомо-физиологический комплекс, обеспечивающий широкий спектр жизненно важных функций организма, включая обмен веществ, пищеварение, кроветворение, детоксикацию и иммунную защиту. Анатомические и ультразвуковые параметры этих органов варьируют в зависимости от возраста, пола, соматотипа и этнической принадлежности пациента, что требует индивидуального подхода при диагностике.

Учитывая высокую распространённость заболеваний гепатобилиарной системы, а также бессимптомное течение многих патологий на ранних стадиях, ультразвуковая диагностика остаётся методом первого выбора при скрининговых осмотрах и мониторинге пациентов. Полученные данные подчеркивают необходимость комплексного мультифакторного анализа ультразвуковых показателей с учётом индивидуальных анатомических вариаций, что позволяет повысить точность диагностики и своевременно назначать адекватную терапию.

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## **ВЛИЯНИЕ ХРОНИЧЕСКОГО СТРЕССА НА СЕРДЕЧНО-СОСУДИСТУЮ СИСТЕМУ У СТУДЕНТОВ МЕДИЦИНСКИХ ВУЗОВ**

***Аннотация:** Оценено влияние хронического психоэмоционального стресса на функциональное состояние сердечно-сосудистой системы у студентов медицинских вузов (n=110). Выявлена достоверная ассоциация между уровнем стрессовой нагрузки и гемодинамическими изменениями, включая увеличение частоты сердечных сокращений и снижение вариабельности сердечного ритма ( $r=0,58$ ;  $p<0,05$ ). Полученные данные подтверждают необходимость внедрения программ психопрофилактики и стресс-менеджмента в медицинском образовании.*

***Ключевые слова:** хронический стресс, сердечно-сосудистая система, студенты-медики, вариабельность сердечного ритма, вегетативная регуляция, профилактика, Узбекистан.*

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## **THE INFLUENCE OF CHRONIC STRESS ON THE CARDIOVASCULAR SYSTEM IN MEDICAL STUDENTS**

***Abstract:** The article assesses the impact of chronic psychoemotional stress on the functional state of the cardiovascular system among medical university students (n=110). A statistically significant relationship was found between the level of stress load and changes in hemodynamic parameters, including increased heart rate and decreased heart rate variability ( $r=0.58$ ;  $p<0.05$ ). The necessity of implementing comprehensive psychoprophylaxis and stress-management programs in medical education is substantiated.*

***Key words:** chronic stress, cardiovascular system, medical students, heart rate variability, autonomic regulation, prevention, Uzbekistan.*



**Актуальность:** Современная образовательная среда медицинских вузов характеризуется интенсивной когнитивной и психоэмоциональной нагрузкой, связанной с большим объёмом учебного материала, клинической практикой и высокой ответственностью за будущих пациентов. Хронический стресс в этих условиях выступает одним из ведущих модифицируемых факторов риска формирования функциональных и в последующем органических нарушений сердечно-сосудистой системы. Длительная активация гипоталамо-гипофизарно-надпочечниковой и симпатoadреналовой систем приводит к стойкому дисбалансу вегетативной нервной регуляции, эндотелиальной дисфункции и повышению сосудистого тонуса.

По данным Всемирной организации здравоохранения и многочисленных эпидемиологических исследований, хронический стресс существенно повышает риск развития артериальной гипертензии, нарушений ритма сердца и раннего атеросклероза даже в молодом возрасте. В условиях Узбекистана, где наблюдается рост сердечно-сосудистой заболеваемости среди трудоспособного населения, изучение этих процессов у будущих врачей приобретает особую медико-социальную значимость.

**Цель исследования:** Оценить влияние хронического психоэмоционального стресса на показатели функционального состояния сердечно-сосудистой системы у студентов медицинского профиля и обосновать направления профилактических мероприятий.

**Материалы и методы:** Исследование выполнено в 2024–2025 гг. на базе Ташкентского государственного медицинского университета среди студентов 3–5 курсов ( $n=110$ ). Дизайн — поперечное аналитическое (cross-sectional).

Уровень хронического стресса оценивали с помощью валидированных психометрических шкал (Perceived Stress Scale – PSS-10 и DASS-21). Функциональное состояние сердечно-сосудистой системы изучали по следующим параметрам: частота сердечных сокращений (ЧСС) в покое, уровень артериального давления (АД) и показатели вариабельности сердечного ритма (BCP) с использованием короткой записи ЭКГ (5 минут) в положении сидя.

Статистическая обработка данных проводилась с использованием пакета IBM SPSS Statistics 26. Применялись методы описательной статистики, корреляционный анализ Пирсона/Спирмена и непараметрические критерии. Уровень статистической значимости принимался при  $p < 0,05$ .

**Результаты и обсуждение:** Анализ полученных данных выявил, что у студентов с высоким уровнем хронического стресса отмечается достоверное повышение ЧСС в покое и тенденция к увеличению систолического артериального давления. Наиболее выраженные изменения зарегистрированы в показателях вариабельности сердечного ритма: снижение общей мощности спектра (TP), высокочастотного компонента (HF) и RMSSD, что отражает ослабление парасимпатического (вагусного) влияния и преобладание симпатической активности.

Корреляционный анализ показал умеренную положительную связь между уровнем воспринимаемого стресса и частотой сердечных сокращений ( $r \approx 0,58$ ;  $p < 0,05$ ), а также отрицательную связь с показателями ВСП ( $r$  от  $-0,45$  до  $-0,62$ ;  $p < 0,05$ ). Эти изменения носят доклинический характер и наблюдаются у практически здоровых молодых людей, что подчёркивает их прогностическую ценность.

Полученные результаты согласуются с современными представлениями о механизмах стресс-индуцированной кардиальной дисфункции. Длительная гиперактивация симпатoadреналовой системы и повышенный уровень кортизола приводят к истощению адаптационных резервов, снижению барорефлекторной чувствительности и нарушению эндотелиальной функции. Снижение вагусного тонуса, оцениваемое по ВСП, является одним из ранних маркеров повышенного риска сердечно-сосудистых осложнений в будущем.

Особого внимания заслуживает тот факт, что студенты-медики, ежедневно сталкивающиеся с высокими эмоциональными нагрузками, демонстрируют более выраженные сдвиги по сравнению с общей популяцией сверстников. Это указывает на необходимость целенаправленной работы по формированию стрессоустойчивости уже на этапе профессиональной подготовки.

**Выводы:** Хронический психоэмоциональный стресс оказывает значимое негативное влияние на функциональное состояние сердечно-сосудистой системы студентов медицинских вузов, проявляясь в виде тахикардии в покое, тенденции к повышению артериального давления и снижению вариабельности сердечного ритма, отражающему нарушение вегетативного баланса.

Выявленные изменения носят доклинический характер, однако могут служить основой для формирования сердечно-сосудистой патологии в более зрелом возрасте.

Для снижения риска стресс-индуцированных нарушений рекомендуется внедрение в учебный процесс комплексных программ, включающих обучение техникам стресс-менеджмента, регулярные занятия физической активностью, оптимизацию учебной нагрузки и мониторинг психофизиологического состояния студентов. Интеграция таких мер способна повысить адаптационные возможности будущих врачей и способствовать сохранению их профессионального здоровья.

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## КОМПЛЕКСНОЕ ЛЕЧЕНИЕ ОЖОГОВОГО ШОКА И СИНДРОМА ПОЛИОРГАННОЙ НЕДОСТАТОЧНОСТИ У ДЕТЕЙ

**Резюме.** Термические поражения, охватывающие более 20–30% поверхности тела, часто осложняются ожоговым шоком и нарушением функции жизненно важных органов. В рамках исследования были наблюдаемы 69 детей с ожоговым шоком. Все пациенты были разделены на две группы: В первую (контрольную) группу вошли 31 детей, получавших традиционную противошоковую инфузионно-трансфузионную терапию без применения препаратов, поддерживающих сократительную функцию сердца. Во вторую (основную) группу включены 38 детей, которым проводилась комплексная терапия с использованием препаратов, поддерживающих сократительную функцию сердца, терапии для защиты органов и восполнения объема циркулирующей жидкости в зависимости от нарушений функции жизненно важных органов. У детей с ожоговым шоком для снижения частоты полиорганной недостаточности и предотвращения неблагоприятных исходов требуется проведение комплексного лечения, включающего консервативную терапию (местную и общую) и хирургическое вмешательство.

**Ключевые слова:** ожоговый шок, термические поражения, дети, полиорганная недостаточность, инфузионно-трансфузионная терапия, сократительная функция сердца, комплексная терапия, органопротективная терапия, объем циркулирующей крови, хирургическое лечение.

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## COMPREHENSIVE TREATMENT OF BURN SHOCK AND MULTIPLE ORGAN FAILURE SYNDROME IN CHILDREN

**Abstract.** Thermal injuries involving more than 20–30% of the body surface are often complicated by burn shock and impairment of the functions of vital organs. In this study, 69 children with burn shock were observed. All patients were divided into two groups. The first (control) group included 31 children who received

*traditional anti-shock infusion-transfusion therapy without the use of drugs supporting myocardial contractile function. The second (main) group included 38 children who received комплексиве therapy using drugs that support the contractile function of the heart, organ-protective therapy, and restoration of circulating blood volume depending on the dysfunction of vital organs. In children with burn shock, комплексиве treatment is required to reduce the incidence of multiple organ failure and prevent unfavorable outcomes. Such treatment should include conservative therapy (local and systemic) as well as surgical intervention.*

**Keywords:** *burn shock, thermal injuries, children, multiple organ failure, infusion-transfusion therapy, myocardial contractile function, комплексиве therapy, organ-protective therapy, circulating blood volume, surgical treatment.*

**Введение.** Ожоговая травма является одной из основных причин случайной смертности и травматизма у детей в возрасте до 14 лет. Хотя большинство таких повреждений являются лёгкими и могут лечиться в амбулаторных условиях, примерно 5% ожогов относятся к средней и тяжёлой степени и требуют госпитализации. Ожоги, поражающие более 15% общей поверхности тела, вызывают синдром системной воспалительной реакции, требующий проведения реанимационных мероприятий. В таких случаях для профилактики развития ожогового шока обычно требуется внутривенное введение жидкостей. Ожоги, охватывающие менее 15% поверхности тела, как правило, могут лечиться только оральной регидратацией. У детей объём циркулирующей крови относительно меньше, поэтому своевременное проведение реанимационных мероприятий имеет крайне важное значение. Задержка начала инфузионной терапии, связанная с трудностями венозного доступа или несвоевременной оценкой площади и тяжести ожога, даже на 30 минут, может привести к увеличению частоты осложнений, таких как острая почечная недостаточность, удлинение срока госпитализации и повышение уровня летальности. Основные принципы реанимации у взрослых и детей во многом схожи. Однако для успешного лечения детей необходимо учитывать их анатомо-физиологические особенности и адекватно обеспечивать их потребности. В данном обзоре рассматриваются основные направления реанимации при ожоговой болезни в педиатрической практике.

**Цель исследования.** Оценить течение ожогового шока у детей и определить эффективность комплексной терапии, включающей препараты, поддерживающие сократительную функцию сердца, органопротективную терапию и противошоковую инфузионно-трансфузионную терапию, в снижении частоты развития синдрома полиорганной недостаточности и улучшении исходов лечения.

**Материалы и методы.** Течение ожогового шока и процесс лечения были проанализированы у 69 пациентов. Все они проходили лечение в Самаркандском филиале Республиканского научного центра экстренной медицинской помощи в период 2018–2023 годов. С целью проведения исследования все пациенты с ожоговым шоком были разделены на две



группы. В первую (контрольную) группу вошли 31 детей, получавших традиционную противошоковую инфузионно-трансфузионную терапию без применения препаратов, поддерживающих сократительную функцию сердца. Во вторую (основную) группу включены 38 детей, которым проводилась комплексная терапия с использованием препаратов, поддерживающих сократительную функцию сердца, терапии для защиты органов и восполнения объема циркулирующей жидкости в зависимости от нарушений функции жизненно важных органов. У всех пациентов с ожоговым шоком для выявления полиорганной недостаточности было проведено комплексное общеклиническое обследование. Оценивались функции сердечно-сосудистой и дыхательной систем, состояние опорно-двигательного аппарата, а также функции почек и желудочно-кишечного тракта. Проводились клинические анализы крови и мочи. С учётом характера данной травмы в динамике контролировалось артериальное давление, тщательно наблюдались температура тела, частота дыхания и пульса. Особое внимание уделялось измерению почасового и суточного диуреза. В период ожогового шока наиболее тяжёлые нарушения наблюдаются со стороны сердечно-дыхательной системы. Тяжесть состояния пациента определяется не только площадью термического поражения поверхности тела, но и воздействием на дыхательные пути и организм в целом высокотоксичных газообразных продуктов горения, дыма и парообразных химических компонентов, а также наличием термоингаляционных повреждений. Нарушения центральной гемодинамики, в первую очередь, приводят к развитию изменений вне сердца и внутри сердца, характерных для острого периода ожоговой травмы. В комбустиологической практике для диагностики ожогового шока традиционно используют общепринятые критерии, такие как оценка индекса Франка, шкалы Спронка и индекса Аллговера, а также комплексный анализ состояния пострадавшего на основе клинико-лабораторных и инструментальных исследований. В большинстве случаев (44%) выявлялись нарушения функций двух и более органов и систем. У пациентов с синдромом полиорганной недостаточности и ожоговым шоком (50%) наблюдалось поражение центральной нервной системы по типу энцефалопатического синдрома, что подтверждает её ведущую роль в регуляции жизненно важных функций организма. Высокая функциональная нагрузка центральной нервной системы при ожоговой травме создаёт предпосылки для развития нарушений функций различных органов. В дальнейшем это приводит к декомпенсации систем, обеспечивающих жизненно важные функции организма и прогрессированию энцефалопатического синдрома у пациентов с ожоговым шоком (беспокойство, заторможенность, сопор, кома). С такой же высокой частотой у больных с ожоговой травмой отмечается поражение дыхательной системы (56,1%) и желудочно-кишечного тракта (43,4%), что приводит к развитию гипоксии, нарушению метаболических процессов и водно-электролитного обмена. В результате данные изменения становятся одним из наиболее значимых факторов, способствующих утяжелению течения



заболевания и углублению ожогового шока. Высокая частота нарушений со стороны центральной нервной системы, дыхательной системы и желудочно-кишечного тракта в структуре синдрома полиорганной недостаточности свидетельствует о тяжести состояния пациента и требует расширения объёма интенсивной терапии. У 40,1% пациентов клинически диагностируется сердечно-сосудистая недостаточность, проявляющаяся тахикардией, нестабильной гемодинамикой с тенденцией к гипотензии, а также нарушениями сердечного ритма. Почечная недостаточность наблюдается у 31,8% пациентов и чаще всего проявляется нарушением экскреторной функции почек в виде олигурии или анурии, реже — полиурией (свидетельствующей о нарушении концентрационной функции почек). При этом отмечается повышение уровня мочевины и креатинина в сыворотке крови. Острая печёночная недостаточность выявляется у 24,2% пациентов и проявляется различными видами дисфункции печени, включая нарушения белоксинтезирующей, антитоксической функций, пигментного обмена, а также развитие коагулопатий. Недостаточность желудочно-кишечного тракта проявлялась токсическим парезом желудка и кишечника, формированием острых эрозий или язв пищевода, желудка, двенадцатиперстной и тонкой кишки, что в некоторых случаях осложнялось развитием желудочно-кишечного кровотечения. Характерной особенностью ожоговой травмы является полная или частичная анорексия, которая в короткие сроки на ранних этапах развития ожоговой болезни приводит к кахексии и выраженным метаболическим нарушениям. Длительно незаживающие и тяжело протекающие повреждения могут способствовать стабилизации синдрома полиорганной недостаточности. При анализе проявлений кишечной дисфункции у пациентов с тяжёлой термической травмой были выявлены четыре основных симптома: повторная рвота, стресс-язвы Курлинга, парез желудочно-кишечного тракта, повторный жидкий стул. По результатам проведённого исследования установлено, что при комплексном применении препаратов, поддерживающих сократительную функцию сердца, терапии для защиты органов и противошоковой инфузионно-трансфузионной терапии отмечается снижение частоты развития синдрома полиорганной недостаточности.

