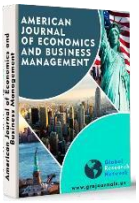

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Article

Organization of Effective Refresher Courses for Employees of the Road Industry of the Republic of Uzbekistan

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Abstract: The article analyzes approaches to improving the qualifications of road industry personnel to ensure stable economic growth of the region, including the development of transport infrastructure, the use of international experience, analysis of current problems, as well as an attempt to develop scientific-theoretical and practical proposals and recommendations for organizing an effective system of advanced training for road industry employees. Special attention is paid to integrating the principles of the "green economy" into the system of training and professional development of personnel, as well as into infrastructure development as a key factor for the sustainable development of the national economy.

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Keywords: Systemic Approach, Organization, Efficiency, Personnel Training, Advanced Training, Green Economy Personnel, Sustainable Development, Stable Regional Economic Growth, Transport Infrastructure Development, International Experience, Scientific-Theoretical and Practical Proposals, Recommendations.

1. Introduction

It is well known that roads are a crucial element of transport infrastructure, providing connections between cities, regions, and countries. They enable the transportation of goods and passengers, creating conditions for economic development. According to the draft Presidential Decree "On Approval of the Road Development Strategy of the Republic of Uzbekistan for 2020–2030," the main goal of the strategy is to define directions, approaches, and mechanisms for the development and improvement of the road network, enhancing its operational characteristics to contribute to sustainable and dynamic economic growth, strengthening the defense capability and economic security of the Republic, and raising the living standards of the population [1].

The economic effect of road development must be taken into account. Road development leads to an increase in transport volumes and a reduction in the cost of transport services, which has a positive impact on the economy. Furthermore, road construction and reconstruction create jobs and stimulate the development of the construction industry. Road development is one of the main priorities in the development of Uzbekistan's transport system [2].

2. Methodology

The study employs a mixed-methods approach combining qualitative and quantitative analysis to examine the effectiveness of organizing refresher courses for road industry employees in Uzbekistan. The research is based on a systematic and comparative analysis of statistical data, legislative documents, and international experience in personnel training and infrastructure development [3].

Quantitative data were collected from official statistical sources, including reports on cargo transportation dynamics, workforce structure, and training center activities during the period 2013–2025. These data were analyzed using descriptive statistical methods to identify trends in labor distribution, training participation, and sectoral development [4].

In addition, a questionnaire survey was conducted among leading specialists of road enterprises in the Fergana Valley regions to assess current challenges and identify effective approaches to professional development. The survey results were processed using comparative and analytical methods to determine key influencing factors [5].

Qualitative analysis was applied to evaluate international best practices, particularly the dual education systems of Germany and China, and their applicability to Uzbekistan's context. The research also incorporates elements of system analysis to assess the interaction between economic, environmental, and educational factors within the framework of sustainable development and the green economy [6].

The combination of these methods ensures a comprehensive evaluation of the current training system and allows for the development of scientifically grounded recommendations aimed at improving the effectiveness of refresher courses in the road industry.

In Uzbekistan, roads play an important role in the country's socio-economic development. For domestic needs, the majority of freight and passenger transportation in the republic currently falls on roads. In particular, road transport accounts for about 85% of all freight transportation and over 95% of passenger transportation. Roads provide access to certain states, serving as the material foundation for the Republic's foreign economic relations and its integration into the global economic system [7].

According to the State Committee of the Republic of Uzbekistan on Statistics, in 2024, the share of road transport services was the highest in the total volume of transport services, with 1.4 billion tons of cargo transported. During this period:

- **Rail transport** shipped 73.9 million tons of cargo;
- **Pipeline transport** pumped 61.8 million tons of gas;
- **Air transport** carried 14.4 thousand tons of cargo.

