PhD.Raximov Xasan Shukurjonovich
Namangan state technical university Department of Economics
https://orcid.org/0009-0003-3981-4626

ANALYSIS OF INDICATORS DETERMINING THE ECONOMIC EFFICIENCY OF THE RAILWAY TRANSPORT SYSTEM

Annotation. *This article analyzes the economic efficiency of the railway transport system, its current condition, existing problems, and ways to solve them. It discusses the role of the transport system in the national economy, the necessity of its innovative development, reforms in infrastructure, and ongoing digitalization processes. In addition, based on international experience, the article provides recommendations for improving the efficiency of railway transport.*

Keywords. *Railway transport, economic efficiency, transport logistics, infrastructure, digitalization, public–private partnership, energy efficiency.*

Introduction. In the global integration processes taking place today, the importance of the transport complex and infrastructures in the efficient use of economic potential is steadily increasing. The tasks of developing these sectors are being carried out by the global transport and logistics system. According to the World Bank, “the volume of global transport services within global GDP is estimated at USD 4.3 trillion (6.9%), with 110 billion tons of cargo and more than 1 trillion passengers transported annually, and the number of employees engaged in transport infrastructure reaching 100 million people.”[1].

Modern freight transportation technologies are rapidly advancing worldwide. Therefore, ensuring the innovative development of the transport system requires countries to improve mechanisms for efficiently utilizing their *transport–transit* and *transport–logistics* potential.

Historically, railway transport has been the core element of Uzbekistan’s

[1] The World Bank: World Development Indicators. http: //data.worldbank.org/indicator

transport infrastructure and continues to occupy a central position in the national economy. This mode of transport is a crucial factor for sustainable economic growth, the economic integration of regions, and the achievement of socio-economic stability. The railway system not only supports economic processes by transporting goods and passengers but also contributes to Uzbekistan's integration into the international economic community. Its effective functioning creates conditions for the balanced development of all sectors of the national economy.

The state of the transport system is a strategically important sector that supports the country's socio-economic growth and strengthens its foreign economic relations. The sustainable development of this sector holds a key place in state policy. Its advancement reinforces Uzbekistan's position and influence in the global economy and increases its competitiveness in domestic and international markets. In this context, infrastructure upgrades that meet modern requirements and solutions to challenges within the transport system become critically important. At the same time, enhancing the efficiency of transport infrastructure requires the adoption of innovative approaches and advanced technologies.

Degree of Problem Investigation.

Research on improving the economic efficiency of the railway transport system, state regulation, energy efficiency, and environmental performance is considered an important scientific direction in modern economic theory and practice. International scholars such as M. Porter, K. Menard, M. Castells, and M. Lambert have scientifically substantiated issues related to effective management of transport infrastructure, organization of logistics chains, and the role of government policy in the transport sector[2]. They developed scientific models concerning state–sector integration and the establishment of public–

[2] Porter M. Competitive Strategy: Techniques for Analyzing Industries and Competitors. – Free Press, 1980.; Menard C. Handbook of New Institutional Economics. – Springer, 2005.; Castells M. The Rise of the Network Society. – Wiley-Blackwell, 2010.; Lambert D. Logistics and Supply Chain Management. – Pearson, 2014.

private partnerships in railway infrastructure, and analyzed the transport system from the perspectives of competitiveness and environmental efficiency.

Among CIS scholars, the works of V. G. Borodin, A. Kolik, and K. Ya. Kirillov have provided important scientific foundations on issues such as state regulation, electrification of railway infrastructure, and energy efficiency[3]. They identified methodological approaches to increasing sectoral efficiency through the introduction of renewable energy sources and “green” technologies.

Among scholars in our country, G. Samatov, M. Ikramov, and A. Zohidov have conducted research on the economic efficiency of the railway transport system, improving state management functions, and introducing innovations into infrastructure. They developed proposals for diversifying railway infrastructure, optimizing financing, and expanding opportunities for public–private partnerships based on digitalization.

Research Methodology.

In this study, a comprehensive scientific approach was applied to examine the economic efficiency of the railway transport system. The main methodological foundations included economic analysis, statistical analysis, comparative analysis, trend analysis, and a systematic approach. In addition to assessing the current situation, the research also identified existing problems and developed recommendations aimed at solving them.

Discussion of Analysis and Results.