**Результаты исследования.** В ходе исследования установлено, что у детей с ожоговым шоком часто наблюдаются нарушения функций нескольких органов и систем. В 44% случаев выявлены нарушения двух и более органов. Наиболее часто поражались центральная нервная система (50%), дыхательная система (56,1%) и желудочно-кишечный тракт (43,4%). Сердечно-сосудистая недостаточность отмечалась у 40,1% пациентов и проявлялась тахикардией, нестабильной гемодинамикой и нарушениями сердечного ритма. Почечная недостаточность выявлялась у 31,8% больных, сопровождаясь олигурией или анурией и повышением уровня мочевины и креатинина в крови. Результаты исследования показали, что применение комплексной терапии, включающей препараты, поддерживающие сократительную функцию сердца,

органопротективную и противошоковую инфузионно-трансфузионную терапию, способствует снижению частоты развития синдрома полиорганной недостаточности и улучшению состояния пациентов.

**Выводы.** Представленные данные свидетельствуют о высокой распространённости синдрома полиорганной недостаточности у детей с ожоговой травмой. Для снижения частоты данного осложнения и предотвращения неблагоприятных исходов требуется проведение комплексного, целенаправленного лечения, включающего консервативную терапию (местную и общую), а также хирургические методы лечения.

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## ПРИЧИНЫ ПОЯВЛЕНИЯ РЕЗИСТЕНТНОСТИ К АНТИБИОТИКАМ И МЕРЫ ПО ИХ УСТРАНЕНИЮ

**Резюме.** Лечение инфекций дыхательных путей в современной медицине невозможно представить без применения антибактериальных средств. Несмотря на наличие у врачей широкого спектра препаратов, обладающих активностью против большинства патогенных микроорганизмов, выбор конкретного антибиотика в конкретной клинической ситуации остаётся сложной задачей. Это связано с этиологическими особенностями инфекционного процесса, вариабельностью возбудителей респираторных инфекций и потенциальным ростом их устойчивости к антибиотикам. Дополнительные трудности возникают из-за ограниченной информированности практикующих специалистов о принципах рационального использования антибактериальных препаратов, их фармакокинетических характеристиках, спектре антимикробной активности и токсичности современных средств. Согласно данным ряда международных исследований, более 60% назначаемых антибиотиков являются необоснованными или нерациональными [1–3]. В дальнейшем рассматриваются подходы и принципы, которые позволяют врачу оперативно принимать обоснованное решение при выборе эффективной антибактериальной терапии, повышая её рациональность и безопасность.

**Ключевые слова:** инфекции дыхательных путей, антибактериальная терапия, антибиотики, рациональное применение антибиотиков, резистентность микроорганизмов, фармакокинетика антибиотиков, антимикробная активность, безопасность терапии.

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## CAUSES OF ANTIBIOTIC RESISTANCE AND MEASURES TO ELIMINATE THEM

**Abstract.** The treatment of respiratory tract infections in modern medicine cannot be imagined without the use of antibacterial agents. Despite the availability

*of a wide range of drugs active against most pathogenic microorganisms, the selection of a specific antibiotic in a particular clinical situation remains a complex task. This is associated with the etiological characteristics of the infectious process, the variability of respiratory pathogens, and the potential increase in their resistance to antibiotics. Additional difficulties arise due to the limited awareness of practicing specialists about the principles of rational use of antibacterial drugs, their pharmacokinetic characteristics, the spectrum of antimicrobial activity, and the toxicity of modern agents. According to a number of international studies, more than 60% of prescribed antibiotics are unreasonable or irrational [1–3]. The following discussion considers approaches and principles that allow physicians to make prompt and well-grounded decisions when selecting effective antibacterial therapy, thereby increasing its rationality and safety.*

**Keywords:** *respiratory tract infections, antibacterial therapy, antibiotics, rational use of antibiotics, microbial resistance, antibiotic pharmacokinetics, antimicrobial activity, therapy safety*

**Основная часть.** Основным показанием для рационального применения антибактериальной терапии является воспалительный процесс бактериальной этиологии. Одной из серьёзных проблем лечения инфекций верхних и нижних дыхательных путей остаётся бесконтрольное назначение антибиотиков, особенно при вирусных инфекциях, без соблюдения соответствующих клинических рекомендаций. Распространённость респираторных инфекций ежегодно остаётся стабильной или постепенно увеличивается, что приводит к частым обращениям пациентов к специалистам различных профилей. Согласно отечественным и зарубежным данным, взрослые люди в среднем 2–3 раза в год переносят эпизоды простудных заболеваний [4, 5]. Факторами, способствующими развитию инфекций, являются стресс, снижение иммунного статуса, неблагоприятная эпидемиологическая ситуация, особенно в холодный сезон, а также наличие хронических сопутствующих заболеваний. Большинство острых респираторных заболеваний имеют вирусную природу, протекают легко и при адекватной терапии завершаются успешно [6]. Ошибки в назначении антибиотиков возникают вследствие неправильной интерпретации клинических симптомов (когда вирусная инфекция ошибочно принимается за бактериальную) и стремления предупредить возможные бактериальные осложнения. В таких случаях антибиотики не предотвращают суперинфекцию, а, напротив, способствуют формированию более устойчивых и агрессивных штаммов возбудителей и повышают риск развития побочных эффектов. Нерациональное применение антибактериальной терапии ведёт к серьёзным последствиям [7]. При высокой вероятности бактериальной этиологии заболевания следующим шагом является выбор препарата, активного против предполагаемого возбудителя. В большинстве случаев антибактериальная терапия назначается эмпирически, без точного определения возбудителя и его чувствительности к антибиотикам. Спектр

антимикробной активности препарата должен охватывать большинство вероятных бактериальных патогенов, вызывающих инфекцию в конкретной локализации. При бактериальных инфекциях дыхательных путей препарат должен быть активен против наиболее распространённых патогенов: *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, *Streptococcus pyogenes*. *Streptococcus pneumoniae* является одним из ведущих бактериальных возбудителей респираторных инфекций. Во всём мире инфекции пневмококковой этиологии представляют серьёзную проблему для здравоохранения. В настоящее время идентифицировано более 90 различных серотипов пневмококка, все они потенциально патогенны, при этом около двадцати серотипов вызывают тяжёлые формы заболеваний. Согласно статистике, до 70% всех случаев пневмонии, примерно 25% средних отитов, 5–15% гнойных менингитов и около 3% эндокардитов обусловлены пневмококковой инфекцией [8–10]. *Haemophilus influenzae* долгое время считался возбудителем гриппа, поскольку заболевания, вызываемые этим микроорганизмом, часто протекают в форме неспецифического назофарингита или острой респираторной вирусной инфекции, что и объясняет историческое название. Впервые в 1892 году немецкий бактериолог Рихард Пфайфер (1858–1945) ошибочно описал его как возбудителя гриппа. Тем не менее, *H. influenzae* способен вызывать серьёзные заболевания, включая пневмонию, хронические обструктивные болезни лёгких, синуситы, менингиты и сепсис [11]. *Moraxella catarrhalis*, особенно у детей, также участвует в развитии респираторных инфекций. Этот патоген часто вызывает заболевания совместно с *Haemophilus influenzae* и пневмококком, являясь второй по частоте причиной обострений хронических обструктивных заболеваний лёгких, вызванных бактериальными патогенами [12].  $\beta$ -гемолитические стрептококки группы А (пиогенные стрептококки, *S. pyogenes*) вызывают широкий спектр патологий, включая тонзиллит, фарингит, скарлатину, рожу, перитонзиллярный абсцесс, флегмону шеи, сепсис, отит, менингит, стрептодермию, ревматизм и гломерулонефрит [3]. Основной причиной снижения эффективности антибактериальной терапии является способность микроорганизмов развивать устойчивость к действию антибиотиков (резистентность). Доказано, что необоснованное и чрезмерное использование антибиотиков, в том числе в профилактических целях или для самолечения, ускоряет этот естественный процесс. Риск возникновения и распространения антибиотикорезистентности был признан научным сообществом почти сразу после появления первых антибиотиков. В течение многих лет данная проблема решалась за счёт разработки и внедрения новых препаратов, способных преодолевать резистентность [14]. Согласно отдельным источникам, экономические потери, связанные с устойчивостью к антибиотикам, к 2050 году могут составить около 100 триллионов долларов США, а прогнозируемая ежегодная смертность — десятки миллионов человек [15]. В Европе внебольничная пневмония ежегодно регистрируется примерно у 2–12 человек на 1000 взрослых [30]. Несмотря на то что большинство



пациентов получают лечение амбулаторно, данные инфекции остаются одной из ведущих причин смертности [1].

**Заключение.** Проблема устойчивости бактерий к антибиотикам находится в руках человека. Полностью избавиться от этой проблемы, возможно, невозможно, однако её можно замедлить и даже снизить. У простых людей устойчивость к антибиотикам можно предупредить. Для этого необходимо отказаться от самолечения, строго соблюдать назначенные врачом схемы антибактериальной терапии, соблюдать личную гигиену, обрабатывать раны и царапины дезинфицирующими средствами, а также проявлять ответственное отношение к собственному здоровью. Одним из наиболее эффективных механизмов снижения потребления антибиотиков является вакцинация. Широкое проведение иммунизации среди населения позволяет снизить уровень заболеваемости, уменьшить необоснованное использование антибактериальных препаратов и, как следствие, замедлить темпы роста устойчивости к антибиотикам.

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## **МЕДИКО-СОЦИАЛЬНАЯ ОЦЕНКА ГОТОВНОСТИ СТУДЕНТОВ МЕДИЦИНСКОГО ПРОФИЛЯ К ДЕЙСТВИЯМ В УСЛОВИЯХ ЧРЕЗВЫЧАЙНЫХ СИТУАЦИЙ И ГРАЖДАНСКОЙ ЗАЩИТЫ**

**Аннотация:** В статье проведена оценка готовности студентов к действиям при чрезвычайных ситуациях ( $n=120$ ). Установлена положительная корреляция между стрессоустойчивостью и эффективностью оказания первой помощи ( $r=0,61$ ;  $p<0,05$ ). Разработана модель институционализации подготовки в системе медицинского образования.

**Ключевые слова:** гражданская защита, медицина катастроф, подготовка студентов, чрезвычайные ситуации, стрессоустойчивость, Узбекистан.

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## **MEDICAL AND SOCIAL ASSESSMENT OF THE READINESS OF MEDICAL STUDENTS TO ACTION IN EMERGENCY SITUATIONS AND CIVIL PROTECTION**

**Abstract:** An assessment of students' emergency preparedness ( $n=120$ ) was conducted. A positive correlation was found between stress resilience and first aid effectiveness ( $r=0.61$ ;  $p<0.05$ ). A model for institutionalizing training in medical education was developed.

**Key words:** civil protection, medical disaster, training of students, occurrence of situations, stress resistance, Uzbekistan.

**Актуальность:** В свете растущих глобальных вызовов и участвовавших чрезвычайных ситуаций, гражданская защита становится критически важной. Всемирная организация здравоохранения подчеркивает, что своевременная квалифицированная медицинская помощь в течение "золотого часа" существенно повышает шансы на выживание пострадавших. Поэтому подготовка медицинских специалистов, готовых действовать эффективно в условиях ограниченных ресурсов и экстремальных ситуаций, является ключевым приоритетом для системы здравоохранения Узбекистана.

**Цель исследования:** Изучить готовность студентов-медиков к задачам гражданской защиты, проанализировать её медико-социальные предпосылки и предложить меры по улучшению.

**Материалы и методы:**

Исследование проведено в 2024–2025 гг. среди студентов медицинского профиля ( $n=120$ ). Дизайн исследования — поперечное (cross-sectional). Методология включала анонимное анкетирование, симуляционную оценку практических навыков (сердечно-лёгочная реанимация, контроль кровотечения по протоколу MARCH) и статистическую обработку данных с использованием пакета IBM SPSS Statistics. Для анализа применялись методы описательной статистики и корреляционный анализ; уровень статистической значимости принимался при  $p < 0,05$ .

**Результаты и обсуждение:** Анализ показал наличие статистически значимого разрыва между теоретической базой и практическими навыками (Таблица 1).

| Показатель                            | Значение(%)    | Уровень готовности |
|---------------------------------------|----------------|--------------------|
| Теоретическая подготовка              | $78,4 \pm 5,2$ | Высокий            |
| Практическая реализация навыков       | $51,7 \pm 7,1$ | Допустимый         |
| Навык медицинской сортировки(триаж)   | $42,0 \pm 6,3$ | Недостаточный      |
| Психологическая готовность (по Риссу) | 5,4 (из 10)    | Недостаточный      |

Таблица 1. Показатели функциональной готовности студентов ( $M \pm m$ )

Выявлена статистически значимая положительная корреляция между частотой прохождения тренингов и снижением количества ошибок при симуляции чрезвычайных ситуаций ( $r = 0,73$ ;  $p < 0,05$ ).

Авторская модель институционализации подготовки:



**Выводы:** Уровень практической готовности студентов медицинского профиля составляет 51,7%, что свидетельствует о необходимости усиления симуляционно-ориентированного обучения. Ключевым ограничивающим фактором выступает недостаточная стрессоустойчивость в условиях временного дефицита. Интеграция предложенной модели способна повысить готовность будущих врачей к действиям в чрезвычайных ситуациях на 30–40%.

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## RAQAMLI TEXNOLOGIYALAR ASOSIDA KIMYO DARSLARINI TASHKIL ETISH

**Annotatsiya.** Raqamli texnologiyalar kimyo darslarini yanada qiziqarli, samarali va tushunarli qilishga yordam beradi. Ushbu tezisdá "Topqir uz" tadqiqot platformasining imkoniyatlarini ko'rsatadi, bu orqali o'quvchilarning kimyoviy bilimlarini mustahkamlashni oshirish masalalari ko'rib chiqiladi.

**Kalit so'zlar:** Raqamli ta'lim, Topqir.uz platformasi, AKT (Axborot-kommunikatsiya texnologiyalari).

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## ORGANIZATION OF CHEMISTRY LESSONS BASED ON DIGITAL TECHNOLOGIES

**Abstract.** Digital technologies can help make chemistry lessons more interesting, effective, and understandable. This thesis demonstrates the capabilities of the "Topqir uz" research platform, which will address issues related to improving students' chemical knowledge.

**Keywords:** Digital education, Topqir uz platform, gamification, ICT (Information and Communication Technologies).

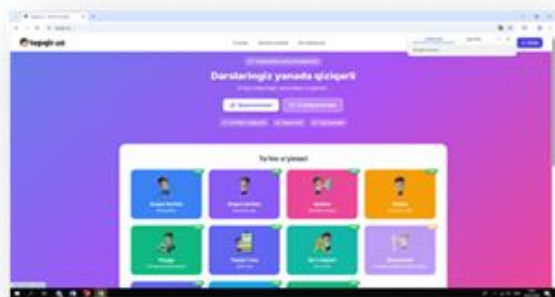
Bugungi kunda kimyo ta'limida nazariy bilimlarni amaliyot bilan bog'lashda raqamli texnologiyalardan foydalanish, kimyo darslarini samarali tashkil etish, yechimlaridan biri hisoblanadi. **Topqir.uz** platformasi orqali kimyo darslarini tashkil etish quyidagi afzalliklarni beradi: O'yinlashtirish platformadagi mantiqiy topshiriqlar va kimyoviy terminlar asosidagi o'yinlar o'quvchini bilimini mustahkamlashga yordam beradi.

Raqamli o'qitish modellarini joriy etish zamonaviy ta'lim tizimlarida davom etayotgan o'zgarishlarda asosiy harakatlantiruvchi kuch hisoblanadi. Axborot va kommunikatsiya texnologiyalarining jadal rivojlanishi, onlayn o'qitish platformalarining ko'payishi va gibrid o'qitish usullarining tobora ko'proq qo'llanilishi bilan ta'lim muhiti yanada moslashuvchan, interaktiv va individual o'quvchilarning ehtiyojlariga moslashtirilmoqda [1].