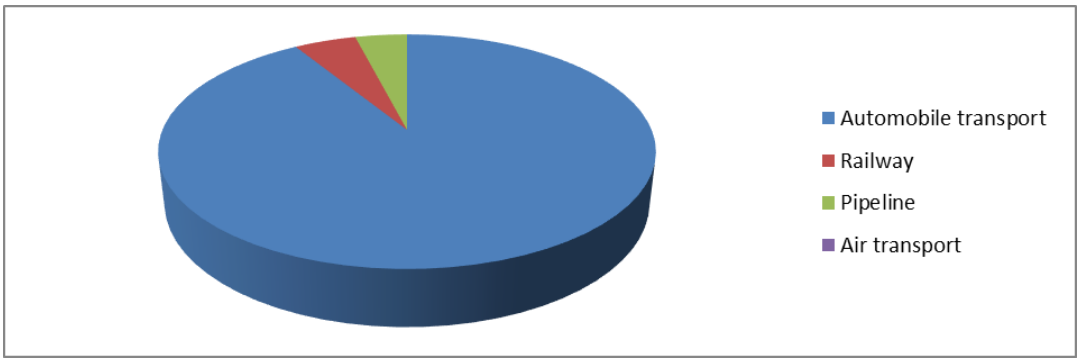

Figure 1. Transport services by mode of transport in 2024, in the total volume of transport services, million tons of cargo.

The volume of cargo transportation by all modes of transport during the period 2020–2024 is as follows:

2020 – 1,366.7 million tons; 2021 – 1,420.2 million tons; 2022 – 1,420.9 million tons; 2023 – 1,455.7 million tons; 2024 – 1,521.2 million tons [8].

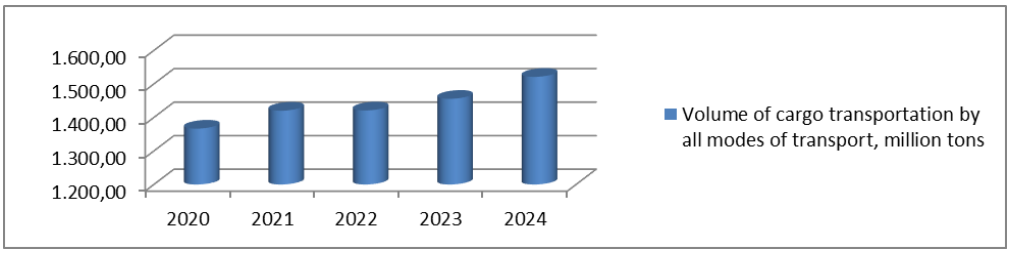

Figure 2. Volume of cargo transportation by all modes of transport, million tons.

In 2025, road transport carried 1,434.5 million tons of cargo, which is 4.7% more than in 2024. In January–December 2025, the volume of freight turnover increased by 1,746.3 million t-km, reaching 26,110.3 million t-km, which is 7.2% higher compared to 2024 [9].

In Uzbekistan, the volume of transport services reached 188.2 trillion soums by the end of 2025.

Cargo Transportation Dynamics (2020–2025):

- **2020–2023:** Steady recovery and growth were observed following the pandemic, driven by the development of commercial road transport and infrastructure.
- **2024–2025:** According to data for 2024, the volume of cargo transported reached 1,459,478.4 thousand tons. It was forecasted that by mid-2025, commercial road transport indicators would increase by 12.4%, based on an analysis presented on CyberLeninka.
- **Structure:** Road transport maintains its leading position, while rail transport also plays an important role in international freight.
- **Industry development:** Includes the growth of the private vehicle fleet, which increased from 2.95 million units at the beginning of 2021 to more than 4.7 million by the end of 2025ю

In addition, transit cargo is transported through the territory of the Republic. For example, in 2025, the volume of transit cargo shipments through the territory of Uzbekistan reached 14.7 million tons. The bulk of this volume (about 12.1 million tons) was handled by rail transport, while 2.7 million tons were handled by road transport. The growth in transit became possible due to the development of new corridors, including the China–Kyrgyzstan–Uzbekistan route [10].

Key transit indicators for 2025:

- Total transit: 14.7 million tons.
- Rail transport: 12.1 million tons.
- Road transport: 2.7 million tons.