Freight volume and freight turnover are key indicators that determine the physical scale of activity in the sector. These indicators, expressed in tons and ton-kilometers, make it possible to assess the service capacity of the network, its geographical coverage, and its level of adaptation to domestic and foreign markets. Notably, the consistency between the growth rates of freight turnover and dynamics in industrial production reflects the extent to which the transport

[3] Borodin V.G. Upravleniye transportnoy sistemoy: teoriya i praktika. – M.: Infra-M, 2019.; Kolik A. Gosudarstvennoye regulirovaniye v transportnoy otrasli. – SPb.: Piter, 2021.; Kirillov K.Ya. Modeli razvitiya jeleznodorojnogo transporta. – M.: Ekonomika, 2022.

network is integrated into the economic environment.

Table 1

Composition of freight transportation and freight turnover by modes of transport [4]

№		2022	2023	2024
Total freight volume, million tons				
	Total across all modes of transport	**1420.9**	**1455.7**	**1521.2**
Including the following				
1.	Railway	5.1	5.1	4.8
2.	Automobile	90.4	90.8	91.1
3.	Pipeline transport	4.5	4.1	4.1
Freight turnover, million ton-kilometers				
4.	**Total across all modes of transport**	75492.7	77139.1	79507.4
Including the following				
5.	Railway	33.1	35.1	34.5
6.	Automobile	27.2	28.3	28.9
7.	Pipeline transport	39.3	36.3	36.2

During 2022–2024, the dynamics of freight volume and freight turnover exhibited variability across different modes of transport. In particular, the relative shares and growth trends between railway and road transport indicate that institutional and technological issues within the transport sector remain significant. Although total freight volume increased from 1,420.9 million tons in 2022 to 1,521.2 million tons in 2024, this growth occurred primarily due to road transport. Freight transported by rail declined from 5.1 million tons in 2022 to

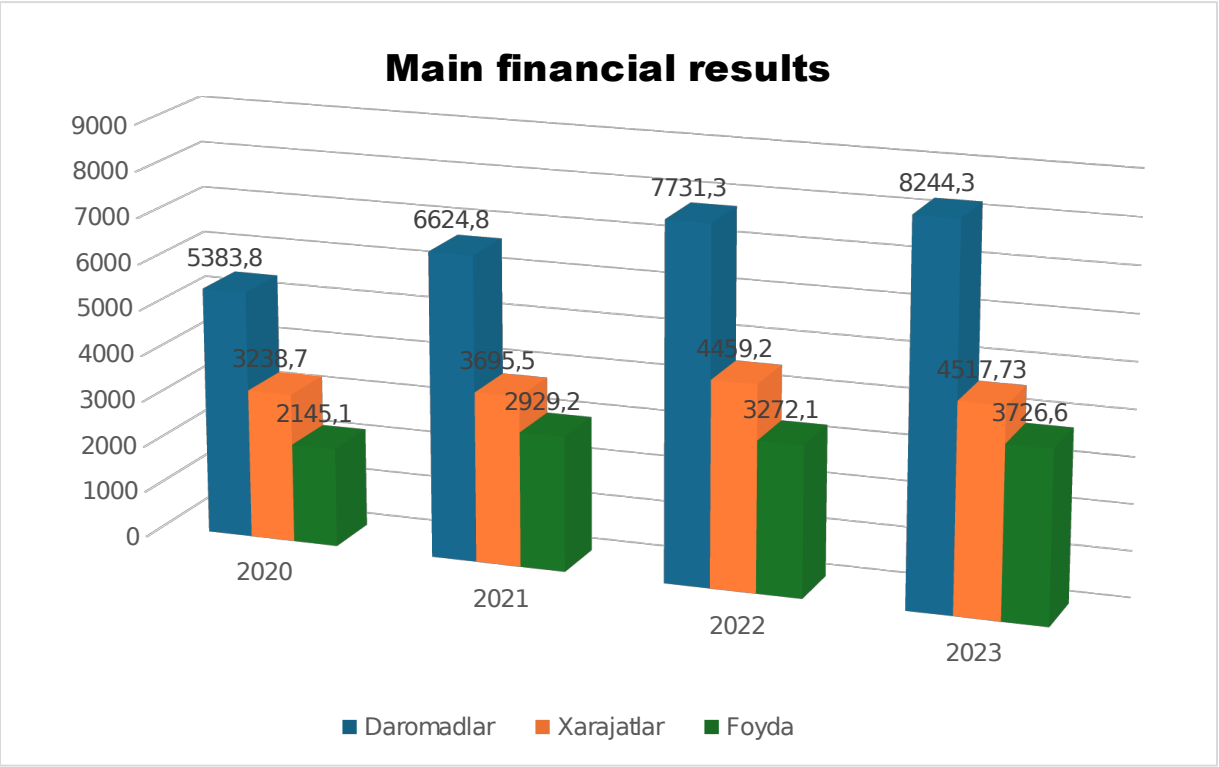
[4] Data of the National Statistics Committee of the Republic of Uzbekistan.