Raqamli ta'lim resurslarini ta'limga joriy etish bugungi kunning dolzarb mavzusidir [2]. Bepalko P.I., Kruglik T.M., Mashbits E.I., Po'lat E.S., Selevko G.I. asarlarida turli fanlarni o'qitishda zamonaviy kompyuter texnologiyalari vositalarining o'quv-uslubiy imkoniyatlari to'liq tahlil qilingan [3, 4, 7].

Kimyo fanida **Topqir.uz** platformasidan foydalanish darsning samaradorligini va o'quvchilarning qiziqishini sezilarli darajada oshiradi. Raqamli vositalar yordamida murakkab kimyoviy tushunchalarni tushunish, virtual tajribalar o'tkazish va interfaol o'quv materiallaridan foydalanish samaradorlikni oshirish imkoniyatini beradi [5].

Kimyo ko'pincha formulalar va murakkab nazariyalardan iborat bo'lgani uchun, o'yin orqali elementlarni yodda qolishini osonlashtiradi va bunda o'quvchi kimyoviy formulalarni ko'radi, takrorlaydi [6]. Bundan tashqari platforma bepul va o'zingiz kimyo fanidan test tuzib joylashingiz mumkin. Kimyo darslarida quyidagicha qo'llashingiz mumkin:



1-rasm. Topqir.uz platformasi



2-rasm. Platformadagi xotira mashqi o'yini

**1. Elementlar va terminlarni yod olish uchun:** kimyoviy elementlar belgilari, ularning lotincha nomlari yoki valentliklarini yod olishda **"Xotira mashqi"** (Memory game) o'yinidan foydalanish juda foydali. Platforma birinchi oynasi va undan siz o'zingizga kerakli o'yinga kirasiz, fanni tanlaysiz o'zingizga kerakli savollarni kiritasiz, boshlash tugmasini bosasiz (1-2-rasm).

**2. Formularni mustahkamlash uchun:** kislotalar, tuzlar yoki organik birikmalar formulalarini "**Arqon tortish**" yoki "**Poyga**" o'yinlari orqali guruhlararo musobaqa shaklida o'tkazish mumkin. Sinfda sog'lom raqobat muhiti paydo bo'ladi va o'quvchilar formulalarni xatosiz yozishga harakat qilishadi.

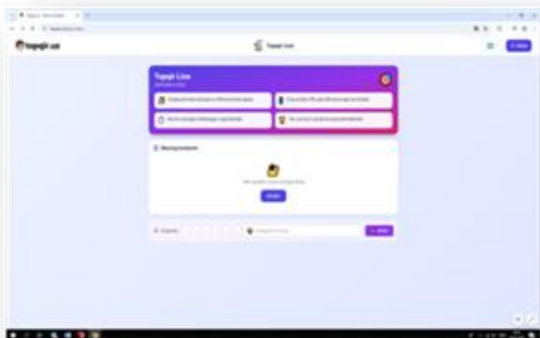


3-rasm. Arqon tortish o'yini qismi topqir.uz platformasida



4-rasm. Poyga o'yini qismi topqir.uz platformasida

**3. Bilimlarni tezkor tekshirish:** mavzu tushuntirib bo'lingach, "**SyncQuiz**" (Jonli test) orqali 5-10 daqiqalik nazorat o'tkazish mumkin. Siz darsning o'zidayoq qaysi o'quvchi mavzuni tushunganini, qaysi biri o'quvchi tushunmagani ko'rasiz (platforma avtomatik statistika chiqarib beradi, 5-rasm).



5-rasm. Platformaning jonli test bo'limi o'quvchilarni tezda baholashga yordam beradi.



6-rasm. Quti ochish o'yin qismi platformadagi

**4. Murakkab jarayonlarni qiziqarli qilish:** masalan, kimyoviy reaksiyalar tiplarini (birikish, parchalanish, o'rin olish) ajratish bo'yicha o'yinlar yaratish mumkin. O'quvchi nazariyani vizual va interaktiv shaklda qabul qilgani uchun ma'lumot uzoq muddatli xotirada saqlanadi (6-rasm).

Tadqiqot doirasida Topqir.uz platformasidan foydalanishning samaradorligini aniqlash maqsadida pedagogik eksperiment o'tkazildi. Eksperimentda 2 ta guruh: nazorat guruhi (an'anaviy dars o'tilgan) va tajriba guruhi (Topqir.uz platformasi integratsiya qilingan) ishtirok etdi. O'zlashtirish darajasini aniqlash uchun o'quvchilarga bir xil darajadagi kimyoviy topshiriqlar va testlar berildi. Olingan natijalar quyidagi jadvalda o'z aksini topgan:

### Tajriba va nazorat guruhidagi baholash natijalari

| Sinflar        | O'quvchilar soni(n) | 10 ballar soni | 9 ballar soni | 8 ballar soni | 7 ballar soni | 6 ballar soni | $\bar{X}, \bar{Y}$ |
|----------------|---------------------|----------------|---------------|---------------|---------------|---------------|--------------------|
| Nazorat guruhi | 25                  | 3              | 6             | 7             | 4             | 5             | 7,92               |
| Tajriba guruhi | 25                  | 5              | 7             | 7             | 3             | 3             | 8,32               |

Olingan sonli ma'lumotlarni matematik-statistik tahlil qilishda Styudentning tanlama mezondan foydalanildi: o'zlashtirish darajasini quyidagi formula asosida hisoblaymiz:

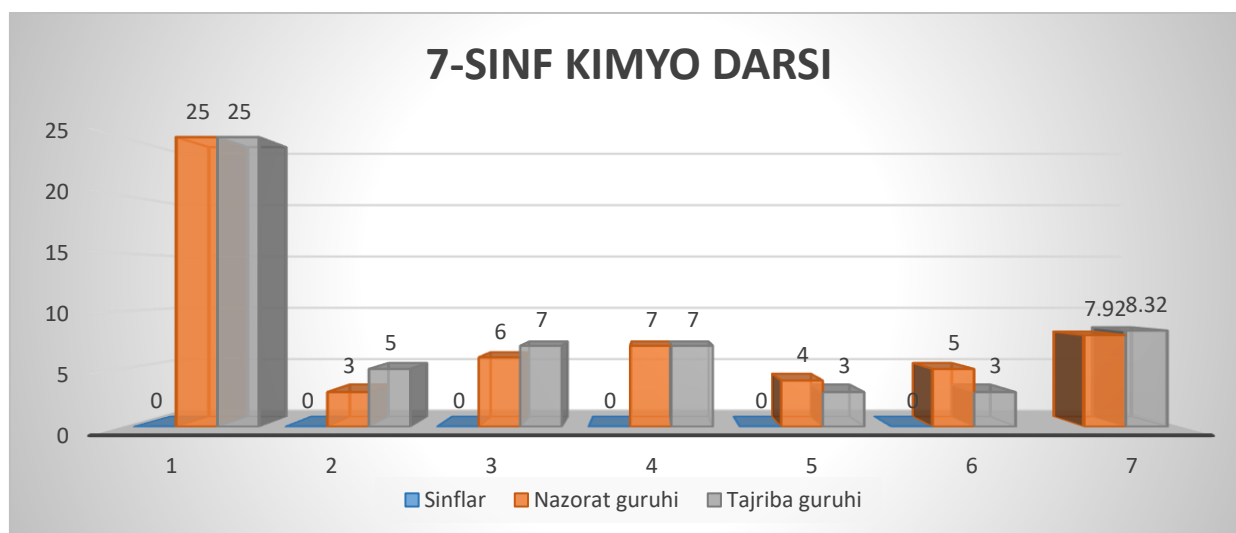
$$\bar{X} = \frac{1}{n} \sum_{i=1}^3 n_i X_i = \frac{1}{25} (3 \cdot 10 + 6 \cdot 9 + 7 \cdot 8 + 4 \cdot 7 + 5 \cdot 6) = \frac{1}{25} \cdot 198 = \frac{198}{25} = 7,92$$

$$\text{Foizda } \bar{X} = \frac{7,92}{3} \cdot 100\% = 264\%$$

$$\bar{Y} = \frac{1}{n} \sum_{i=1}^3 n_i Y_i = \frac{1}{25} (5 \cdot 10 + 7 \cdot 9 + 7 \cdot 8 + 3 \cdot 7 + 3 \cdot 6) = \frac{1}{25} \cdot 208 = \frac{208}{25} = 8,32$$

$$\text{Foizda } \bar{Y} = \frac{8,32}{3} \cdot 100\% = 277,3\%$$

Tajriba guruhidagi o'rtacha o'zlashtirish nazorat guruhidagi o'zlashtirish ko'rsatgichidan  $(277,3 - 264)\% = 13,3\%$  ga yuqori ekan. Bu esa, o'z navbatida,  $(\frac{277,3}{264} = 1,05)$  barobar ortiqqligini anglatadi. Demak, tajriba guruhida o'rtacha o'zlashtirish nazorat guruhidagidan yuqori ekan:  $\bar{X} < \bar{Y}$ . Tajriba va nazorat guruhidagi baholash natijalari jadvalidan foydalanib 7-sinf kimyo mashg'uloti darslaridagi o'quvchilar o'zlashtirish ko'rsatgichi diagramma asosida ifodalandi.



1-jadval. Nazorat va tajriba guruhlardan olingan natijalarning digrammadagi ko‘rinishi.

**Xulosa:** O‘shish ko‘rsatkichi qariyb 13,3% ni tashkil etdi, bu raqamli texnologiyalar ([Topqir.uz](http://Topqir.uz)) qo‘llanilganda o‘rta muddatli natijalar uchun ilmiy jihatdan hisoblandi. Shunday qilib [Topqir.uz](http://Topqir.uz) platformasidan foydalanish quyidagi ijobiy o‘zgarishlarga olib keldi: "A'lo" va "yaxshi" baholar olgan o‘quvchilar soni 16 nafardan 19 nafarga yetdi. Nazorat guruhida 9 nafar o‘quvchi qoniqarsiz 7 va 6 ball olgan bo‘lsa, tajriba guruhida platformadagi interaktiv topshiriqlar yordamida bu ko‘rsatkich 3 nafargacha kamaydi.

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## **XALQ HUNARMANDCHILIGI ELEMENTLARINI O'RGANISHDA KASHTACHILIK ISHLARINING O'RNI**

**Annotatsiya:** Mazkur mavzuda xalq hunarmandchiligi elementlarini o'rganishda kashtachilik san'atining o'rni va ahamiyati yoritiladi. Kashtachilik o'zbek xalqining boy madaniy merosini aks ettiruvchi muhim yo'nalishlardan biri bo'lib, unda milliy naqshlar, ramzlar va estetik qarashlar mujassamdir. Annotatsiyada kashtachilik orqali yosh avlodga milliy qadriyatlarni singdirish, ularning ijodiy qobiliyatlarini rivojlantirish hamda an'anaviy hunarlarni asrab-avaylash masalalari tahlil qilinadi.

**Kalit so'zlar:** Kashtachilik, xalq hunarmandchiligi, milliy naqshlar, an'anaviy san'at, madaniy meros, ijodiy rivojlanish, amaliy san'at, milliy qadriyatlar, hunar o'rganish.

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## **THE ROLE OF EMBROIDERY IN STUDYING ELEMENTS OF FOLK HANDICRAFTS**

**Annotation.** This topic explores the role of embroidery in studying the elements of traditional folk crafts. Embroidery is an essential part of Uzbek cultural heritage, reflecting national patterns, symbols, and aesthetic values. The annotation highlights the importance of embroidery in transmitting cultural traditions to younger generations, fostering creativity, and preserving traditional crafts.

**Key words.** Embroidery, folk crafts, national patterns, traditional art, cultural heritage, creative development, applied arts, national values, craft education.



O'zbek milliy kashtado'zlik xalq hunarmandchilik san'atining eng qadimiy turlaridan bo'lib, u xalqning o'z turmushini go'zal qilish istagi natijasida yuzaga kelgan. Kashta kiyimlar va buyumlarni bezashda hamda ro'zg'or bezak buyumlari tayyorlashda qadimdan qo'llaniladi. Kashtachiligimiz san'ati nafaqat mamlakatimizda, balki chet ellarda ham shuhrat qozongan. O'zbek chevar ustalari qo'llari bilan tikilgan kirpich, so'zana, zardevor, gulko'rpa, choyshab kabilar Fransiya, Italiya, Yaponiya, Germaniya, Belgiya, Amerika, Hindiston kabi xorijiy, shuningdek Respublikamizning Farg'ona vodiysida faqat xonadonlarda emas, balki amaliy san'at muzeylarida ko'p namunalari to'planib, doimiy ekspozitsiyaga aylanib qolgan. Hozirgacha buyumlar o'ziga xos go'zallik, nafis bezaklarning rang-barangligi bilan kishilarni hayratga solib kelmoqda. Badiiy kashtachilik uzoq tarixga ega, buni arxeologik topilmalar va yozma manbalar isbotlab bermoqda [1].

O'zbek kashtachiligi iqlimi, tabiiy sharoit, muhit bilan bog'liq holda barcha kasb-hunarlari bilan birgalikda rivoj topgan. XIV - XV asrlarga mansub miniatyuralar orqali kashtachilikning juda qadimdan rivojlanganligini ko'rish mumkin. Ispan elchisi Rui Ganzalem de Klavixo Amir Temur saroyida o'zbek milliy kashta bezaklarini ko'rganini kundaligida yozib qoldirgan. Kamoliddin Behzod "Zafarnoma"ga ishlagan. "Temur taxtda" miniatyurasida chodirga ishlangan kashtani ham aks ettirgan. O'zbek kashtachiligi qo'shni xalqlar kashtachiligi ta'sirida boyidi va rivojlandi. O'zbek kashtalariga e'tibor bersak, unda hind, xitoy, rus, qozoq, qirg'iz va tojik kashtachiliklarining usullarini uchratamiz. Kashtachilik san'atida har bir millatning o'ziga xos eng ko'p qo'llaydigan naqshlari bo'ladi. O'zbek kashtalarida o'simliksimon, geometrik shakl hamda gul naqshlari ko'p qo'llaniladi. Qadimiy an'analarga ko'ra, o'zbek qizlari-bo'lajak kelinchak seplari bo'lmish har xil kashtachilik buyumlarini ya'ni dastro'mol, choyxalta, parda, belbog', sumka, nimcha, joynomoz, gulko'rpa, kirpich, zardevor, choyshab, so'zana, kiyim bezaklari va bosh kiyimlarini, sovg'alarni o'zlari tayyorlashgan. To'yda kuyovning qarindosh-urug'lariga kelin o'zi tikkan buyumlarini sovg'a qilgan. To'ydan oldin sep yoyib ko'rgazma qilinar, bu kelinning chevarligini, mehnatsevarligini namoyish etishi va kashta qanchalik nozik, chiroyli bo'lsa yuqori baholanar edi. Qizlar juda yoshligidan boshlab kashta tikishga o'rgatilib, ular uch, to'rt yildan keyin mustaqil kashta tikishni boshlaganlar. O'rta Osiyoda kashtachilik juda keng tarqalgan bo'lib, oilada kashta tikish bilan ayollar shug'ullanishgan. O'tmishda bu kashtalar oq va tabiiy malla shoyi, adras, hisoriga, baxmal matolarga tikilgan, keyinchalik satin, shoyi, baxmalga tikiladigan bo'ldi. Ish jarayonida ular o'z mahoratlarini oshirishgan, bir-biridan va kattalardan avlodlar tajribasini o'rganishgan. Xalq badiiy hunarmandchilik mahsulotlari faqat bizning mamlakatimizda emas, balki chet mamlakatlarda ham cheksiz talab qilinadi. Pliniyning aytishicha, Vavilon kashtachiligi qadimdan mashhur bo'lib, matoga turli rangdagi iplar bilan kashta tikishni o'sha yerda kashf etishgan. Keyinchalik Vavilon Rim imperiyasi tarkibiga kirgach ipak, zar yoki jun ip qo'shib tikilgan rang-barang kashtachiligi bilan shuhrat qozongan. Kashtachilik san'atining an'analari Vizantiyada ham rivoj topgan [2].