The results of the analysis of the foreign trade turnover of the Republic of Uzbekistan are presented in Table 1.

Table 1. Analysis of the foreign trade turnover of the Republic of Uzbekistan.

in mln.USD

Indicators	2021	2022	2023	2024	2025	Growth, 2025/2021	
						в $	в %
Export	14081,1	15275,9	19229,1	19743,8	50000	35918,9	255

Import	23740,4	28220,3	35574,8	35237,9	35000	11759,6	49,53
Foreign trade turnover	37821,5	43496,2	54803,9	54981	85000	47178,5	125

Source: The table was compiled by the author based on materials from Stat. uz.

Analysis of the data in the table shows that the growth of exports in 2025 compared to 2021 will be:

$$\text{Growth} = \frac{50000 - 14081.1}{14081.1} \times 100 = 255\%.$$

The growth of imports in 2025 compared to 2021 will be 49.53%. The growth of foreign trade turnover in 2025 compared to 2021 will be 125% [11].

A visualization of the dynamics of exports and imports of the Republic of Uzbekistan is clearly shown in Diagram 3.

An analysis of literary sources shows that modern economic and business processes require training and professional development of personnel with competencies that meet labor market requirements.

In the context of the dynamic development of Uzbekistan's regions, the strategic development of transport infrastructure is becoming one of the key factors ensuring economic growth and competitiveness [12]. At the same time, global challenges related to climate change and the depletion of natural resources make the transition to a green economy—an economy that promotes well-being and social justice while significantly reducing environmental risks—highly relevant [13].

Thus, improving the training and professional development of road industry personnel for sustainable regional economic growth requires the integration of green economy principles, including the development of environmentally safe transport infrastructure, innovative educational programs, and the application of international experience [14].

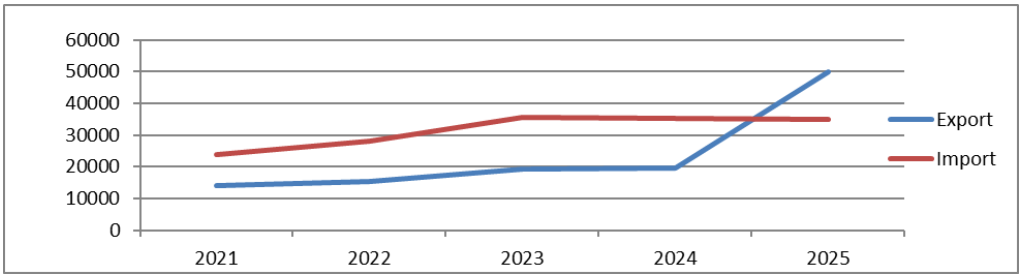

Figure 3. Dynamics of exports and imports of the Republic of Uzbekistan.

Literature Review

Human capital theory emphasizes the importance of investing in education and professional training to ensure economic development [15]. Research confirms that qualified personnel contribute to increased labor productivity, which in turn leads to greater regional competitiveness. Reports from the World Bank and the United Nations Environment Programme highlight the role of the green economy as a foundation for sustainable economic growth [16].

In recent years, the Republic of Uzbekistan has demonstrated impressive rates of economic growth, solidifying its leadership in Central Asia. According to the World Bank, GDP growth is projected at 5.8% in 2025 and 5.9% in 2026. In 2024, GDP reached $115 billion, an increase of 6.5% compared to the previous year [17].

According to the State Committee of the Republic of Uzbekistan on Statistics, the transport sector's share of GDP was 9.4% in 2023. In particular, the development of roads and railways remains a priority. However, despite this positive trend, there is a shortage of qualified personnel in the transport sector, including its infrastructure, i.e., the road industry. In 2023, specialists with higher education in logistics and transport accounted for only 12% of the total workforce in the sector [18]. Issues related to improving the system of training and professional development of specialists and their impact on the efficiency of road industry organizations have been examined in studies [19].

