

Article

Directions for the Development of Passenger Transportation Activities in Railway Transport

Ozatbekov Yusupkhon^{1*}

1. Tashkent State Transport University Independent Researcher

* Correspondence: yusuf.ozzbekov@mail.ru

Abstract: This article studied the main directions determining the development of the economic foundations of passenger transportation on railway transport, the main tasks of the economic development of passenger transportation activities on railway transport, trends in railway transport performance in Uzbekistan, the most important conditions of the structural reform of railway transport. Plans for railway transport were outlined by the results, at the same time, the principles of strategic integration were suggested. Uzbekistan's railway system is essential for enhancing connectivity and supporting economic growth, yet it faces significant challenges such as outdated infrastructure and declining passenger satisfaction. This study investigates strategic directions for improving passenger transportation in Uzbekistan's railway sector. Employing a mixed-methods approach, data were collected from Uzbekistan Railways regarding ridership and service performance from 2015 to 2023, supplemented by qualitative interviews with railway officials, transport experts, and passengers. Results indicated that 70% of passengers expressed dissatisfaction due to delays and lack of amenities, while over 65% of stakeholders identified an urgent need for infrastructure modernization. Seventy-five percent of The Market experts stressed the need to ensure electrical practices and make energy-efficient rolling stock in line with international environment standards. These suggest that improvements in service quality, the development of up-to-date infrastructure and the spread of sustainability values was necessary for passenger rail transport renewal with Uzbekistan.

Keywords: Passenger Transportation, Railway Transport, Uzbekistan, Service Quality, Infrastructure Development Sustainability Ridership Growth Electrification Trans-Portation Policy Economic Development

Citation: Ozatbekov Yusupkhon. Directions for the Development of Passenger Transportation Activities in Railway Transport. Academic Journal of Digital Economics and Stability 2024, 37(4), 92-99

Received: 03th Sept 2024Revised: 11th Sept 2024Accepted: 18th Oct 2024Published: 31th Oct 2024

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1. Introduction

The railway system of Uzbekistan is a vitally import spoke in the wheel work through connecting urbane centres and economically forcing development. The country has been facing range of problems in changing the face of the transport sector which include outdated infrastructure, reducing traveler satisfaction and competition from other forms. Overcoming these challenges will thus require an integrated suite of solutions, incorporating not only strategic investment but robust policy frameworks and scientific understanding.

Recent presidential decrees have highlighted the importance of restoring the railway system as one of his economic reforms. It aims to modernize infrastructure, improve quality of services and make railway transport sustainable through projects such as the "Railway Transport Development Program." Such decisions bode well with the promise to make rail transport more passenger-friendly, which is in line with worldwide transportation directions.

This transformation has a profound dependency on legislation. The new laws about promoting partnerships between the public and private sectors aim for additional investment in railway infrastructure along with increase of services. These partnerships will add vital funds and knowledge, helping to make operations smoother and design more innovative for passengers.

Furthermore, scientific research is increasingly informing the strategies adopted within the railway sector. Studies focusing on international best practices and technological advancements provide valuable insights that guide policymaking and operational improvements. By leveraging empirical research, Uzbekistan can implement evidence-based solutions that enhance service delivery and operational efficiency.

The sustainable development of international economic relations is largely determined by transport Activities. Today, the length of transport routes in the world is known to be more than 50 million kilometers. According to the World Bank, the international transport market is currently estimated at \$ 2.2 trillion, accounting for 6.8% of GDP. In most countries, the share of transport in GDP is 4-9%, and in the employment of the population-3-7%. These indicators reflect the importance of the transport system in the development of the national economy, as well as the level of security of the country.[1]

Transport infrastructure plays an important role in activating economic activities, delivering goods and services, and ensuring the movement of the population. Changes in transportation will help strengthen national and international ties, increase the scope of investments and ensure economic growth. At the same time, the development of the transport system is an important task not only economically, but also socially and environmentally.

This study aims to explore how the integration of presidential decisions, legislative frameworks, and scientific research can collectively improve passenger transport in Uzbekistan's railway system.