XIII va XV asrlarda Kichik Osiyo doirasida paydo bo'lgan hamda Vizantiya imperiyasini barbod qilgan usmoniy turklar ham ushbu san'atga o'zlarining munosib ulushlarini qo'shganlar. Qrim va Kavkazning qayeridaki Vizantiya madaniyati uzoq vaqt kuchli ta'sir o'tkazgan bo'lsa, o'sha yerda kashtachilik rivojlanavergan. Qadimgi Rus ham Vizantiyaga taqlid qilib kashtachilik san'atini o'rgangan. Rus kashtasi gullarining xarakteriga va tikilish usullariga ko'ra juda turli-tumandir. Popok (yo'rma) chokli kashta tikish Olonets, Vologda oblastlari va Arxangelsk oblastining g'arbiy qismida keng tarqalgan. Hozirgi vaqtda Rossiyada ellikdan ortiq baxyasimon kashtado'zlik korxonalari bor. Ivanovo, Ryazan, Kalinin, Smolensk va boshqa oblastlarda kashtado'zlik markazlari bo'lib, u yerdagi korxonalarda turli kiyimlar va uy ro'zg'orni bezaydigan turli buyumlar ishlab chiqariladi. XIX asrning ikkinchi yarmida kashta tikish mashinasining ixtiro etilishi kashtachilik korxonalarining vujudga kelishiga asos soldi. Kashtado'zlikning yirik namoyandalaridan Andijondagi "Qizil bayroq" arteli rassom kashtado'zi X. Nazarov, Samarqanddagi "Xotin-qizlar mehnati" arteli kashtado'zi Usmon Shokirov, toshkentlik kashtado'z va chizmakash Xayri Sobirovalar kashta buyumlariga yangi turli xil naqsh kompozitsiya va tikish usullarini yaratdilar. X. Sobirova onasi Zaxira Mirxoliqovadan qo'lda, mashinada tikish sirlarini va chizmachilikni o'rgandi. X. Sobirova 15 yoshidan boshlab onasining kashtado'zlik hunarini davom ettirib, "Sharq guli" va "Ilg'or" nomli Stalin artelida 16 yil ishlab ko'p shogirdlar yetishtirishda o'z hissasini qo'shdi. Yetishib chiqqan kashtachilar o'zining san'ati va tabiatiga ko'ra go'zallik xaqidagi orzularini ifodalashga harakat qilganlar. Kashta tikish uchun gazlama bilan, ip buyumning nimaga mo'ljallanganiga, bezakning xarakteriga va tikish usuliga muvofiq tanlanadi. Kashta tikiladigan materialga muvofiq rangdagi ip tanlash kashtado'zlikda katta ahamiyatga ega. Bu kashtado'zdan katta mahorat va did talab qiladi. Kashtada foydalaniladigan iplar rangining o'zaro muvofiqligi ham kashtaning jozibador chiqishiga sabab bo'ladi. O'tmishda turli-tuman rangdagi matolarning kamligi sababli ko'pgina bezak kashtalari bugun mato sathini kashta bilan qoplab tikilgan. Hozirda so'zana, choyshab, zardevor kabi bezak buyumlari baxmal, shoyi, satin, shuningdek turli-tuman iplar ham ko'p. Bu kashtani jozibador chiqarishda rangdan keng foydalanish imkonini beradi. Kashtado'z kashta tikmoqchi bo'lgan kiyim shakliga, matosi rangiga qarab kashta nusxasini tanlashi kerak. Kashta iplari paxta tolasidan to'rt qavatli qilib, turli ranglarda tayyorlanadi, xira bo'ladi va 50 metrli kalava tarzida savdoga chiqariladi [3].

Mulina-yuqori sifatli paxta tolasidan tayyorlanadi. 12 qatli, maxsus ishlov berib sifati oshirilgan, chidamli bo'ladi. O'n yoki yigirma metrlik kalava tarzida chiqariladi. Ipak iplar-tabiiy va kimyoviy tolalardan tayyorlanadi. Pishitib-yigirilgan turli razmerdagi oq bo'yalgan bo'lib, kalava qilingan (40g li), g'altak va qog'oz patronlarga o'ralgan (50, 100, 200m uzunlikda) bo'ladi. 13-18-nomerli ipak iplar jun, zig'ir poyasidan, sun'iy tolalardan tayyorlangan iplar, mayin sim, zar ip, charmdan ensiz qilib tayyorlangan tasmalar bilan tikiladi.

Naqsh nusxasini har xil gazlamalarda har xil yo'llar bilan tushiriladi. Masalan, nusxa ko'chiradigan qog'ozlar axta yorug'lik yordamida, naqsh chizilgan

qog'ozni gazlama ustidan ko'klab chiqiladi keyin bu qog'ozlar yirtib olinadi. Hamma hollarda ham oldin bezakni originaldan shaffof yoki millimetrli qog'ozga uchi yaxshi ochilgan qalamda ko'chirib olinadi. Shundan keyin uni gazlamaga o'tkaziladi.

Bezakni (naqsh) nusxa ko'chiradigan (kopirovka) yordamida ko'chirish.

Gazlamani oldin dazmollab, tekis yuza (stol, taxta) ustiga yozib qo'yiladi, bunda gazlamaning asos va arqoq iplari qiyshayib qolmasligiga qarash kerak. Naqsh (tekis chok, suv chok, ustki chok va hokazo bilan tikiladigan) chizilgan shaffof qog'ozni gazlama ustiga qo'yib, to'g'nog'ich bilan qadab qo'yiladi. Nusxa ko'chiradigan qog'ozini to'q tomonini gazlamaga qaratib shaffof qog'oz tagiga qo'yiladi, uchi yaxshi ochilgan qalam bilan bezak ustidan chizib chiqiladi. Turli rangdagi nusxa ko'chiradigan qog'ozlar bo'lgani ma'qul, shunda och rangdagi gazlamaga to'q rangli (qora, ko'k, yashil), to'q rangli gazlamaga och rangli (oq, sariq) nusxa ko'chiradigan qog'oz ishlatiladi. Bezakni ko'chirib bo'lingach nusxa kopiroyka) qog'ozi olinib, bir tomondagi to'g'nog'ichlar chiqariladi va bezagi tekshiriladi. Shundan keyingina shaffof (kal'ka) qog'oz olib tashlanadi. Naqshni nusxa ko'chiradigan qog'oz bilan ko'chirishda bezakning chiziqlari qalin bo'lmasligini yodda tutish kerak, aks holda kashta tikayotganda gazlama va ip kir bo'lib qoladi. Shuning uchun ishlatiladigan kopiroyka qog'ozidan foydalanish yaxshiroq, yangisini esa ishlatishdan oldin quruq paxta yoki latta bilan artish kerak.

Yupqa shaffof gazlamalarga kashta gulni gazlama tagidan yoritish yo'li bilan ko'chirish mumkin. Tagiga lampa qo'yilgan oyna ustiga yaxshi ko'rinadigan kashta gulni qo'yib, uning ustiga yaxshi tortilgan chambarakga (kergiga) o'rnatilgan gazlama qo'yiladi. Gazlama tagida ko'rinib turgan kashta gulni uchi yaxshi ochilgan qalam bilan gazlamaga chizib olinadi. Movut baxmal va yaltiroq gazlamalar ustiga kashta gulni shaffof qog'oz ustidan ko'klash yo'li bilan ko'chiriladi. Buning uchun bezakni shaffof qog'ozga ko'chirib olib, uni gazlama ustiga qo'yiladigan, butun chizig'i bo'ylab mayda zich qaviqlar bilan ninani oldinga yo'naltirib tikib chiqiladi. Keyin qog'oz yirtib tashlanadi.

Bezakni axta (andaza, ulgi) yordamida ko'chirish. Axta naqsh yoki biror rasmni shaffof (kal'ka) qog'ozga chizib, chiziq yo'llarini igna bilan teshib, buyum yuziga tushirish uchun tayyorlangan andoza. Axtani tayyorlash uchun shaffof (xitoy) qog'ozga naqsh kompozitsiyaga moslab simmetriya o'qi bo'yicha qog'ozni ikkiga, to'rtga va hokazo buklanadi. Buklamaning bir qismiga naqsh chiziladi. Naqshli shaffof qog'ozni yumshoq gazlama yoki bir necha qavat gazeta qog'ozi ustiga qo'yib, naqsh chiziqlari ustidan 2-3 mm oraliqda igna bilan teshib chiqiladi. Naqsh nusxasi igna bilan teshib bo'lingandan keyin, shaffof qog'oz yopib yuboriladi, natijada axta hosil bo'ladi. Tayyor bo'lgan axtani ish yuzasiga qo'yib, ustidan xoka urib va bosib yurgazib chiqiladi. Geometrik shakldagi bezakni teshma ko'chirishda uning kataklari vertikal va gorizontall chiziqlar kesishgan nuqtalarda teshib hosil qilinadi. Kashta gul chizilgan shaffof qog'ozni kerosinlangan latta bilan artib, toza tomonini gazlamaga qaratib qo'yiladi-da, bir necha joyidan to'g'naladi. Movut yoki paxmog'ning (ochroq bo'lgani yaxshi) yoki paxtaning ustiga doka o'rab tampon qilinadi. To'q rangdagi gazlamaga bezakni ko'chirish uchun xokani bo'r

yoki tish poroshogi aralashgan kerosinda ho‘llab olinadi. Shu maqsadda hech narsa bilan aralashmagan tish pastasini ishlatish ham mumkin. Teshib ko‘chirishda kashta gulning gazlamasidagi tasviri aniqroq, buzilmay chiqadi, bu ayniqsa kashta gulning bitta bo‘lagini bir necha marta tikish kerak bo‘lganda, mehnatni osonlashtiradi va tezlashtiradi. Andozalarni bir necha marta ishlatish mumkin. Bu axtalar (andoza) alohida paketda saqlangani tuzik. Naqsh chizilgan gazlama parchasiga tikiladigan, uni dumaloq chambarakka tortish qiyin bo‘lsa, bu gazlama parchasining chetlariga ish tugagandan keyin so‘kib tashlanadigan, hohlagan boshqa gazlama parchasini ulab qo‘yish mumkin [4].

Matoda gullarning o‘rni-o‘rnini topib qo‘yish, xususan buyumlardagi gullarni joylashtirib chizish g‘oyatda murakkab va mas’uliyat talab ishdir. Kashtado‘zlik san’atida nushasi va chizmakash hunari ustalarining o‘rni beqiyos. Chevar har qancha mohir bo‘lmasin, naqshlarni nushasi, chizmakashlar asosan atroflicha o‘ylab ko‘rib, o‘z kasb-hunarlarining an’analari va spetsifik xususiyatlari asosida chizib beradilar. Ba’zan kashta tikish uchun tanlangan bezak mo‘ljallangan buyum kattaligiga to‘g‘ri kelmay, uni kattalashtirish yoki kichiklashtirish kerak bo‘ladi. Buning uchun bezak ustiga ixtiyoriy kattalikdagi o‘zaro teng kvadratlardan chiziladi. Bunda kvadratlar qancha mayda bo‘lsa, bezakning nuqtalari shunchalik aniq ko‘chiriladi va nusxasi ham oson chiziladi.

Millimetrni qog‘oz yoki toza qog‘ozga buyum kattaligidagi to‘g‘ri to‘rtburchak chizib, bezakdagi kvadratlar soni qancha bo‘lsa, shuncha kvadratlarga bo‘linadi. Agar bezak gulni kattalashtirayotgan bo‘lsa, bu kataklar originaldagi kataklardan katta bo‘lib, rasm guli kichiklashayotgan bo‘lsa, bu kataklar originaldagidan kichik bo‘lib chiqadi. Shundan keyin kataklar bo‘yicha originaldagi kashta gulning asosiy nuqtalari toza to‘rga ko‘chiriladi. Bu nuqtalarni ravon chiziq bilan ehtiyotlab birlashtirib bezakning kattalashtirilgan yoki kichiklashtirilgan nusxasi hosil bo‘ladi. Rasm nuqtalarini oson topish uchun chizilgan to‘rning ikki tomoniga raqamlar qo‘yiladi [5].

O‘rta Osiyoda kashtachilik juda keng tarqalgan bo‘lib, oilada har bir ayol kashta tikishni bilishi kerak bo‘lgan. Shuning uchun har bir oila o‘zi uchun buyumlarni o‘zi tayyorlagan. Bezak buyumlarining turi juda ko‘p, masalan, so‘zana, kirpich, choyshab, choy xalta, zardevor, palak, gulko‘rpa, dorpech, parda, belbog‘, do‘ppi, ko‘ylak, dastro‘mol, hamyon, joynomoz, sumka, nimcha va boshqalar badiiy did bilan bezatiladigan bezak buyum turlari bilan tanishib chiqamiz. Palak-devorlarga ilinadigan eng yirik, eng qimmat bezak buyumlaridan biri. Palakda osmon va to‘lin oy aks ettiriladi. Uni qadimda oq yoki malla bo‘zga kashta tikib tayyorlangan. U so‘zanadan gullarning yirikligi, zaminining ham kashta qoplanishi bilan farq qiladi. Palakni o‘rtasida yirik oy tasviri qizil qirmizi, pushti ipak bilan kashtalanadi va atrofiga juda chiroyli qilib o‘simliksimon naqshlar tikiladi. Naqshlar ichida ko‘pincha bodom, qalampir elementlari qo‘llaniladi. Palakda qirqtacha oy ham tasvirlash mumkin, shuning uchun oyini soniga qarab olti oyli palak, o‘n ikki oylik palak, hattoki katta uylar uchun qirq oyli palaka tikilgani bizga ma’lum. Oylar turli ranglar bilan bir necha xil tasvirlangan. Shu o‘rinda Surxon vohasida tikilib kelayotgan kashtalar o‘zinig takrorlanmas jiloli

ranglari, naqshlari bilan ajralib turadi. Kashta tikish jarayonida nafaqat go'zallik dunyosiga sayohat qilgandi, balki, insonlarni sabr-toqatli bo'lishga undaydi.

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## **ЛИНИЯ КАК КУЛЬТУРНЫЙ КОД И МИФОЛОГИЯ КАК СМЫСЛОВАЯ МАТРИЦА: ХУДОЖЕСТВЕННАЯ СТРУКТУРА СОВРЕМЕННОЙ 2D-АНИМАЦИИ**

***Аннотация:** В статье рассматривается художественная специфика современной 2D-анимации в контексте доминирования трёхмерной графики. Цель исследования — выявить механизмы устойчивости рисованной анимации через выразительность линии и использование мифологических структур. Материалом выступают фильмы Studio Ghibli и Cartoon Saloon. Применяются методы художественно-пластического и культурно-нарративного анализа. В результате доказано, что 2D-анимация сохраняет актуальность благодаря способности передавать индивидуальный художественный стиль и культурную символику.*

***Ключевые слова:** 2D-анимация, Studio Ghibli, визуальная культура, эстетика линии, мифология, фольклор, культурная память.*

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## **LINE AS A CULTURAL CODE AND MYTHOLOGY AS A SEMANTIC MATRIX: THE ARTISTIC STRUCTURE OF MODERN 2D ANIMATION**

***Abstract:** The article examines the artistic specificity of modern 2D animation in the context of the dominance of 3D graphics. The aim of the study is to identify the mechanisms of resilience of hand-drawn animation through the expressiveness of line and the use of mythological structures. The material includes films by Studio Ghibli and Cartoon Saloon. Methods of artistic-plastic and cultural-narrative analysis are applied. As a result, it is proved that 2D animation remains relevant due to its ability to convey individual artistic style and cultural symbolism.*

***Keywords:** 2D animation, Studio Ghibli, visual culture, aesthetics of line, mythology, folklore, cultural memory.*



## **Введение**

Анимация занимает особое место в системе современных аудиовизуальных искусств. В отличие от игрового кино, где движение фиксируется камерой, в анимации движение создаётся художником. Как отмечает исследователь анимации Paul Wells, «анимация представляет собой искусство создания движения из неподвижных изображений» [1, с. 12].

В XXI веке анимационная индустрия претерпела значительные изменения. Развитие компьютерных технологий привело к доминированию трёхмерной графики в массовом кинопроизводстве. Однако рисованная анимация не исчезла, а трансформировалась. По данным международных исследований, около 30 % мировых анимационных проектов продолжают создаваться в технике 2D [2, с. 45].