3. Results

An analysis of the international experience of countries such as Germany and China shows that investments in personnel training and transport infrastructure development have a synergistic effect [20]. In Germany, dual vocational education systems operate, allowing theoretical training to be combined with practical experience in enterprises. China, in turn, actively invests in the creation of educational clusters integrated with transport hubs, which ensures high labor productivity and reduced logistics costs.

Starting from the 2021/2022 academic year, Uzbekistan introduced a dual form of education, which is already yielding results in the German education system. A new form of training has also been introduced, allowing for the practical application of theoretical knowledge acquired in educational institutions in preparing youth for professions. Article 15 of the Law of the Republic of Uzbekistan "On Education" No. 637 of September 23, 2020, defines dual education as a separate form of education, while Article 17 of this Law defines the dual form of education as follows: "Dual education is aimed at providing students with the necessary knowledge, skills, and abilities, the theoretical part of which is carried out at an educational institution, and the practical part – at the student's workplace" [21]. The President of the Republic of Uzbekistan pays attention to the systematic development of the dual education form in Uzbekistan based on German experience. In particular, Decree of the President of the Republic of Uzbekistan "On Measures for the Development of Education, Upbringing, and Science in the New Period of Uzbekistan's Development" of November 6, 2020, provided for the creation of a dual education system. Thus, new mechanisms for competitive personnel training have been introduced by organizing education in harmony with work activities according to the real needs of the labor market of Uzbekistan and specific jobs in enterprises (organizations) and economic sectors.

The development of transport infrastructure, when based on environmentally sustainable technologies, contributes not only to economic growth but also to improving the quality of life of the population. The use of renewable energy sources, reduction of greenhouse gas emissions, development of electric vehicles and low-carbon logistics are becoming urgent tasks in personnel training [22].

The international experience of Germany and China demonstrates the successful integration of educational initiatives with the needs of both the transport sector and the environmentally oriented economy. Germany, for example, integrates "green competencies" into dual programs, teaching students sustainable mobility technologies. China is developing the concept of "green cities," where transport hubs are closely linked to clean technologies and corresponding personnel programs [23].

Uzbekistan has also taken steps in this direction. For instance, elements of practical training related to environmentally friendly solutions in logistics and transport are already being introduced within the framework of dual education. It is important that educational programs, including advanced training for specialists of enterprises and road industry organizations, are developed taking into account the tasks of the green transition and sustainable development.

An analysis of statistics on advanced training of specialists of enterprises and road industry organizations during the period 2013–2023 at the Namangan Training Center for Advanced Training of Road Industry Workers is presented in Table 2.

Table 2. Analysis of statistics on advanced training of specialists of enterprises and road industry organizations during the period 2013–2023 at the Namangan Training Center for Advanced Training of Road Industry Workers.

№	Academic year	Total	Including			
			Engineering and technical workers		Road patrol workers and machine operators	
			people	*In %*	*people*	*In %*
1	2013	204	204	100	0	0
2	2014	902	129	14,30	773	85,70
3	2015	356	171	48,33	185	51,67
4	2016	432	59	13,66	373	86,34
5	2017	556	163	29,32	393	70,68
6	2018	1022	298	29,16	724	70,84
7	2019	1086	176	16,21	910	83,79
8	2020	218	40	18,35	178	81,65
9	2021	1049	232	22,12	817	77,88
10	2022	779	58	7,45	721	92,55
11	2023	749	200	26,70	549	73,30
Total		**7353**	**1730**	**23,53**	**5623**	**76,47**

Source: The table was compiled by the authors based on data from reports of the Namangan Training Center for Advanced Training of Road Industry Workers.