4.8 million tons in 2024, representing a decrease of nearly 10 percent. This indicates that railway transport is losing its share in domestic freight movement.

Road transport, on the other hand, carried 90.4 million tons of freight in 2022, rising to 91.1 million tons in 2024. Although the increase is not substantial, it demonstrates that road transport continues to maintain its dominance and that market demand remains more oriented toward this mode of transport. The efficiency of road transport is explained by its logistical flexibility, shorter distances, and time savings; however, it also has drawbacks, including high costs and negative environmental impacts.

A reverse pattern is observed in freight turnover indicators. Railway freight turnover amounted to 33.1 billion ton-km in 2022 and increased slightly to 34.5 billion ton-km in 2024. Although the change is modest, the railway system remains efficient for long-distance freight transportation. At the same time, the relatively slow growth rate suggests stagnation in infrastructure modernization and service quality. In road transport, freight turnover increased from 27.2 billion ton-km in 2022 to 28.9 billion ton-km in 2024, marking a 6.3 percent rise over three years. This indicates growing intensity in the use of road transport, particularly in regional logistics, where it holds a dominant position.

Based on these results, first, it is evident that the intersectoral competitiveness of railway transport is declining, which can be attributed to its limited financial capacity, insufficient service diversification, slow technological modernization, and a centralized tariff-setting approach. Second, the high share of road transport reflects its ability to adapt quickly to market needs, supported by the increase in private operators and service segmentation, which collectively enhance its maneuverability and competitive advantage. At the same time, road transport imposes a heavy load on road infrastructure, entails high fuel costs, and has negative environmental effects, all of which require a more systematic policy response.



Picture 1 Key financial results of "Uzbekistan Railways" JSC in 2020–2023, billion UZS

Although the financial performance of freight transport operations of "Uzbekistan Railways" JSC during 2020–2023 appears to demonstrate stable growth on the surface, deeper analysis reveals significant internal inconsistencies and fragilities in terms of economic sustainability. Revenue increased from 5.4 trillion UZS to 8.2 trillion UZS. However, it is fundamentally incorrect to evaluate this growth in absolute terms as purely positive—because the increase in revenue is not driven by profitability, but rather by a disproportionate rise in costs. This is clearly reflected in the efficiency index, which remains at an average level of 1.7–1.8, indicating that the sector still operates with revenue only slightly exceeding expenses, which is insufficient for ensuring stable profitability.

The highest recorded profit of 3.7 trillion UZS in 2023 does not represent strategic effectiveness, but rather reflects the increased volumetric load of operations. In reality, this masks the deteriorating state of the railway infrastructure and operational system. In other words, profit growth is not the

result of resource efficiency or higher productivity - it is largely the outcome of tariff indexation and forced expansion of service volumes.

Furthermore, analysis of cost dynamics shows that expenditures, which amounted to 3.2 trillion UZS in 2020, surpassed 4.5 trillion UZS by 2023 - an increase of 1.4 times. This growth rate is not proportional to revenue growth.

The underlying problem is the declining competitiveness of railway transport compared to other modes. As road transport increasingly dominates due to its flexibility and logistical speed, railways are compelled to generate profit mainly through higher transport volumes. In the long term, this sharply increases infrastructure operation and maintenance costs while preserving the system in its current, non-transformational state.

Although the financial indicators of “Uzbekistan Railways” JSC appear positive externally, this growth is not based on the sector’s real economic capacity. Rather, it depends on state guarantees, inflationary indexation, and artificially increased freight volumes. The sector is characterized by institutional deficiencies, low capital efficiency, a heavy cost burden, and passiveness within a competitive market environment. This highlights the need for restructuring, tariff reform, digitalization of operations, and the introduction of modern management models.

In the last decade, the railway sector has exhibited trends such as disproportionate growth, rising capital expenditures, and stagnation in transit activities. The following data (Table 2) provides a clear picture of year-by-year changes in operating revenue, investment inflows, dynamics of fixed assets, and the volume of transit freight. (Table 2).