Особенно ярко потенциал 2D-анимации проявляется в работах студии Studio Ghibli (Хаяо Миядзаки, Исао Такахата) и европейских проектах Cartoon Saloon (Томм Мур). Их фильмы демонстрируют высокий уровень художественной выразительности и активное использование мифологических структур для осмысления современных социальных проблем.

**Актуальность исследования** обусловлена ростом интереса к авторской анимации, развитием фестивального движения, сохранением художественных традиций рисованной анимации, а также обращением современной анимации к культурному наследию.

**Цель исследования** — выявить художественные и культурные механизмы устойчивости 2D-анимации в современной медиасреде, включая выразительность линии и использование мифологических структур.

**Научная новизна** заключается в том, что 2D-анимация рассматривается не только как технологический формат, но как особая художественная система визуального выражения. Предлагается авторский метод культурно-нарративного анализа анимационного сценария.

### **1. Методы исследования**

В исследовании применялись следующие методы:

1. **Метод художественно-пластического анализа** — позволяет рассматривать анимационный кадр как форму визуального высказывания художника. Анализировались параметры: линия, пластика движения, композиция, цветовая символика.

2. **Метод визуального анализа** — последовательный разбор ключевых сцен из каждого фильма (не менее 5 сцен на фильм) с фиксацией выразительных средств.

3. **Метод сравнительного культурного исследования** — сравнение японской (синтоизм) и кельтской мифологий в анимации.

4. **Метод культурно-нарративного анализа сценария** (авторский) — включающий: анализ мифологического источника, анализ трансформации мифа в сценарии, анализ визуальной интерпретации мифологических образов, анализ социальной проблематики.

**Материал исследования:** 5 анимационных фильмов (3 японских, 2 ирландских) общим хронометражем около 7 часов. Анализировалось более 30 ключевых сцен. Методом сплошной выборки выделены сцены, в которых: (а) линия является основным выразительным средством; (б) присутствуют мифологические персонажи или мотивы.

#### **Перечень анализируемых фильмов:**

1. «Spirited Away» («Унесённые призраками») — реж. Х. Миядзаки, Япония, 2001.

2. «Princess Mononoke» («Принцесса Мононоке») — реж. Х. Миядзаки, Япония, 1997.

3. «The Tale of the Princess Kaguya» («Сказание о принцессе Кагуя») — реж. И. Такахата, Япония, 2013.

4. «Song of the Sea» («Песнь моря») — реж. Т. Мур, Ирландия, 2014.

5. «Wolfwalkers» («Волки-оборотни») — реж. Т. Мур, Ирландия, 2020.

## **2. РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ**

В результате применения методов художественно-пластического и культурно-нарративного анализа были получены следующие результаты.

### **2.1. Художественная специфика 2D-анимации**

**Фильм «Spirited Away»** демонстрирует особую выразительность рисованной линии и пластики движения. Пространство кадра насыщено деталями. Важно отметить: сложную композиционную структуру кадров, плавность анимации персонажей, выразительную работу с цветовой атмосферой, контраст между миром людей и миром духов.

**Фильм «Princess Mononoke»** сочетает японскую мифологию, экологическую проблематику и сложную визуальную композицию. Лес изображён как живой организм. Визуальный язык строится на контрасте между индустриальным городом и природным миром.

**Фильм «The Tale of the Princess Kaguya»** отличается визуальной стилистикой, вдохновлённой традиционной японской живописью. Линии намеренно сохраняют ощущение незавершённости. Особенно выразительны сцены эмоционального напряжения, где рисунок становится экспрессивным и динамичным.

**Фильмы «Song of the Sea» и «Wolfwalkers»** вдохновлены ирландскими средневековыми рукописями и кельтскими орнаментами. Композиция кадра строится на сочетании геометрических форм и декоративных элементов. «Wolfwalkers» отличается динамичной линией рисунка и контрастной цветовой системой.

### **2.2. Мифологические мотивы и социальные смыслы**

В «Princess Mononoke» мифологические структуры используются для обсуждения экологических проблем. Конфликт между индустриальным обществом и природной средой представлен через образы духов природы — ками [5, с. 78–82].

В «**Spirited Away**» мифология духов сочетается с критикой общества потребления. Пространство бани духов становится метафорой социальной системы, где доминируют материальные ценности [6, с. 112–115].

В «**Song of the Sea**» мифология селки становится метафорой психологического состояния персонажей, переживающих семейную утрату [7, с. 204–210].

В «**Wolfwalkers**» образ волка-оборотня используется для исследования конфликта между цивилизацией и природным миром, а также темы культурной памяти [8, с. 156–160].

### 2.3. Количественные результаты

**Таблица 1. Распределение выразительных средств по фильмам**

| Фильм                           | Доминирующее выразительное средство | Количество сцен с мифологическими мотивами | Основная социальная проблема   |
|---------------------------------|-------------------------------------|--------------------------------------------|--------------------------------|
| Spirited Away                   | линия + цвет                        | 12                                         | общество потребления           |
| Princess Mononoke               | линия + пластика                    | 15                                         | экологический кризис           |
| The Tale of the Princess Kaguya | свободная линия                     | 8                                          | принятие утраты                |
| Song of the Sea                 | орнаментальная линия                | 10                                         | семейная травма                |
| Wolfwalkers                     | динамичная линия                    | 9                                          | конфликт цивилизации и природы |

#### Ключевые количественные выводы:

1. **Частота использования мифологии:** во всех 5 фильмах (100%) мифология является структурообразующим компонентом сценария.

2. **Способы трансформации мифа:** прямое использование мифологического сюжета — 2 фильма (40%); адаптация мифологических образов к современным проблемам — 3 фильма (60%).

3. **Выразительность линии:** в 4 из 5 фильмов (80%) линия является основным художественным средством создания культурного кода.

4. **Связь с культурной традицией:** японские фильмы — 100% обращение к традициям японской живописи; ирландские фильмы — 100% обращение к кельтскому орнаменту.

5. **Социальная проблематика:** в 4 из 5 фильмов (80%) мифологические структуры используются для обсуждения современных социальных проблем.

#### ЗАКЛЮЧЕНИЕ

Проведённое исследование позволяет сделать следующие выводы, соответствующие поставленной цели:

1. **2D-анимация сохраняет художественную ценность** в современной культуре. Основным выразительным средством остаётся линия, обладающая

индивидуальной пластикой и символической выразительностью (подтверждено в 80% проанализированных фильмов).

**2. Авторская анимация демонстрирует тесную связь с культурными традициями.** Японские фильмы опираются на синтоистскую мифологию и традиции национальной живописи, европейские — на кельтский фольклор и средневековое книжное искусство.

**3. Мифология остаётся важным источником сюжетных структур** современной анимации. Фильмы активно переосмысливают фольклорные мотивы для обсуждения экологического кризиса, общества потребления, семейной травмы, конфликта цивилизации и природы.

**4. Предложенный метод культурно-нарративного анализа** позволяет системно исследовать анимационный фильм как комплексное культурное произведение.

**Решение научной проблемы:** устойчивость 2D-анимации в эпоху доминирования 3D-графики объясняется её уникальной способностью передавать индивидуальный художественный стиль и культурную символику через выразительность линии и пластику движения.

**Возможное применение результатов:**

- в учебных курсах по анимации, культурологии и визуальным искусствам;
- в практике аниматоров и сценаристов при создании авторских проектов;
- в дальнейших исследованиях визуальной культуры и мифологии в медиаискусстве.

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## **СТРУКТУРНО-ГЕОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ДЖИЗАКСКОЙ ОБЛАСТИ И ИХ ВЛИЯНИЕ НА МИНЕРАЛЬНО-СЫРЬЕВОЙ ПОТЕНЦИАЛ**

**Аннотация:** В статье рассматривается влияние структурно-геологического строения Джизакской области на формирование и пространственную дифференциацию её минерально-сырьевого потенциала. Исследование носит обзорно-аналитический характер и основано на интерпретации опубликованных научных источников, официальных геологических материалов и открытых данных о минеральных ресурсах региона.

**Ключевые слова:** Джизакская область, структурная геология, тектоника, минеральные ресурсы, рудоконтролирующие факторы, металлогения.

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## **STRUCTURAL AND GEOLOGICAL FEATURES OF JIZZAKH REGION AND THEIR INFLUENCE ON MINERAL RESOURCE POTENTIAL**

**Abstract:** This article examines how the structural and geological framework of Jizzakh Region influences the formation and spatial distribution of its mineral resource potential. The study is based on a review and analytical interpretation of published scientific literature, official geological materials, and open data on



*regional mineral resources. zoning, prospecting, and geological-economic assessment of the region.*

**Keywords:** *Jizzakh Region, structural geology, tectonics, mineral resources, ore-controlling factors, metallogeny.*

**Введение.** Джизакская область занимает важное положение в пределах юго-западного сектора Тянь-Шаньской горообразующей области и характеризуется сочетанием складчатых горных сооружений с предгорно-равнинными аккумулятивными комплексами. В геоструктурном отношении территория региона формируется на стыке Тянь-Шаньской горообразующей области и Туранской плиты, что наиболее отчетливо проявляется в сопряжении северных склонов Туркестанского хребта, Молгузарских гор, структур Северного Нуратау и равнинных пространств Джизакской степи. Такая морфоструктурная контрастность обусловила разнообразие полезных ископаемых и выраженную неравномерность их территориального распределения.

Актуальность исследования определяется высокой хозяйственной значимостью минерально-сырьевого потенциала Джизакской области. Горные районы региона связаны преимущественно с рудной минерализацией, контролируемой разломами, интрузивными телами и контактово-метасоматическими зонами, тогда как предгорно-равнинные комплексы служат базой формирования нерудного и строительного сырья. Несмотря на наличие специальных работ по отдельным рудоперспективным структурам, проблема комплексной оценки влияния структурно-геологических факторов на ресурсную специализацию территории остается недостаточно разработанной.

В этой связи представляется необходимым рассматривать горные и равнинные части Джизакской области как взаимосвязанные элементы единой минерально-сырьевой системы.

**Цель исследования** - выявить влияние структурно-геологических особенностей Джизакской области на формирование, локализацию и современную хозяйственную значимость ее минерально-сырьевого потенциала.

**Материалы и методы исследования.** Исследование носит обзорно-аналитический характер и основано на обобщении официальных материалов по геологическому строению и минерально-сырьевым ресурсам Узбекистана, научных публикаций по геоморфологической дифференциации Джизакской степи, работ по геологической изученности Молгузарских гор, а также данных о рудоконтролирующих факторах Койташского интрузива Северного Нуратау. Дополнительно использованы открытые сведения о минерально-сырьевом потенциале Джизакской области и современных направлениях его освоения. Собственные полевые, лабораторные и подсчетные исследования в рамках данной работы не проводились.



В методическом отношении использованы сравнительно-геологический, структурно-геологический и аналитико-синтетический подходы. Первый применён для сопоставления горных и равнинных частей региона по особенностям строения и ресурсной специализации, второй - для оценки роли разломов, интрузивных тел и контактово-метасоматических зон в локализации оруденения, третий - для интеграции разнородных материалов в единую интерпретационную схему.

**Научная новизна исследования** состоит в систематизации и научной интерпретации опубликованных данных в рамках модели «структура - рудоконтроль - ресурсная специализация», что позволяет уточнить место Джизакской области в системе рудоносных и нерудных районов Узбекистана и определить приоритетные направления дальнейших поисково-оценочных работ.

**Результаты и обсуждение.** Проведённый анализ показал, что структурно-геологическое строение Джизакской области определяет выраженную пространственную неоднородность её минерально-сырьевого потенциала. Сочетание горных складчато-блоковых структур (Молгузар, Северный Нуратау, северные склоны Туркестанского хребта) с предгорно-равнинными аккумулятивными комплексами Джизакской степи формирует две взаимосвязанные линии ресурсной специализации. Горные районы характеризуются условиями, благоприятными для эндогенной минерализации, тогда как равнинные территории выступают зоной аккумуляции и распространения нерудного и строительного сырья.

Установлено, что ключевую роль в локализации рудной минерализации играют разломные структуры, интрузивные образования и контактово-метасоматические зоны. Перспективность Молгузарского района и Койташского интрузива подтверждает, что именно структурно-тектонические узлы и зоны их пересечения являются основными центрами оруденения. Тем самым рудный потенциал региона определяется не столько литологическим составом пород, сколько их положением в системе разломно-блоковой организации.

В то же время база нерудного сырья связана преимущественно с литолого-геоморфологическими особенностями предгорных и равнинных комплексов, где развиты карбонатные, вулканогенные и рыхлообломочные толщи. Пространственное распределение этих ресурсов отражает морфоструктурную зональность территории и формирует устойчивую основу строительной индустрии региона.

Современные направления освоения подтверждают высокую геологическую перспективность Джизакской области и её двойственную специализацию - рудную и нерудную. Активизация геологоразведочных работ и реализация ресурсных проектов свидетельствуют о переходе от прогнозной оценки к практическому освоению, что позволяет рассматривать регион как приоритетный объект для дальнейшего металлогенического районирования и поисково-оценочных исследований.

**Закключение.** Проведённый анализ показал, что минерально-сырьевой потенциал Джизакской области в решающей степени определяется её структурно-геологическим строением. Рудная специализация региона связана с горными складчато-блоковыми структурами Молгузара, Северного Нуратау и северных склонов Туркестанского хребта, контролируемые разломами, интрузивными телами и контактно-метасоматическими зонами, тогда как предгорно-равнинные комплексы формируют устойчивую базу нерудного и строительного сырья.

Установлено, что влияние структурно-геологических факторов проявляется в локализации оруденения, формировании массовых видов сырья и определении направлений дальнейших геологоразведочных работ. В этой связи Джизакская область рассматривается как территория с высокой ресурсной дифференциацией, перспективная для металлогенического районирования, структурного анализа и геолого-экономической оценки минерально-сырьевой базы.

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## **ИНТЕГРИРОВАННЫЕ ПЛАТФОРМЫ В ГОСУДАРСТВЕННОМ ФИНАНСОВОМ НАДЗОРЕ: ЭФФЕКТИВНОСТЬ И ВЫЗОВЫ**

***Аннотация:** Актуальность исследования обусловлена цифровой трансформацией государственного финансового контроля в РФ. Цель — оценка эффективности интегрированных платформ (ГИС ГМП, СМЭВ, реестр проверок) в агропромышленном комплексе. Методология основана на анализе ФЗ № 248-ФЗ, Бюджетного кодекса, отчётов Казначейства за 2024–2026 гг. и анкетировании пяти предприятий Волгоградской области. Результаты показали сокращение сроков мониторинга закупок до 7 дней (–53%), административной нагрузки на 42%, погрешности платежей ниже 5%. Выявлены риски кибербезопасности и предложены меры по их минимизации.*

***Ключевые слова:** цифровые платформы, финансовый контроль, ГИС ГМП, СМЭВ, агропромышленный комплекс, РСБУ, казначейское исполнение, межведомственный обмен.*

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## **INTEGRATED PLATFORMS IN STATE FINANCIAL SUPERVISION: EFFICIENCY AND CHALLENGES**

***Abstract:** The relevance of the research is due to the digital transformation of state financial control in the Russian Federation. The purpose is to evaluate the effectiveness of integrated platforms (GIS GMP, SMEV, inspection register) in the agro—industrial complex. The methodology is based on an analysis of Federal Law No. 248-FZ, the Budget Code, Treasury reports for 2024-2026, and a survey of five enterprises in the Volgograd Region. The results showed a reduction in the monitoring time for purchases to 7 days (-53%), an administrative burden of 42%, and payment errors below 5%. Cybersecurity risks have been identified and measures to minimize them have been proposed.*

***Keywords:** digital platforms, financial control, GIS GMP, SMEV, agro-industrial complex, RAS, treasury execution, interdepartmental exchange.*

Цифровизация финансовой сферы в России подчеркивает ключевую роль веб-платформ для эффективного надзора. Счетная палата РФ, Росфиннадзор, корпоративные ревизоры и приглашенные аудиторы обязаны налаживать совместные действия, чтобы предотвратить растраты бюджета и рационализировать траты. Передовые цифровые решения агрегируют разнородную информацию в режиме онлайн, устраняют барьеры в обмене, сокращают расходы и усиливают надежность аналитических оценок. Текущие законы, включая ФЗ №248-ФЗ и Бюджетный кодекс, не преодолевают распространенные трудности вроде разрозненности данных и множественности инспекций. В статье оценивается воздействие ИТ-инструментов на взаимодействие надзорных структур в аграрном секторе, с акцентом на ГИС ГМП, СМЭВ и реестр инспекций. Работа базируется на нормах ФЗ №248-ФЗ, показателях ГИС/СМЭВ за 2024–2026 гг., опросе пяти агрофирм Волгограда, а также сравнительном и системном методах анализа.