Analysis of the data on the number of employees in various categories (engineering and technical workers, and road workers with machine operators) by year from 2013 to 2023, presented in Table 1, shows that during the period under review, the number of employees increased significantly. In 2013, there were only 204 employees, but by 2023 this number had grown to 749 people. As a result, the total increase was 545 people, or approximately 267% over 10 years. Dynamics of the share of engineering and technical workers: In the early years, for example in 2013, almost all workers were engineers and technical specialists (100%); however, the share of engineers and technicians decreased significantly in subsequent years. The highest percentage of such workers was recorded in 2015, when engineers made up 48.33% of the total workforce. However, each year the share of engineers continued to decline, reaching its lowest value in 2022 (7.45%). Throughout the entire period, there has been a steady increase in the number of road workers and machine operators. In 2013, their share was 0%, but already in 2014 it reached 85.7%, significantly shifting the workforce structure in favor of this category. In 2023, the share of road workers and machine operators is 73.3%, which also indicates a continued increase in their numbers. The table shows significant fluctuations in the number of employees in different years. For example, in 2016, there was a decrease in the total number of employees (432 people), associated with a reduction in engineering and technical workers. However, in 2018, the number sharply increased to 1,022 people, which is also associated with an increase in the number of road workers and machine operators. Comparison of the data shows that the overall share of engineering and technical workers over the entire period was 23.53%, while the share of road workers and machine operators was 76.47%. This result clearly demonstrates a trend toward the dominance of road workers in the labor resources of this sector. The greatest changes occur in 2022–2023. In 2022, the share of engineering and technical workers fell to 7.45%, while the share of road workers reached 92.55%. This may indicate a significant increase in the volume of road

works and mechanization of processes in recent years, which requires an increase in the number of workers and machine operators. Analysis of the data presented in Table 2 indicates that, overall, there is a clear trend toward an increasing share of road workers and machine operators, which is associated with increased volumes of road construction and repair, as well as the mechanization of labor. At the same time, the number of engineering and technical workers is steadily declining, indicating a reduction in the number of such specialists being sent to refresher courses due to a lack of funds for travel expenses, as well as the reluctance of road organization management to send engineering and technical personnel to refresher courses with time away from production in the regions under consideration [24].

To address this problem, in 2024 the author conducted a questionnaire survey of leading specialists from road enterprises in the Fergana Valley regions on improving management in the process of repair, reconstruction of roads and artificial structures, as well as organizing refresher courses for industry workers, and obtained the following preliminary results:

First, the existing system of advanced training for road industry workers needs improvement.

Second, for economic feasibility, advanced training of road industry workers should be organized as follows: workers and machine operators – on-site; engineering, technical, and clerical staff – remotely (online).

Third, to improve the transport and operational qualities of roads, attention must be focused on the main factors affecting them in the following proportion: employee knowledge and qualifications – 60%; funding – 10%; material supply – 15%; technical support – 15%.

Fourth, the increase in operational efficiency resulting from the integration and merging of key factors into a single system due to the synergistic effect is 30 percent.

In our opinion, the implementation of the obtained results makes it possible to organize refresher courses for road industry workers on a scientific basis [25].

4. Discussion

The findings of this study highlight that the effectiveness of refresher training systems in the road industry is strongly influenced by both organizational and socio-economic factors. The observed growth in the number of trained personnel, alongside the structural shift toward road workers and machine operators, reflects the increasing demand for practical labor in response to the expansion of infrastructure projects. However, the declining share of engineering and technical staff indicates a potential imbalance in workforce development, which may negatively affect long-term sectoral efficiency.

The results confirm that the integration of international practices, particularly dual education models, can significantly enhance the quality of personnel training. The experience of Germany and China demonstrates that combining theoretical education with practical workplace training leads to higher productivity and better alignment with labor market demands. This supports the broader theoretical perspective of human capital development, which emphasizes the role of education and skills in economic growth.

Furthermore, the study reveals that incorporating green economy principles into training programs is essential for sustainable development. The transition toward environmentally friendly transport systems requires not only technological innovation but also the development of new competencies among specialists. Therefore, training programs must be adapted to include knowledge of energy efficiency, environmental standards, and low-carbon technologies.