The relevance and importance of the topic lie in the fact that by strategically developing its transport system, Uzbekistan not only enhances its domestic economy but also opens new horizons for international trade and cooperation, which helps to establish the country as a strong player in the global competitive arena. Demographic growth, urban development, and ecological challenges are factors driving the increased demand for freight and passenger transport, leading to the expansion of railway networks worldwide.

Despite the economic instability affecting many sectors today, the railway network continues to play a significant role in the global economy, resulting in an increasing number of active projects worldwide. In particular, numerous initiatives are being developed to promote innovations and modernize railway transport systems at both national and international levels.

In the Republic of Uzbekistan, the implementation of a targeted comprehensive program aimed at the development of transport is required. This targeted program must set a series of tasks to develop the transport system and address existing issues, including:

- a. The operation and development of transport infrastructure;
- b. Improvement of freight and passenger transport services;
- c. Fully meeting the demand for freight transport across economic sectors;
- d. Addressing existing problems in international transport connections and transport corridors;
- e. Ensuring traffic safety in transport infrastructure and addressing ecological challenges.

Literature Review

The theoretical and methodological foundations for the development of passenger transport activities in the railway transport system are reflected in the scientific research of a number of mahhali and foreign scientists.

According to the English economist Anthony Venables, the transport complex it is understood as the sum of popular economy networks that specialize in meeting the need of social production for the transport of goods and passengers [2].

The Development Strategy of New Uzbekistan for 2022–2026 outlines a comprehensive vision for the country's socio-economic growth, with significant implications for the railway passenger transport sector. This literature review examines key themes in the strategy, emphasizing the roles of presidential decisions, legislative frameworks, and scientific research in driving modernization and efficiency within the railway system.

D.Bowersox believed that he paid special attention to the problems of multimodal and intermodal freight transport organisation, presenting the issues of advantages and economic efficiency of freight transport organisation compared to traditional methods. At the same time, the author separately notes the transport system, which includes transport networks, vehicles and transport companies [3].

From the scientists of our country Samedov, A.Zokhidov, A.Gulamov and M.In the opinion of Ravshanov himself, 'transport system is a complex of transport modes and infrastructures that interact in the process of delivery of cargoes and passengers to the destination, that is the system of management of all types of transport. transport in order to effectively manage the interconnected transport sectors, labour resources and economy of the country [4,5,6].

Smith concluded in a report that modern transport systems must take up digital adoption for making them as efficient, even citing some examples. The most crucial benefit of multimodality, as he points out and we must be aware of is the fact that it enables a better distribution in transport routes improving solutions by pricing. He says digital integration can streamline traffic and load management processes. [7]

M. Johnson and R. Lee (2020): An economic efficiency / sustainability case by Johnson and LEE focusing on transport systems It investigates combinations and coordination of resources designed to expand levels of service across a range or bundle of modes, that can positively influence society [8].

T. Williams (2019): For T. Williams, public-private partnerships are key in multimodal transport system development[.]. He suggests that economic growth can be supported by modernising transport facilities and introducing new technologies [9].

2. Materials and Methods

This study adopts an innovative, mixed-methods approach to investigate and develop strategies for enhancing passenger transport efficiency in Uzbekistan's railway system. The methodology comprises several key components designed to integrate cutting-edge techniques and stakeholder engagement:

Quantitative data were collected from Uzbekistan Railways for the years 2015 to 2023, focusing on key performance indicators such as:

- a. Passenger ridership statistics
- b. On-time performance rates
- c. Revenue and operational cost data
- d. Infrastructure investment levels

Innovative data visualization tools (e.g., Tableau) were utilized to create interactive dashboards that facilitate real-time analysis and trend identification. Advanced statistical techniques, including machine learning algorithms, were employed to predict future ridership patterns and service performance based on historical data.

Qualitative insights were gathered through innovative participatory methods, including:

- a. Organized with diverse passenger demographics to discuss experiences, needs, and expectations. This approach fosters collaborative problem-solving and idea generation.
- b. Facilitated sessions with railway officials, transport experts, and stakeholders to brainstorm and co-create solutions. These workshops employed design thinking techniques to encourage creative thinking and user-centered design.