Table 2

Key indicators of the railway transport sector [5]

[5] Data of “Uzbekistan Railways” JSC.

Years	Revenue from core activities in railway transport, billion UZS	Volume of investments in the railway transport sector, billion UZS	Transit transportation mln. t	Volume of fixed assets in railway transport, billion UZS
2015	4316,5	198,5	7,5	39 319
2016	4715,2	246,2	8,0	42 381
2017	6967,1	518,0	7,8	51 580
2018	7529,2	2 107,6	7,3	70 014
2019	8512,9	2 679,8	7,0	83 376
2020	9605,4	1 521,1	8,2	93 026
2021	10372,4	1 639,6	8,5	107 066
2022	10496,4	3 114,1	10,2	111 476
2023	12085,5	3 285,5	11,3	121 745

During 2015–2023, the formation of key performance indicators in the railway transport sector exhibited disproportional and imbalanced growth dynamics. Although revenue from core activities increased from 4.3 trillion UZS in 2015 to 12.1 trillion UZS in 2023, this growth was shaped not by increases in freight volume, service diversification, or operational efficiency, but primarily by inflation, tariff indexation, and external financing. Despite rising revenues, the lack of qualitative transformation and modernization in the sector continues to hinder the formation of a foundation for rapid, sustainable development.

A critical issue requiring special attention is the sharp fluctuations in investment volumes and the imbalance between investment inflows and their returns. For example, while investments amounted to 198.5 billion UZS in 2015, by 2023 this figure had soared to 3.3 trillion UZS—an increase of more than 16.5 times. However, this surge in investment has not been reflected in corresponding improvements in operational efficiency, freight turnover, or

transit capacity, indicating the presence of a “depth” problem within the sector’s capital structure. Despite large sums being directed toward infrastructure, the absence of institutional restructuring mechanisms and the lack of market-based tools in the sector result in low investment efficiency.

Additionally, the transit freight indicator showed only minimal growth—from 7.5 million tons in 2015 to 11.3 million tons in 2023, averaging an annual increase of just 6.3 percent, which cannot be considered satisfactory. This indicates a weakening of Uzbekistan Railways’ cross-border significance within regional logistics. Despite growing geoeconomic and geopolitical demand for Central Asia’s transit functions, the railway sector has not been able to fully capitalize on this opportunity. Contributing factors include underdeveloped railway hubs and logistics nodes, bureaucratic constraints at customs and border services, high transit fees, and competitive advantages offered by alternative routes—particularly those passing through Kazakhstan and the Caucasus.

The growth in fixed assets also raises questions regarding its efficiency. Fixed assets increased from 39.3 trillion UZS in 2010 to 121.7 trillion UZS in 2023. Although this growth appears substantial, the share of physically and morally depreciated assets remains unclear. In many cases, expenditures have been driven not by modernization but by repairs and temporary maintenance of functionality. This indicates that the productive capacity of fixed assets is low, their renewal cycle is prolonged, and amortization returns are insufficient. Key structural problems include:

• Low capital efficiency – despite large increases in investment volumes, there is no correlation between investments, profitability, and freight flows.
• Stagnation of transit potential – Uzbekistan’s role as a “transport hub state” in regional logistics is weakening.

• Inefficient structure of fixed assets – nominal asset growth is not supported by real productivity gains or service diversification.

• Loss of intersectoral competitiveness – railway logistics remains associated with bureaucracy, additional time requirements, and higher costs.

The analysis demonstrates that although “Uzbekistan Railways” JSC has shown nominal growth in certain economic indicators in recent years, the sector continues to face complex challenges in terms of efficiency, financial sustainability, and competitiveness. While freight volume and revenue trends appear positive, high infrastructure-related costs, outdated technical assets, and weak competitive positioning limit overall performance. Furthermore, the absence of ESG-compliant environmental mechanisms poses a strategic barrier to the sustainable development of the transport sector.

Conclusion. Railway transport is a strategically important sector for Uzbekistan’s economic stability and regional integration. To enhance its economic efficiency, it is advisable to take action in the following areas:

• Accelerating digitalization – introducing automated management systems and electronic freight documentation.

• Implementing the “green transport” concept – expanding electrified trains and energy-efficient technologies.

• Developing public–private partnerships – attracting private investors for infrastructure modernization.

• Improving logistics centers – establishing multimodal logistics hubs.
• Strengthening international cooperation – coordinating transit regimes with neighboring countries.

These recommendations will contribute to the modernization of the transport system and positively affect all sectors of the economy.

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