At the same time, the survey results indicate that the current system of refresher training requires modernization. In particular, the differentiation of training formats—on-site for workers and online for technical staff—can improve accessibility and cost-effectiveness. The identification of key factors influencing operational efficiency, such as employee qualifications (60%) and resource availability, further emphasizes the need for a systemic approach to personnel development.

Overall, the discussion demonstrates that improving refresher training systems requires a комплексный approach that integrates educational реформы, technological advancements, and environmental considerations. Such an approach will not only enhance workforce productivity but also contribute to the sustainable development of the national economy.

5. Conclusions

The following conclusions were drawn during the scientific research:

1. Strategic development of transport infrastructure is impossible without training personnel with skills in environmentally sustainable technologies.
2. The green economy requires a systematic approach to specialist training, where ecological thinking, knowledge of regulatory requirements, and the ability to implement energy-efficient and carbon-free solutions play an important role.
3. Integration of green principles into educational and economic policy will ensure not only economic growth but also an improvement in the environmental situation.
4. Organize refresher courses for road industry workers on a scientific basis.
5. For economic feasibility, advanced training of road industry workers should be organized as follows: workers and machine operators – on-site; engineering, technical, and clerical staff – remotely (online).

Practical proposals

We have developed practical proposals in the following main areas:

- **Improving the activities of training and advanced training centers:** Enhancing the work of training centers in regions with high potential for transport and industrial growth, where educational programs will include disciplines on environmentally friendly technologies, sustainable resource management, energy saving, and low-carbon logistics.
- **Stimulating investment in environmental education:** Providing tax and financial incentives to companies actively participating in the training of specialists in green economy fields, including "green" construction of transport infrastructure, development of electric vehicles, and low-emission logistics.
- **Attracting international experts in sustainable development:** Organizing internships and joint educational programs with the participation of foreign specialists practicing in green transport technologies, renewable energy sources, environmental engineering, and sustainable urban planning. This will allow the introduction of international standards into personnel training and the adaptation of best practices to the conditions of the region.
- **Implementing practice-oriented projects:** Supporting student and research initiatives, as well as projects under government grants, aimed at developing solutions to reduce the carbon footprint of transport, optimizing routes with consideration for the environment, organizing science-based refresher courses, and developing environmentally safe construction materials for transport infrastructure.

Recommendations

We recommend organizing personnel training and advanced training in the following main areas:

- **State support for sustainable educational initiatives:** Development and implementation of national programs for personnel training and advanced training focused on the goals of the green economy, with special attention to the transport sector, including the road industry, as one of the main sources of emissions. Inclusion of requirements for "green" competencies of specialists in state standards.
- **Public-private partnership with an environmental focus:** Involving the private sector in personnel training not only as an employer but also as a participant in fostering environmental responsibility and implementing green standards. Implementation of joint educational projects aimed at developing ecological transport and reducing negative environmental impact.
- **Monitoring and evaluation with consideration of sustainability:** Development of a system for assessing the effectiveness of educational programs and refresher courses for road industry workers, adding environmental sustainability criteria such as: graduates' contribution to "green" innovations, implementation of energy efficiency projects, pollution reduction, participation in programs for transitioning to a carbon-free economy.

Development of environmental culture and competencies: Integrating ecological thinking into all levels of personnel training — from undergraduate to higher education, as well as advanced training of road industry workers. Raising awareness among students, trainees of refresher courses for road industry workers, and teachers about the UN Sustainable Development Goals, the climate agenda, and the principles of "green growth."

REFERENCES

[1] T. W. Schultz, "Investment in human capital," *The American Economic Review*, vol. 51, no. 1, pp. 1–17, 1961.

[2] G. S. Becker, *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. Chicago, IL, USA: Univ. of Chicago Press, 1993.

[3] World Bank, *World Development Report 2020: Trading for Development in the Age of Global Value Chains*. Washington, DC, USA: World Bank, 2020.

[4] State Committee of the Republic of Uzbekistan on Statistics, *Statistical Collection "Transport and Economy"*. Tashkent, Uzbekistan, 2023.