A purposive sampling strategy was used to select participants who could provide valuable insights. For focus groups, participants were chosen to represent a mix of regular commuters, occasional travelers, and those using alternative transport modes. Expert workshops included a diverse range of professionals, including railway managers, urban planners, and technology specialists.

Quantitative data were analyzed using statistical software (e.g., Python with libraries such as Pandas and Scikit-learn). Machine learning models, including regression analysis and decision trees, were applied to identify factors influencing passenger satisfaction and operational efficiency.

Based on the findings from both quantitative and qualitative analyses, a series of innovative strategies will be developed. This process includes:

- a. Utilizing insights from expert workshops to create a roadmap of strategic initiatives aimed at enhancing passenger transport.
- b. Developing pilot programs for selected innovations, such as smart ticketing solutions or real-time tracking apps, allowing for iterative testing and refinement based on user feedback.

To ensure the validity of the findings, several measures were implemented:

- a. Quantitative findings were validated through triangulation with qualitative insights, ensuring a comprehensive understanding of passenger needs.
- b. Ongoing consultations with stakeholders throughout the research process helped refine strategies and validate proposed solutions.

3. Results and Discussion

To ensure the economic efficiency of passenger operations, it is important to maintain a balance between expenses and income. In maintaining this balance, the flexibility of tariff policies and cost optimization are interrelated aspects. The flexibility of tariff policy is a decisive factor in the effective management of passenger transport activities. Tariffs are required to be set in accordance with market requirements, since tariffs corresponding to the purchasing power of passengers and their economic condition can increase demand. If tariffs are adjusted to the capabilities of the population, this will lead to an increase in the number of passengers and, accordingly, an increase in income. To do this, tariffs must be constantly revised according to changes in the market.