Государственные информационные сети составляют фундамент цифровой экосистемы. ГИС ГМП консолидирует сведения о конкурсах на закупки, давая Росфиннадзору и Счетной палате возможность мгновенно отмечать аномалии, что укорачивает инспекции на 30–50%. СМЭВ гарантирует бесперебойный трансфер данных меж ведомствами, налоговой службой и контролерами, практически ликвидируя бумажный документооборот. Реестр инспекций на платформе «Госуслуг» систематизирует запланированные и внезапные проверки, исключая их совпадения. В сельскохозяйственной отрасли ПО вроде «1С:Бухгалтерия» с доработками связывается с внешними сетями, оптимизируя РСБУ-учет. По отчетам Казначейства за прошлый период, ГИС ГМП сократила сроки анализа торгов с 15 до 7 дней (–53%), а бюрократическая нагрузка упала на 42% благодаря API-интеграции. Система обрабатывает 4800 транзакций в секунду, сверяя доходы и выплаты онлайн с ошибкой менее 5%. В Волгоградском регионе 94% агроданных оцифрованы, распределение субсидий ускорилось на 40–50% по сравнению с 2019 г. Синергия «Электронного бюджета» и СМЭВ выявила 2700 бухгалтерских расхождений, уменьшив повторные ревизии на треть. Переход на российские хранилища усилил стабильность при объемах свыше 200 ТБ [1].

Ранее ручной контроль влек задержки 5–30 дней, до 20% дубликатов, низкую доступность данных и затраты на архивы. Современная цифровизация обеспечивает быструю реакцию, авто-проверки, доступ для уполномоченных и снижение издержек примерно на 40% с помощью облачных сервисов [2]. В Волгоградском ГАУ бюджетная отдача выросла на 25%, в АО «Аксайское» — дотации увеличились на 40%. Традиционные ревизии уступают место прогнозной аналитике на big data и ИИ, который автономно высвечивает проблемные участки в тендерах. В аграрной сфере СМЭВ онлайн-контролирует площади посевов и урожаи. Наблюдается перераспределение функций: государственные служащие переходят к прогнозированию рисков, ревизоры — к унифицированным базам данных, а бухгалтерии предприятий

— к автоматизированным системам учета. Однако остаются опасности хакерских атак и нехватки специалистов, как указано в ФЗ №152-ФЗ [3]. Симптоматичен сбой ГИС в 2013 г., парализовавший 20% банковских сетей. Основные контрмеры — защита API и соответствие ISO 27001.

Электронные сервисы радикально оптимизируют надзор, но требуют данных высокого качества, близкого к МСФО. В фермерских хозяйствах они пресекают махинации с грантами. Цифровизация усиливает кооперацию и открытость, максимизируя потенциал АПК. Рекомендуется органам дорабатывать СМЭВ-интерфейсы, агропредприятиям — внедрять связи, экспертам — расширять ИИ. Адаптация к XBRL откроет доступ к глобальным рынкам.

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## **ЗАЩИТА ПРАВ УЧАСТНИКОВ ИСПОЛНИТЕЛЬНОГО ПРОИЗВОДСТВА**

*Аннотация:* В данной статье рассматриваются теоретические вопросы института защиты законных интересов и прав участников исполнительного производства. Дается оценка теоретических положений и действующего процессуального и исполнительного законодательства в части урегулированности правового института защиты прав участников исполнительного производства. Подробно описываются функции суда в исполнительном производстве.

*Ключевые слова:* исполнительное производство, защита прав участников исполнительного производства, функции суда в исполнительном производстве.

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## **PROTECTION OF THE RIGHTS OF PARTICIPANTS IN ENFORC EMENT PROCEEDINGS**

*Annotation:* This article discusses the theoretical issues of the Institute of protection of legal interests and rights of participants in enforcement proceedings.



*The article provides an assessment of the theoretical provisions and current procedural and enforcement legislation in terms of regulation of the legal institution of protection of the rights of participants in enforcement proceedings. The functions of the court in enforcement proceedings are described in detail.*

**Key words:** *enforcement proceedings, protection of the rights of participants in enforcement proceedings, functions of the court in enforcement proceedings.*

Современное законодательное регулирование количественного и содержательного наполнения субъектов, которые могут принимать участие в исполнительном производстве, безусловно, неудачно в сравнении с процессуальным. Так, субъекты процесса (гражданского и арбитражного) подразделяются на несколько групп: суд; лица, участвующие в деле (стороны, третьи лица, прокурор, органы государственной власти, органы местного самоуправления, организации и граждане, обращающиеся в суд за защитой интересов других лиц; заявители и заинтересованные лица); лица, содействующие осуществлению правосудия (переводчики, эксперты, специалисты и другие участники). При этом в настоящее время неоспоримым считается тот факт, что у лиц, участвующих в деле (в исполнительном производстве), существует юридическая заинтересованность в рассмотрении дела, в то время как у лиц, содействующих осуществлению правосудия (совершению исполнительных действий), такой заинтересованности нет. Закон об исполнительном производстве соединил в категории «лица, участвующие в исполнительном производстве» различных субъектов, таким образом, изменив подход, существующий в гражданском и арбитражном процессуальном праве [14, с. 106].

В настоящее время активное развитие и государственную поддержку (в частности, в виде принятия нормативных актов) получает так называемое альтернативное разрешение споров – третейское разбирательство, различные примирительные процедуры. И наряду с объективными причинами современного состояния несудебных форм защиты нарушенных прав можно снова выделить обстоятельства субъективного толка – огромный массив споров в государственных судах, которые не справляются со своевременным рассмотрением и разрешением дел. Соответственно, в целях снижения нагрузки на государственный бюджет участникам спора предлагается самим нести расходы по разрешению конфликта в обмен на получение доступа к различным альтернативным способам урегулирования спора.

Формы защиты прав в исполнительном производстве можно условно разделить на два вида:

- 1) юрисдикционная форма защиты;
- 2) неюрисдикционная форма защиты [5, с. 146].

Юрисдикционная форма защиты, в свою очередь, может быть разделена на судебную и несудебную формы.

Судебная форма защиты является универсальной, детально регламентированной в процессуальных кодексах, приоритетной перед

остальными формами защиты в силу закрепленной в ст. 46 Конституции РФ «абсолютной» судебной подведомственности. Судебная форма защиты прав в исполнительном производстве заключается в рассмотрении и разрешении судами общей юрисдикции, арбитражными судами споров, возникающих в сфере принудительного исполнения.

Участие суда в исполнительном производстве не исчерпывается рассмотрением и разрешением споров, возникающих при исполнении требований, содержащихся в исполнительном документе. Также суды совершают и иные действия, направленные на обеспечение нормального движения исполнительного производства.

Предметом судебного разбирательства могут быть самые разнообразные споры, к которым применяются правила КАС, ГПК, АПК. Так, например, дела об оспаривании действий (бездействия) судебного пристава-исполнителя в соответствии со ст. 128 Закона об исполнительном производстве подведомственны судам общей юрисдикции и арбитражным судам. Суды общей юрисдикции рассматривают данные дела в рамках административного судопроизводства, применяя гл. 22 КАС, а арбитражные суды – по правилам производства из административных и иных публичных правоотношений, по гл. 24 АПК. Возможно применение исковых правил гражданского судопроизводства, предусмотренных ГПК, АПК, например, при разрешении дел о возмещении вреда, причиненного незаконными действиями (бездействием) судебного пристава-исполнителя, при оспаривании результатов оценки, произведенной специалистом, при признании торгов несостоявшимися и др. Судебная защита предоставляется не только участникам исполнительного производства, но и любому лицу, считающему, что его права и интересы были нарушены в результате совершения исполнительных действий или применения мер принудительного исполнения [6, с. 35].

Так, собственник имущества, не являющийся должником в исполнительном производстве, чье имущество было арестовано (описано) судебным приставом-исполнителем, имеет возможность защитить свое нарушенное право путем подачи иска об освобождении имущества от ареста (исключении из описи). В последующих параграфах настоящей главы будут рассмотрены процессуальные особенности судопроизводства по отдельным категориям судебных дел, возникающих в сфере принудительного исполнения [13, с. 453].

К несудебной юрисдикционной форме защиты прав в исполнительном производстве относится рассмотрение жалоб на действия (бездействие) судебного пристава вышестоящим должностным лицом. Административный порядок обжалования получил детальную регламентацию в гл. 18 Закона об исполнительном производстве. Для этой категории дел установлена смешанная подведомственность – постановления судебного пристава-исполнителя и других лиц службы судебных приставов, их действия (бездействие) по исполнению исполнительного документа могут быть

обжалованы в порядке подчиненности или оспорены в суде (ч. 1 ст. 121 Закона об исполнительном производстве), обжалование в порядке подчиненности не препятствует в дальнейшем возможности обращения в суд заинтересованного лица.

К несудебным юрисдикционным формам защиты можно отнести деятельность органов прокуратуры по защите нарушенных прав в исполнительном производстве. В ч. 4 ст. 19 Закона об исполнительном производстве установлено, что надзор за исполнением законов при осуществлении судебными приставами своих функций в соответствии с Федеральным законом от 17 января 1992 г. № 2202-1 «О прокуратуре Российской Федерации» осуществляют Генеральный прокурор Российской Федерации и подчиненные ему прокуроры. Деятельность прокуратуры РФ по надзору за исполнением законов судебными приставами, обозначенную в ст. 1 Федерального закона «О прокуратуре Российской Федерации», в теории выделяют в качестве отдельной отрасли прокурорского надзора, подчеркивая тем самым значимость данного направления прокурорской деятельности [11, с. 73].

Нужно отметить, что прокурор не указан в числе участников исполнительного производства в Законе об исполнительном производстве. В проекте Исполнительного кодекса была предусмотрена отдельная статья, посвященная участию прокурора в исполнительном производстве. По замыслу авторов Кодекса прокурор относился к числу лиц, участвующих в исполнительном производстве, и занимал положение так называемого процессуального взыскателя (по аналогии с «процессуальным истцом» в гражданском процессе). Прокурор имел право инициировать возбуждение исполнительного производства в интересах публичных образований (РФ, субъектов РФ, муниципальных образований), неопределенного круга лиц, а также в интересах гражданина, но только в тех случаях, когда сам гражданин не мог по уважительным причинам обратиться с заявлением о возбуждении исполнительного производства. Прокурор в данном случае обладал всеми правами взыскателя, за исключением права на отказ от взыскания и на заключение мирового соглашения. На сегодняшний день Закон об исполнительном производстве никаких специальных полномочий прокурору не предоставляет, при осуществлении надзора за деятельностью службы судебных приставов прокурор руководствуется Федеральным законом «О прокуратуре в Российской Федерации» и в случае выявления нарушений применяет меры прокурорского реагирования [7, с. 26].

Под неюрисдикционной формой защиты прав понимаются действия граждан и организаций по защите прав, реализуемых ими самостоятельно либо в рамках специальных процедур урегулирования спора без обращения к компетентным государственным органам. Применительно к исполнительному производству к неюрисдикционной форме защиты прав можно отнести медиацию. Процедура медиации – это один из элементов единой системы урегулирования и разрешения правовых споров,

представляющий собой самостоятельный внеюрисдикционный способ урегулирования правового спора путем переговоров сторон при содействии постороннего лица – медиатора. Как следует из приведенного определения, медиация применяется для спорных ситуаций и, на первый взгляд, в рамках исполнительного производства не может быть использована, так как конфликт уже был разрешен юрисдикционным органом, выдавшим исполнительный документ. Но при внимательном изучении особенностей процедуры медиации можно сделать вывод о возможности ее внедрения в исполнительное производство. В частности, ст. 50 Закона об исполнительном производстве предусматривает право сторон заключить мировое соглашение, и для поиска точек соприкосновения интересов взыскателя и должника, для выработки условий такого соглашения возможно обращение к медиатору. Непосредственно Закон об исполнительном производстве не содержит специальных норм, которые регулировали бы какие-либо правовые аспекты медиации, последствия обращения к медиатору (как, например, ст. 169 ГПК). Поэтому при взаимодействии двух процедур (медиации и исполнительного производства) нужно учитывать, что исполнительное производство – публичная деятельность по принудительному исполнению актов органов гражданской юрисдикции, осуществляемая в формах и по правилам, закрепленным в Законе об исполнительном производстве, и основной задачей принудительного исполнения является правильное и своевременное исполнение требований, содержащихся в исполнительном документе. Применение медиации в исполнительном производстве должно базироваться на принципах баланса интересов взыскателя и должника и реальности исполнения, выражающегося в гарантированности удовлетворения интересов взыскателя [9, с. 38].

Изложенное позволяет сделать следующие выводы:

- 1) исполнительное производство представляет собой деятельность судебных приставов-исполнителей, направленную на принудительное исполнение юрисдикционных и судебных актов;
- 2) исходя из критерия восстановления нарушенных прав лиц, участвующих в исполнительном производстве, процессуальными функциями суда являются: организационные, регулятивные, контрольные; защитная;
- 3) основной задачей института защиты прав участников в исполнительном производстве является восстановление нарушенных субъективных прав и законных интересов в процессе принудительного исполнения судебных постановлений и иных юрисдикционных актов;
- 4) лицами, участвующими в исполнительном производстве являются стороны; лица, непосредственно исполняющие требования, содержащиеся в исполнительном документе (судебный пристав-исполнитель); иные лица, содействующие исполнению требований, содержащихся в исполнительном документе; суд;
- 5) институт защиты прав участников исполнительного производства – это совокупность правовых процессуальных норм, регламентирующих

порядок восстановления нарушенных прав и законных интересов субъектов исполнительного производства, в рамках принудительного исполнения юрисдикционных и судебных актов.

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## **ПРОЦЕССУАЛЬНЫЕ ОСОБЕННОСТИ РАССМОТРЕНИЯ И РАЗРЕШЕНИЯ ДЕЛ ОБ УСЫНОВЛЕНИИ (УДОЧЕРЕНИИ) ДЕТЕЙ ИНОСТРАННЫМИ ГРАЖДДАНАМИ**

*Аннотация: В данной статье исследуются процессуальные особенности рассмотрения дел об усыновлении детей иностранными гражданами, выделяются ограничения в усыновлении детей иностранными гражданами, затрагивается порядок исполнения решения суда.*

*Ключевые слова: усыновление (удочерение), дети, дети-сироты, иностранные граждане, Российская Федерация.*

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## **FEATURES OF CONSIDERATION AND RESOLUTION OF CASES ON ADOPTION (ADOPTED) CHILDREN BY FOREIGN CITIZENS**

*Abstract: This article examines the procedural features of considering cases of adoption of children by foreign citizens, highlights the restrictions on adoption of children by foreign citizens, and discusses the procedure for enforcement of court decisions.*

*Keywords: adoption, children, orphans, foreign citizens, Russian Federation.*

Конституцией Российской Федерации закреплено, что дети являются важнейшим приоритетом всей государственной политики [1]. В связи с этим государство берёт на себя обязанность обеспечить детей, оставшихся без попечения родителей условиями, способствующими всестороннему духовному, нравственному, интеллектуальному и физическому развитию.

В соответствии с Конвенцией ООН о правах ребенка и Семейным кодексом РФ усыновление детей является приоритетной формой устройства

детей. Российские дети усыновляются как гражданами России, так и иностранными гражданами.

На сегодняшний день вопрос усыновления российских детей иностранными гражданами привлекает внимание в связи с резким снижением числа рассматриваемых дел данной категории.