[5] OECD, *Education at a Glance 2021: OECD Indicators*. Paris, France: OECD Publishing, 2021.

[6] R. M. Akhmedov, "Expansion of integration between higher education and production as a basis for training competitive specialists in the road industry," *International Scientific-Practical Electronic Journal "My Professional Career"*, no. 30, pp. 138–141, 2021.

[7] R. M. Akhmedov *et al.*, "Improving the effectiveness of student learning using the INSERT method," in *Proc. Republican Scientific-Practical Conf.*, Namangan, Uzbekistan, 2018, pp. 253–255.

[8] R. M. Akhmedov *et al.*, "Innovative pedagogical technologies in training road industry specialists," in *Proc. Republican Scientific-Practical Conf.*, Namangan, Uzbekistan, 2018, pp. 256–259.

[9] R. M. Akhmedov, S. Muidinov, U. Soginbaeva, and Sh. Mukhitdinova, "Improving the system of training specialists in the road industry," *Economics and Society*, no. 10(77), 2020.

[10] R. M. Akhmedov, I. M. Kasimov, and U. S. Soginboeva, "Forecasting the financing volume of road network development," *Symbol of Science*, no. 7, pp. 27–28, 2017.

[11] R. M. Akhmedov, "System approach to management of improving technical and operational qualities of roads," *International Scientific-Practical Electronic Journal "My Professional Career"*, no. 30, p. 146, 2021.

[12] R. M. Akhmedov *et al.*, "Effectiveness of a synergetic approach to management," *Economics and Society*, no. 4-1(83), pp. 658–665, 2021.

[13] R. M. Akhmedov, "The importance of a synergetic approach in management," *International Journal of Progressive Sciences and Technologies (IJPSAT)*, vol. 24, no. 1, pp. 11–14, Dec. 2020.

[14] R. A. Rakhmonjon, "The role of investments in the development of economic indicators," *Middle European Scientific Bulletin*, vol. 9, 2021.

[15] Law of the Republic of Uzbekistan "On Education," No. 637, Sep. 23, 2020.

[16] Decree of the President of the Republic of Uzbekistan "On measures for the development of education, upbringing, and science," No. UP-6108, Nov. 6, 2020.

[17] Namangan Training Center for Road Industry Workers, [Online]. Available: https://old.uzavtoyul.uz/ru/post/namangan-oquv-markazi.html
[18] R. M. Akhmedov, "Business processes in system approach to planning and management of road repairs and reconstruction," *Xorazm Ma'mun Academy Bulletin*, no. 1/2(122), pp. 77–81, 2025.
[19] R. M. Akhmedov, "Methodological foundations of system approach in road management," *Xorazm Ma'mun Academy Bulletin*, no. 12/2(121), pp. 139–143, 2024.
[20] R. M. Akhmedov, "Business processes in system-based planning and management of road reconstruction," *Xorazm Ma'mun Academy Bulletin*, no. 1/2, pp. 77–81, 2025.
[21] R. M. Akhmedov, "Development of system approach in management," *Xorazm Ma'mun Academy Bulletin*, no. 3/2, pp. 127–130, 2025.
[22] R. M. Akhmedov, "Improvement of training and retraining system in road industry," *Digital Economy Scientific Electronic Journal*, no. 11, pp. 2696–2704, 2025.
[23] R. M. Akhmedov, "Training and retraining of road industry personnel in green economy conditions," *Xorazm Ma'mun Academy Bulletin*, no. 9/2, pp. 55–61, 2025.
[24] R. M. Akhmedov and N. U. Malikov, "System analysis of professional development dynamics of transport infrastructure workers," in *Proc. Int. Conf. Artificial Intelligence and Applications (ICAIA)*, Apr. 2026, pp. 41–50.
[25] R. M. Akhmedov, "Analysis and improvement of training system for transport infrastructure personnel," *Digital Economy Scientific Electronic Journal*, no. 14, pp. 1051–1065, 2026.