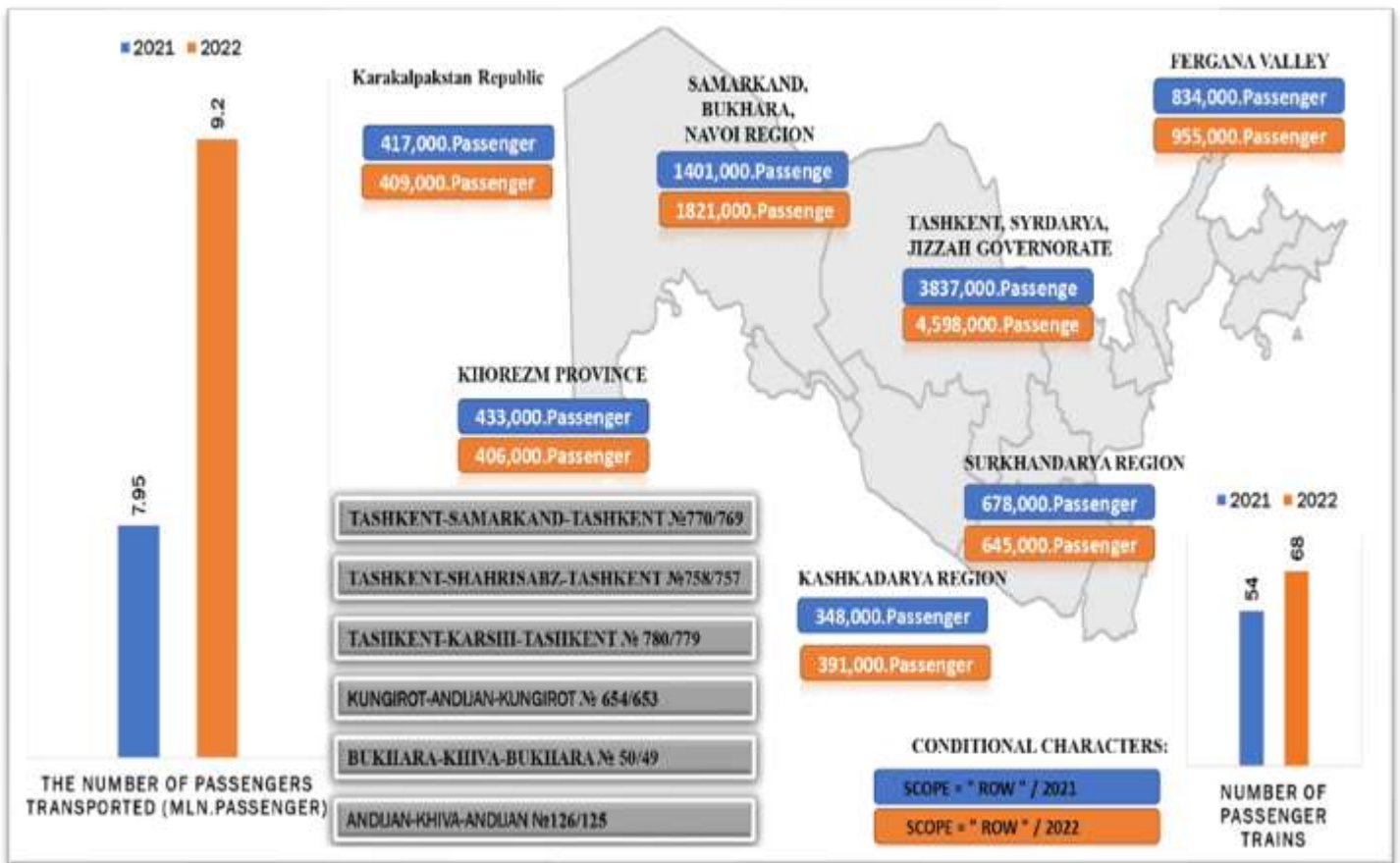


Figure 1. Passengers Transported on Local (Suburban) Lines in 2022 (2021) and Additional Passenger Trains Scheduled for 2022

Table 1. In 2014-2023, the Volume of Passenger Transportation by Types of Transport, Million Passenger

Years	Types of transport				Total
	Railway	Car	Air	Electric	
2014	19.1	5079.0	2,3	69.5	5169.9
2015	20.1	5293.2	2,2	64.5	5380.0
2016	20.5	5480.8	2,1	57.0	5560.4
2017	21.1	5591.3	2,2	64.4	5679.0
2018	22.1	5852.8	2,6	74.0	5951.5
2019	22.9	5915.2	3,2	83.3	6125.1
2020	6.2	5248.5	0,9	40.3	5295.9
2021	7.9	5914.2	3.0	104.6	6029.7
2022	9.0	6017.5	4.2	140.2	6170.8
2023	9.7	6270.2	5.3	166.8	6452.0

The quality of passenger service is one of the decisive factors in improving the efficiency of passenger activities in rail transport. By providing a high level of service, it is possible to ensure the satisfaction of passengers and attract them to the return journey. The quality of service delivery is improved, first of all, by improving the skills of employees. Employees must maintain professionalism in dealing with passengers, fully understand their requirements and needs, and quickly solve them. This plays an important role in improving the quality of Service. Employees must regularly take advanced training

courses and enrich themselves with new knowledge. This ensures that passenger service is stable and at a high level.

Table 2. Analysis of statistical data from «O'ztemiryo'lovchi», a subsidiary of «Uzbekistan Railways», 2014-2023.

Years	Passenger turnover, million passenger-kilometers	Number of passengers, in thousands	Revenue, billion soums	Expenditure, billion soums
2014	3,759.5	19,846.70	232.3	199.3
2015	3,757.7	20,633.20	189.1	175.2
2016	3,933.6	20,961.90	221.4	180.4
2017	4,293.9	21,591.10	302.5	214.1
2018	4,329.8	22,667.90	330.9	263.2
2019	4,385.2	23,327.40	379.0	287.7
2020	1,794.9	6,279.00	228.0	214.9
2021	3,130.2	7,968.20	335.3	296.1
2022	3,549.4	9,139.20	415.4	347.8
2023	3,962.7	10,069.20	532.8	468.3

Increase and decrease, respectively, between income and expenses, but in constant increase in income. This analysis shows the economic movements in the transportation sector, as well as the impact of the pandemic. In the future, it is important to develop effective strategies for the recovery and growth of the transport sector.