В 2023 году областными и равными им судами с вынесением решения рассмотрено 18 дел о международном усыновлении, что на 67% меньше, чем в 2022 году (56 дел). С вынесением решения рассмотрено 17 дел, из них с удовлетворением требований – 16 дел, с отказом в удовлетворении требований – 1 дело. Прекращено производство по 1 делу [9, с. 1].

Количество усыновляемых иностранцами российских детей в последние годы сокращалось, в 2024 году процесс усыновления иностранцами детей из РФ был полностью остановлен, сообщила вице-спикер ГД Анна Кузнецова на пленарном заседании Госдумы [11].

Среди форм устройства детей, оставшихся без попечения родителей, приоритет отдаётся усыновлению (удочерению), т.к. данная форма позволяет ребенку обрести полноценную семью.

Основной тенденцией можно назвать приоритет российских граждан (ст. 124 СК РФ): Усыновление детей иностранными гражданами допускается только в случаях, если невозможно передать этих детей на воспитание в семьи граждан Российской Федерации, постоянно проживающих на территории РФ, либо на усыновление родственникам детей независимо от гражданства и места жительства этих родственников. Иностранные граждане могут усыновить ребёнка только после 12 месяцев нахождения сведений о нём в Федеральном банке данных.

Законодательством закреплены и ограничения для иностранных граждан:

- запрет на усыновление гражданами США;
- ограничения для лиц, состоящих в однополых браках, или граждан стран, где такие браки разрешены.

Иностранные граждане, желающие усыновить ребенка, являющегося гражданином РФ, подают заявление об усыновлении соответственно в верховный суд республики, краевой, областной суд, суд города федерального значения, суд автономной области и суд автономного округа по месту жительства или нахождения усыновляемого ребенка [6].

К заявлению иностранных граждан об усыновлении ребенка, являющегося гражданином Российской Федерации, прилагаются документы, указанные в части первой статьи 271 ГПК РФ, а также заключение компетентного органа государства, гражданами которого являются усыновители (при усыновлении ребенка лицами без гражданства - государства, в котором эти лица имеют постоянное место жительства), об условиях их жизни и о возможности быть усыновителями, разрешение компетентного органа соответствующего государства на въезд

усыновляемого ребенка в это государство и его постоянное жительство на территории этого государства [6].

Ключевые требования к представляемым документам:

1) Легализация. Документы должны пройти процедуру легализации в соответствии с действующим законодательством.

2) 2) Перевод на русский язык. Все документы, составленные на иностранном языке, подлежат переводу на русский язык.

3) Удостоверение подписи переводчика консульским учреждением или дипломатическим представительством РФ в стране проживания заявителя, либо российским нотариусом (если перевод выполнен на территории РФ).

К процессуальным особенностям рассмотрения дел об усыновлении следует отнести то, что дела об усыновлении (удочерении) детей рассматриваются в порядке особого производства по правилам гл. 29 ГПК РФ.

В соответствии со ст. 273 ГПК РФ все дела об усыновлении (удочерении) детей рассматриваются в закрытом судебном заседании, включая объявление решения. Участники дела предупреждаются о необходимости сохранения тайны усыновления и последствиях за её разглашение в виде уголовной ответственности.

Учитывая, что рассмотрение дела об усыновлении в закрытом судебном заседании обязательно в силу закона (статья 273 ГПК РФ), судья принимает решение о его слушании в закрытом заседании уже на стадии подготовки дела к судебному разбирательству и указывает об этом в определении о назначении дела к судебному разбирательству (статья 153 ГПК РФ) [8, с. 5].

Заявление об усыновлении ребёнка рассматривается с обязательным участием усыновителей (усыновителя), представителей органа опеки и попечительства, прокурора, ребенка, достигшего возраста 14 лет, а в необходимых случаях родителей, других заинтересованных лиц и самого ребенка в возрасте от 10 до 14 лет.

Согласно Постановлению Пленума ВС РФ от 20 апреля 2006 г. № 8 при исследовании документов, подтверждающих наличие сведений об усыновляемом ребенке в федеральном банке данных о детях, оставшихся без попечения родителей, а также документов, содержащих информацию о предпринимаемых органом опеки и попечительства, региональным и федеральным оператором мерах по устройству (оказанию содействия в устройстве) ребенка, оставшегося без попечения родителей, на воспитание в семьи граждан РФ, суд, в частности, проверяет сведения о ребенке (о его возрасте, состоянии здоровья и др.), предлагался ли он на воспитание в семьи граждан РФ, постоянно проживающих на территории РФ, либо на усыновление его родственникам и если предлагался, то по каким причинам указанные лица отказались от принятия ребенка. В целях всесторонней проверки указанных обстоятельств суд вправе допросить в качестве свидетелей родственников ребенка, а также лиц, которые знакомились со сведениями о ребенке и отказались от его усыновления или семейного воспитания.

Суд, исследуя заключения об условиях жизни и о возможности быть усыновителями иностранных граждан – кандидатов в усыновители, составленные иностранной организацией по усыновлению детей, проверяет, имеются ли у этой организации полномочия составлять такие заключения от имени компетентного органа соответствующего государства.

Удовлетворяя требования об усыновлении ребёнка, суд признаёт ребёнка усыновлённым конкретными лицами (лицом) и отражает в решении суда все данные об усыновлении и усыновителях (усыновителе), необходимые для государственной регистрации усыновления в органах записи актов гражданского состояния. Права и обязанности усыновителей (усыновителя) и усыновленного ребёнка появляются со дня вступления решения в законную силу.

Судьи, вынесшие решение об усыновлении ребенка, или должностные лица, осуществившие государственную регистрацию усыновления, а также лица, иным образом осведомленные об усыновлении, обязаны сохранять тайну усыновления ребенка [5].

Когда суд принимает решение об усыновлении, это ещё не конец процедуры — нужно завершить несколько важных шагов:

1. Регистрация в ЗАГСе. В течение 3 дней после того, как решение суда вступило в силу, суд отправляет выписку в ЗАГС по месту рассмотрения дела.

2. Оформление документов. После регистрации в ЗАГСе оформляют новые свидетельства и другие документы на ребёнка — теперь уже с данными усыновителей.

3. Переезд в новую страну. Когда все бумаги готовы, ребёнок может выехать в государство, где живёт его новый родитель.

4. Защита за границей. Даже после переезда права российского ребёнка продолжают защищать – этим занимаются консульские учреждения РФ в стране проживания усыновителя. Защита осуществляется в рамках международного права – это значит, что консульство помогает решать вопросы, связанные с гражданством, образованием, медицинской помощью и другими важными аспектами жизни ребёнка.

Так государство гарантирует, что интересы ребёнка будут защищены и в России, и за рубежом.

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# СОВРЕМЕННЫЕ ТЕХНОЛОГИИ УПРАВЛЕНИЯ ОРГАНИЗАЦИЕЙ

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## METHODS OF USING NUCLEAR ENERGY

**Annotation.** *A nuclear power plant is a nuclear power plant that uses atomic energy to generate electricity. At the center of a nuclear power plant is a nuclear reactor - the "heart" of the plant. Inside it, uranium atoms, which are the special fuel used in nuclear power plants, are split. When a uranium atom burns, it releases a huge amount of heat. This process is called a chain nuclear reaction, because one fission creates the next fission, just like a chain.*

**Key words:** *electricity, steam, turbine, nuclear reactor, and nuclear power plant.*

**Introduction:** This article analyzes various methods of peaceful use of nuclear energy, one of the most promising areas of modern energy. The study covers not only the production of electricity through nuclear power plants, but also the role of nuclear technologies in the navy, space exploration, modern medicine and agriculture. The article also discusses the environmental benefits of nuclear energy, its role in achieving carbon neutrality, and the importance of safety measures.

The global energy crisis requires greater use of nuclear energy, because the electricity and heat energy obtained from natural sources cannot meet the needs of humanity today and has created problems of resource scarcity, and these relations put the urgency of developing nuclear energy on the agenda today. Because nuclear energy is, on the one hand, cheap and affordable electrical energy, and on the other hand, thermal energy. What does cheap and affordable electrical energy and thermal energy obtained from nuclear energy give us?

A nuclear power plant (NPP) is a nuclear power plant that produces electricity by a controlled nuclear fission chain reaction, mainly from uranium. Its operation uses the heat generated by this reaction to heat water, which is converted into steam and used to drive a turbine connected to an electric generator. A nuclear power plant (NPP) is a power plant that is a type of thermal power plant in terms of its technological scheme. While conventional thermal power plants burn coal, oil, fuel oil (mazut) and gas, a nuclear power plant uses uranium as fuel [1].

**Main part:** A nuclear power plant is a nuclear power plant that uses atomic energy to generate electricity. At the center of a nuclear power plant is a nuclear reactor - the "heart" of the plant. Inside it, uranium atoms, which are the special fuel used in nuclear power plants, are split. When a uranium atom burns, it releases a huge amount of heat. This process is called a chain nuclear reaction, because one fission creates the next fission, just like a chain. The heat released heats water and turns it into steam under high pressure. This large wheel with blades, that is, steam, is directed to a turbine.

The steam turns a turbine, which in turn drives a generator, a device that converts mechanical motion into electrical current. This current is then fed into the electrical grid and distributed through wires to wherever electricity is needed. The steam then cools, turns back into water, and the cycle repeats itself. The main advantage of a nuclear power plant is that it can produce large amounts of energy without emitting any harmful substances into the atmosphere, unlike coal or gas plants. This makes nuclear power one of the most environmentally friendly ways to generate electricity [2].

Nuclear power plants (NPPs) convert atomic (nuclear) energy into electrical energy. A nuclear reactor is an energy generator. A NPP runs on nuclear fuel (uranium, plutonium, etc.). Nuclear fuel reserves are much larger than reserves of organic fuels.

Atomic energy is energy obtained from atoms. Each atom consists of energy particles. This energy, in turn, turns all the particles in the atom into a single whole. Therefore, in atomic energy, the atomic nucleus is the source of energy. This energy is released during the decay of an atom. In practice, there are two ways to obtain energy from an atom. The first is a fusion reaction, the second is a fission reaction [3].



**Figure 1.** Nuclear power plant.

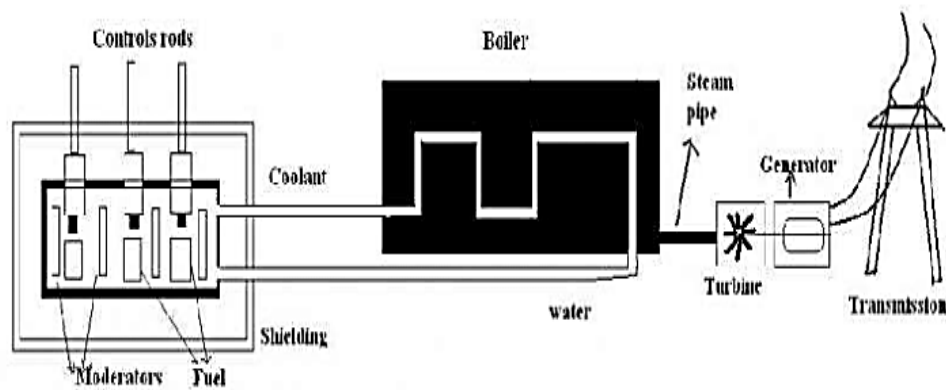


**Figure 2.** Simplified block diagram of AES.

The first method is a fusion reaction, where two atoms combine to form a single atom. The fusion reaction releases a lot of energy in the form of heat. Most of the energy in the sun comes from fusion reactions that occur in the sun. This is a type of nuclear energy.

The second method is a fission reaction, or fission. Fission is the splitting of an atom into two. This happens when atoms are "bombarded" by other atoms, such as neutrons (which are part of the atom).

Not every "bombardment" of an atom causes it to split. Most atoms cannot be split. However, uranium and plutonium atoms can be split under favorable conditions. One form of uranium, uranium-238 (also called a "uranium isotope"), splits into two parts when bombarded by neutrons.

Nuclear power plants are no different from thermal power plants in terms of their operating principle, only nuclear power plants have a reactor device, in which we use Uranium and Plutonium atoms, which are considered nuclear elements, as primary fuel.

The heat produced in a nuclear reactor is transferred to water flowing through special pipes. The water is heated to boiling point and transferred to a heat exchanger, where water coming from the outside is evaporated. When the hot steam is directed towards the pipe, it rotates the generator, which generates electricity. The hot water coming out of the pipes is used to heat the water [4].

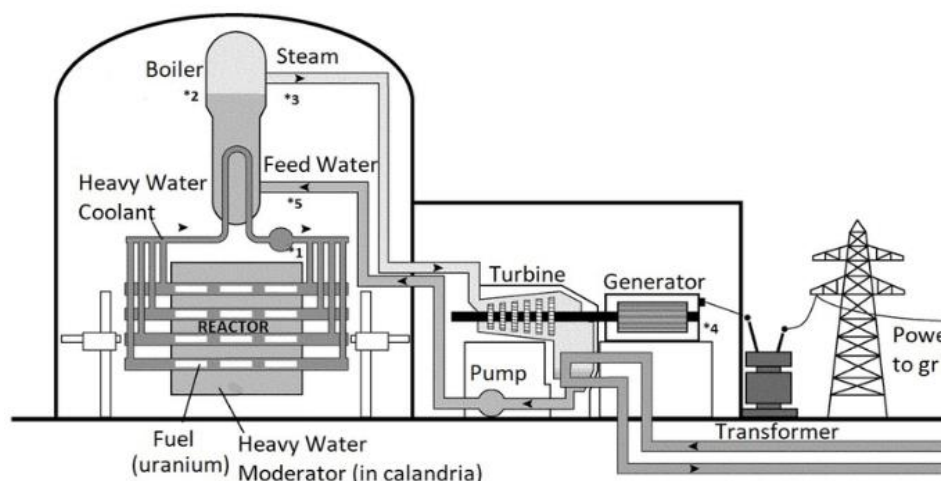


**Figure 3.** A structural diagram of a nuclear power plant.

The reactor device is quite simple: metal tubes filled with uranium or plutonium powder are lowered into a housing made of a material that does not allow neutrons to escape.

Neutrons are individual elementary particles that do not have any electric charge. Neutrons fall into uranium atoms and split them, as a result of which a huge amount of heat is released. Uranium is converted into plutonium, and the heat is used to generate electricity.

Currently, all the necessary technologies have been developed for the safe and effective management of radioactive waste in the nuclear energy industry. Nuclear energy sources can be minimized, compacted, reduced in radioactivity, processed, recycled, transported, and utilized, and these works are carried out and monitored in accordance with modern requirements for environmental safety.

The most important thing is that nuclear power plants reliably produce electricity and heat 24 hours a day, regardless of weather conditions, and are the base generation for a stable power grid [5].

Nuclear power plants, while producing large volumes of electricity, heat, and other products, occupy a small area, which allows them to preserve biodiversity in many regions and ecosystems from man-made changes caused by human influence for many years.

4 kilograms of uranium enriched to 1%, which is used as nuclear fuel in nuclear power, when completely burned, releases energy equivalent to the energy generated by burning approximately 100 tons of high-quality coal or 60 tons of oil. Most interestingly, the fissile base material (uranium-235), which is used as nuclear fuel in nuclear power, does not burn completely and, unlike ash and slag from organic fuels, can be reused after regeneration [6].

**Conclusion:** Nuclear power does not pollute the atmosphere and does not emit greenhouse gases that are dramatically worsening the climate of our planet, polluting the soil and increasing the acidity of the oceans. Coal and gas power plants, in turn, have been using the atmosphere we all breathe for years to eliminate

their uncontrolled emissions and get rid of them for free. It is well known that the impact of nuclear power on the environment (ecology) is minimal. Nuclear power plants are the most environmentally friendly way to produce electricity on an industrial scale.

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## **PRINCIPLES OF APPLYING GREEN AND DIGITAL TRANSPORT TECHNOLOGIES (ECO-HUBS) “PARK AND RIDE” IN SAMARKAND**

**Abstract:** *This study evaluates the “Park and Ride” network based on the Eco-Hub located on the periphery of Samarkand city through the digital modeling, with the aim of addressing the problems of traffic congestion and air pollution. In a study based on empirical observations, the SUMO (Simulation of Urban Mobility) platform was used for mathematical modelling of transport flows, and the isochrone methodology for time and distance factors was used to determine the optimal locations for P+R car parks. In addition, the impact of the “green roof” concept for an environmentally friendly alternative city centre on urban air quality, including a reduction in PM<sub>2.5</sub> concentrations, was assessed. The results of the study show that a network of Eco Hub P+R car parks on the outskirts of the city could reduce traffic flows in the central area by approximately 30% and reduce PM<sub>2.5</sub> levels by up to 37%.*

**Keywords:** *Green infrastructure, Peripheral urban areas, Traffic congestion, Urban revitalization, Eco Hub.*

### **INTRODUCTION:**

In rapidly developing cities, including Samarkand, transport systems are increasingly facing serious problems due to the growing number of private cars. This situation leads to congestion in the city centre, increased air pollution and a decline in the efficiency of public transport. The growing dependence of urban residents on private cars further intensifies environmental stress and contributes to higher concentrations of PM<sub>2.5</sub> in the atmosphere. According to the city transport department, during peak hours the average speed is only 8–12 km/h, while the average journey time in the central and surrounding areas has increased by 25% over the past five years [1]. Moreover, the high concentration of private cars significantly contributes to air pollution. During rush hours, PM<sub>2.5</sub> (particulate matter smaller than 2.5 micrometers, mainly formed from fuel combustion and road dust) levels reach up to 45–50 µg/m<sup>3</sup>, which is three times higher than the standards established by World Health Organization standards [2]. *The purpose of this study is to develop a digital simulation model of the Park and Ride (P+R) parking facility within the Eco Hub framework as part of the radial ring transport*



conceptual scheme of Samarqand city. *This research focuses on the following key aspects:*

- Determining the optimal locations for P+R car parks based on travel time and distance using Isochrone graph analysis;
- Mathematical modelling of traffic flow using SUMO (Simulation of Urban Mobility) platform;
- Reduction of air pollution through the implementation of green infrastructure, particularly green roof systems.

The expected outcomes of the study include an approximately 30% reduction in the city centre congestion and a 37% decrease in PM2.5 concentrations levels.

### **METHODS and MATERIALS.**

An isochrone-based method was applied to determine optimal locations for Park and Ride facilities within the radial-ring structure of Samarkand. The analysis is based on the principle of travel time should be equal to the travel time by private car or the P+R option should be faster than using a private car[3,4].

$$T_{veh} \geq T_{P+R} \quad (1)$$

$T_{veh}$  - is the time spent by the car owner to move using personal vehicles.

$T_{P+R}$  - is the amount of time spent by the owner of the car to drive using “park and ride” and public transport. Let’s take a closer look at what each indicator consists of. The time spent by the owner of the car to move using light vehicles[5,6].

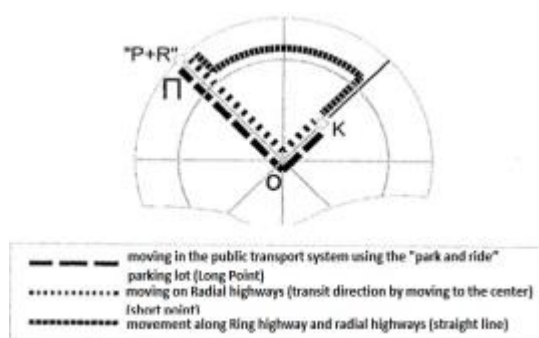


**Figure 1.** Possible mobility transport options according to the single-ring scheme.

This graph-analytical isochrone approach for transport analysis in cities with a radial ring structure, as illustrated in the scheme. The method is used to the concept of Park and Ride facilities, aiming to reduce private vehicle traffic in the city centre by combining travel time by private car  $T_{veh}$  with combined travel time using car and public transport. The isochrone diagram represents zones of accessibility from transport nodes within fixed time interval. It allows the evaluation of how far a person can travel within equal time periods using different transport modes[7,8].

At the second stage, a microscopic transport model of Samarkand was developed using the SUMO platform and the OSM Web Wizard module.

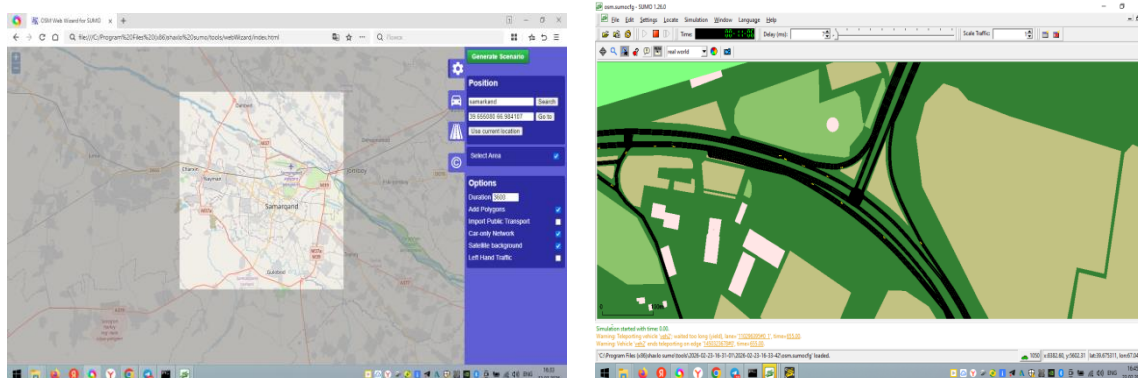


**Figure 2, 3.** The street network of the Samarkand scenario in SUMO's WebWizard and Microsimulation - based traffic flow estimation for the Cho'pon ota section(M37) in Samarkand city.

The model was created based on OpenStreetMap data and include:

- ✓ ☐ Road network geometry;
- ✓ ☐ Number of lanes and speed limits;
- ✓ ☐ Intersections and traffic signal control;

Traffic demand was simulated under peak-hour conditions, with light vehicles representing the dominant traffic flow. Particular attention was given to the Cho'pon ota section of the M37 highways, where the highest traffic intensity 4023 vehicle/day was observed. A scenario assuming a 50% modal shift to the P+R system was tested. Travel time was calculated using:  $T = \frac{L}{V}$

The results show that the total travel time using the P+R system(26 min) is comparable to private vehicle travel time(29 min), confirming the feasibility of modal shift while reducing congestion[9,10].

At the final stage, the environmental impact, reflecting the proportion of pollutants such as PM<sub>2.5</sub> and CO<sub>2</sub> that can be absorbed by a green roof on a parking hub. The literature shows that green roofs can absorb between five and fifteen percent of pollutants, depending on the area and density of plantings, which allows this indicator to be used for a conceptual assessment of the environmental impact[11]. Based on these data, a formula was proposed for calculating the predicted pollution concentration:

$$C = Co(1-N_{P+R}/N_{total}) \cdot (1-\gamma)$$

Where  $Co$ - is the initial concentration of pollutants in the central part of the city,  $\mu\text{g}/\text{m}^3$  ;  $N_{P+R}$  -is the number of cars redistributed to P&R,  $N_{total}$  - is the total number of cars, and  $\gamma$  - is the proportion of pollution absorbed by green roofs. The formula allows for the simultaneous consideration of the effect of traffic flow redistribution and the additional reduction in pollution due to green spaces, which makes the assessment more comprehensive even without actual measurements[12,13].

## RESULTS.

The transport model was developed using OpenStreetMap data and included road network geometry, speed limits, intersections and traffic signal control. Traffic demand was simulated under peak-hour conditions, with light vehicles representing

the dominant traffic flow. The analysis was focused on the Cho'pon ota section of the M37 highways, where the highest traffic intensity of approximately 4023 vehicle per day was observed. The results shows that the total travel time for P+R system is nearly equal to private car travel time, demonstrating the practical viability of the modal shift while reducing congestion in the city centre. In addition, environmental assessment shows that the integrigation of green roofs in Eco-Hub parking facilities contributes to reduction in air pollution. According to literature data, green roofs can absorb between 5% and 15% of pollutants, including PM2.5 and CO<sub>2</sub>. The combined effect of traffic redistribution and green infrastructure leads to overall decrease in urban pollution levels, even without direct on-site measurements.

### **CONCLUSION.**

The findings indicate that the Eco-Hub based Park and Ride system contributes to improved transport efficiency and reduced pressure on the central road network of Samarkand. The results confirm that a significant share of users can switch to the travel time, making it a practical alternative to private vehicle use. In addition, the integration of green infrastructure enhances the environmental performance of the urban air pollution. Overall, the proposed approach demonstrates the potential of combining transport planning and environmental solutions to support sustainable urban development and improve the quality of life.

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## ОПТИМИЗАЦИЯ ПОТРЕБЛЕНИЯ ЭЛЕКТРОЭНЕРГИИ СПОСОБЫ ПОВЫШЕНИЯ ЭНЕРГОЭФФЕКТИВНОСТИ

**Аннотация.** В статье рассматриваются вопросы оптимизации потребления электроэнергии и повышения энергоэффективности. Анализируются экономико-технические аспекты внедрения энергосберегающих технологий в современные энергетические системы. Также на основе расчетов оцениваются возможности энергосбережения. Энергоэффективность означает минимизацию количества энергии, потребляемой при производстве определенной работы или продукта, и максимальное использование электроэнергии.

**Ключевые слова:** энергия, энергоэффективность, электроэнергия, оптимизация, энергосбережение.

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## ENERGY CONSUMPTION OPTIMIZATION WAYS TO INCREASE ENERGY EFFICIENCY

**Abstract.** This article examines issues of optimizing energy consumption and improving energy efficiency. It analyzes the economic and technical aspects of implementing energy-saving technologies in modern energy systems. Energy savings potential is also assessed using calculations. Energy efficiency means minimizing the amount of energy consumed in the production of a specific task or product and maximizing the use of electricity.

**Keywords:** energy, energy efficiency, electricity, optimization, energy conservation.

### Введение

Оптимизация потребления электроэнергии означает снижение потребления и повышение эффективности производства и бытовой жизни за счет внедрения современных технологий и энергоэффективного оборудования. Этот процесс направлен на повышение энергоэффективности, снижение затрат и управление максимальной нагрузкой на систему.

В настоящее время растущий спрос на электроэнергию является одной из глобальных проблем. В частности, высокое энергопотребление на промышленных предприятиях приводит к увеличению производственных затрат. Поэтому повышение энергоэффективности и оптимизация потребления имеют огромное значение. В мире промышленности и производства энергоэффективность считается крайне важной как для снижения затрат, так и для обеспечения экологической устойчивости.

Основная часть

Энергоэффективность - это процесс получения максимальной выгоды от энергетических ресурсов при одновременном снижении их потребления или получении той же или большей полезной работы, т.е. продукции, услуг, освещения, тепла, при меньшем потреблении энергии. Это процесс, направленный на снижение энергопотребления наряду с энергосбережением за счет модернизации технологий и оборудования.

Основным определением энергоэффективности является совокупность процессов, направленных на эффективное, т.е. рациональное использование энергетических ресурсов. Достижение желаемого результата за счет снижения энергопотребления при энергоснабжении зданий или производственных процессов также является показателем эффективности.



Рисунок 1. Энергоэффективные здания.

Оптимизация потребления электроэнергии означает снижение потребления и повышение эффективности производства и бытовой жизни за счет внедрения современных технологий и энергоэффективного оборудования. Этот процесс направлен на повышение энергоэффективности, снижение затрат и управление максимальной нагрузкой на систему [1].

#### **Методы и результаты**

Для оптимизации потребления электроэнергии и повышения эффективности необходимо внедрять современные технологии, проводить энергетические аудиты, использовать возобновляемые источники энергии и применять системы цифрового управления. Это приведет к снижению



производственных затрат, уменьшению потерь в сети и повышению энергоэффективности [2].



Рисунок 2. Электрические устройства.

Основные пути повышения энергоэффективности:

- технологическое обновление, замена устаревших электродвигателей, трансформаторов и осветительных приборов на высокоэффективное оборудование;
- системы автоматического управления, управление использованием электроэнергии в производственных и бытовых целях с помощью автоматизированных систем в зависимости от времени и нагрузки;
- установка конденсаторных устройств для компенсации реактивной мощности, повышение качества напряжения в электросетях и снижение непроизводственных потерь на промышленных предприятиях;
- расширение использования возобновляемых источников энергии, солнечных батарей и малых гидроэлектростанций;
- внедрение современных систем (ASKUE) энергетического аудита и мониторинга, непрерывный анализ потребления электроэнергии, выявление точек потерь и учет.

Основные пути повышения энергоэффективности:

- Технологическая модернизация, замена устаревшего оборудования на высокоэффективные (энергосберегающие) технологии, использование энергосберегающих систем в промышленности;
- Внедрение интеллектуальных систем, технологий «умный дом» и «умная сеть», использование датчиков и автоматизированного управления в системах освещения;
- Возобновляемая энергия (ВИЭ); установка солнечных батарей, малых гидроэлектростанций и других альтернативных источников энергии;
- Энергетический аудит и мониторинг, учет энергопотребления на предприятиях и в зданиях, выявление потерь и разработка мер по их снижению;
- Теплоизоляция зданий; утепление строительных конструкций современными материалами для снижения тепловых потерь. В рамках данного

исследования был проведен анализ алгоритмических подходов к оптимизации учета электроэнергии и оценена их практическая эффективность. На основе изученных методов были выявлены преимущества автоматизированных систем учета перед традиционными методами [3].

Результаты анализа показали, что внедрение алгоритмов оптимизации значительно повышает точность расчетов. В частности, уменьшились расхождения в энергетическом балансе и расширились возможности определения технических и коммерческих потерь. В результате оптимизации балансировки нагрузки снизилось количество перегрузок в электросетях. Также, благодаря автоматизированным расчетным системам, стало возможным собирать и обрабатывать данные об энергопотреблении в режиме реального времени. Это стало важным для оперативного анализа и принятия управленческих решений [4].

Полученные результаты подтверждают техническую и экономическую эффективность оптимизированных расчетных систем, которые требуют значительных затрат. Однако в долгосрочной перспективе эти затраты компенсируются снижением потерь энергии и повышением точности расчетов.

Экономия энергии может быть достигнута следующими мерами.

Технические методы:

- Замена старого оборудования на современное;
- Внедрение автоматизированных систем управления;
- Снижение потерь в электросетях.

Экономические методы:

- Введение дифференцированных тарифов;
- Проведение энергетических аудитов;
- Привлечение инвестиций.

Для повышения энергоэффективности можно использовать простые традиционные методы.

1. Внедрение передового электрооборудования. Основным методом снижения потребления - использование энергосберегающего и высокоэффективного оборудования:

- светодиодные осветительные приборы - потребляют в 5-10 раз меньше электроэнергии, чем традиционные лампы;
- энергоэффективные двигатели и компрессоры - значительно снижают энергопотребление.

2. Автоматизированные системы управления.

Для контроля энергопотребления используются интеллектуальные счетчики и датчики. Эти системы автоматически оптимизируют потребление энергии и своевременно, в соответствии с поставленными задачами, отключают неработающее оборудование.

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## 2. Автоматизированное управление системой.

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Использование возобновляемых источников энергии (фотоэлектрические панели, малые гидроэлектростанции) и повторное использование тепловой энергии для отопления значительно снижают энергопотребление.

## 5. Обучение потребителей.

Также важно повышать осведомленность членов сообщества и жителей об энергосбережении и повышении энергоэффективности.

Расчет потребления электроэнергии [5].

Энергоэффективность рассчитывается по следующей формуле.

$$\eta = \frac{P_{\text{даход}}}{P_{\text{расход}}} \cdot 100\%$$

Здесь:

$\eta$  – энергоэффективность, %;  $P_{\text{даход}}$  – энергия, затраченная на работу или производство;  $P_{\text{расход}}$  – общее количество потребленной энергии.

## Заключение

Современные подходы к оптимизации выставления счетов за электроэнергию позволяют автоматизировать процесс выставления счетов, уменьшить количество ошибок и установить точные тарифы. В будущем ожидается более широкое применение этих подходов в области энергетической этики.

Повышение энергоэффективности является наиболее эффективным способом снижения потребления электроэнергии. Анализы показывают, что внедрение современных технологий позволяет добиться значительной экономии энергии и экономической эффективности.

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