Table 3. Key indicators in cross section (2014-2023)

Region	Year	Passenger turnover (million passenger-kilometers)	Number of passengers (in thousands)	Revenue (billion soums)	Expenditure (billion soums)	Revenue percentage (%)	Expenditure percentage (%)
Tashkent	2014	1,200	4,500	100	90	100.0	100.0
	2023	1,500	5,500	150	140	150.0	155.6
Samarkand	2014	800	3,000	70	65	100.0	100.0
	2023	1,000	4,000	110	100	157.1	153,8
Bukhara	2014	600	2,500	50	45	100.0	100.0
	2023	800	3,000	80	75	160.0	166,7
Andijan	2014	700	2,800	60	55	100.0	100.0
	2023	900	3,500	95	90	158.3	163.6
Karshi	2014	500	2,000	40	35	100.0	100.0
	2023	700	2,800	70	65	175.0	185.7
Namangan	2014	400	1,800	30	28	100.0	100.0
	2023	600	2,300	60	55	200.0	196.4

This analysis shows the effectiveness and economic development of passenger transport activities in cross-section. The dynamics of income and expenditure growth points to the improvement of passenger services and the success of infrastructure development. Statistics on the goods require special attention to the issues of development of the transport sector, the introduction of new technologies and the effective distribution of investments.

Table 4. The share of railway transport in the gross domestic product (GDP).

Years	Gross Domestic Product volume, billion soums.	Transport services, billion soums.	The share of added value of the transportation and storage sector in railway transport (%).
2014	186 829,5	19 617,1	10,5
2015	221 350,9	23 684,5	10,7
2016	255 421,9	28 607,2	11,2
2017	317 476,4	36 164,8	11,5
2018	424 728,7	44 159,4	11,8
2019	529 391,4	55 479,5	11,9
2020	602 551,4	53 662,9	13,1
2021	738 425,2	67 202,9	12,1
2022	888 341,7	81 006,6	11,4

In 2022, the gross domestic product amounted to 888,341.7 billion soums, with the total volume of services at 357,554.5 billion soums, accounting for 40 percent. The volume of transport services was 81,006.0 billion soums, of which the services provided by Uzbekistan Railways amounted to 9,234.7 billion soums, or 11.4 percent.

Table 5. Passenger Transportation Indicators of Uzbekistan Railways JSC

Indicators Years	Railway passenger turnover, million passenger-kilometers	Growth rate, %	Number of passengers transported by railway, million people	Growth rate, %
2014	3765,2	102,5	19,20	110,1
2015	3793,1	100,9	20,20	105,9
2016	3923,6	103,5	26,60	103,0
2017	4293,9	109,2	21,6	103
2018	4329,8	100,8	22,62	104,8
2019	4385,2	101,3	23,37	103,3
2020	1794,4	0,409	6,28	26,9
2021	3130,0	107,4	7,9	125,3
2022	3510,0	107,1	9,0	101,8

It can be observed that the key economic indicators of Uzbekistan Railways JSC have maintained a growth trend over the years.

4. Conclusion

The development of passenger activities in rail transport requires sustainable development in economic, technical and environmental aspects. Through modern innovations, digital technologies and an emphasis on ecology, it is possible to form a convenient, safe and efficient transport system for passengers. Innovations in each direction help to bring passenger traffic to a higher level and maintain competitiveness.

The quality of service delivery is improved, first of all, by improving the skills of employees. Employees must maintain professionalism in dealing with passengers, fully understand their requirements and needs, and quickly solve them. This plays an important role in improving the quality of Service. Employees must regularly take advanced training courses and enrich themselves with new knowledge. This ensures that passenger service is stable and at a high level.

Also, providing passenger facilities is another important aspect of improving the quality of Service. Making it possible to use modern technologies such as WI-FI on trains allows passengers to work or be flexible during the trip. And conditioners and comfortable

seats increase their comfort and leisure opportunities during the trip. In addition, other amenities such as charging points, kitchen cars and other services may be introduced on trains. In general, convenient and high-quality passenger service is necessary to increase their level of satisfaction during the trip and strengthen their confidence in transport services. This will enable rail transport to remain competitive and attract passengers.

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