**BALTIC JOURNAL OF LAW & POLITICS**
A Journal of Vytautas Magnus University
VOLUME 16, NUMBER 03 (2023)
ISSN 2029-0454

Cit.: *Baltic Journal of Law & Politics* 16:03(2023):3657-3662
DOI: 10.2478/bjlp-2023-00000279

# Correlation-Regression Analysis Of The Main Use Indicators Of Railway Transport

**Khatamov O.K.[1*],**
**Shakarova D.R[2],**

[1]*Head of Department of Termiz State University, Doctor of Economics, Professor.
[2]A doctoral student of Termiz State University.

***Corresponding Author:-** Khatamov O.K.
[*]Head of Department of Termiz State University, Doctor of Economics, Professor.

**Abstract:** In this article, the forecast values of the indicator of passenger transportation by railway transport of Surkhondarya region until 2026 were determined using the ARMA model.

**Keywords:** Transport complex, railway transport, passenger transport, ARIMA, ARMA, AR, autoregression, autocorrelation, model.

**Introduction.** The country's transport complex, including railway transport, is a connecting and system-building element of the development of the national economy and social spheres.
The state views transport as a means of achieving economic, social and geopolitical goals, ensuring national security, the integrity and stability of the country's economy and the transport complex.

The main tasks of railway transport are as follows: fully meeting the demand for cargo transportation with high-quality operation and a certain level of safety, proportional development of the infrastructure, increasing the weight of trains, that is, their load-carrying capacity to provide the projected volume of traffic at the expense of reducing the need for vehicles by increasing.

Analysis of literature on the topic. Many well-known domestic and foreign scientists were involved in the organization of rational cargo transportation systems and formulation of tasks in various directions. Including S.R. Abduazizov, G.A. Kudbiyeva, I.A. Abduraimov, O.J. Ibrahimova [1], M.V. Balashkina [2], V.A. Biloxa [3], P.A. Ivanov [4], A.S. Kolyshev [6,7], D.A. Macheret [8], D.M. Rakhimjonov [9], Z.N. Rakhmatov, Sh.V. Ergashev [10], V.I. Soldatkin [11], N.G. Smekhova [12], S.V. Rachek [13,14] A.I. Shelokov, I.N. Shapkin, H.Sh. Zyabirov [15] paid attention to issues such as the efficient use of railway transport, its economy and the organization of transport processes in general, and the formation of the theory of cargo systems. For example, S.R. Abduazizov, G.A. Kudbiyeva, I.A. Abduraimov, O.J Ibrahimova [1] development prospects in the railway sector, railway

studied and reviewed the trends in the development of the theory of quality in transport. The impact of the efficiency and quality of the transportation process on production and the living conditions of the population was studied. They made suggestions on improving the economic efficiency of the production and economic activity of the structural divisions of railway transport. Also, Z.N. Rakhmatov, Sh.V. Ergashev [10] considered the specific features of using blockchain technologies in the process of cargo transportation in railway transport. This technology provides an opportunity to manage the database during the shipping process. At the same time, in blockchain technology, special attention is paid to the security of data, as well as to the reduction of logistics costs. This makes it possible to optimize the shipping process.

**Analysis and results.** As we know, the state railway considers transport as a means of achieving economic, social and geopolitical goals, ensuring national security, the integrity and stability of the country's economy and the transport complex. Solving these issues largely depends on the quality and efficiency of locomotive complex production units - traction rolling stock. The locomotive complex remains one of the main connecting elements in the country's cargo transportation system. The effectiveness of the work largely depends on how the locomotive complex and its production units work, and their stability and efficiency as a whole depends on JSC "Uzbekiston temir yollari" and all its divisions.

JSC "Uzbekistan Railways" was established on November 7, 1994 at the base of the former Central Asian Railways located in the territory of the Republic of Uzbekistan. The total length of railways is 6950 km, 2500 km of which have been electrified. Annual cargo turnover is 90% of the total cargo turnover of all types of transport.

The main activities of the society are as follows:
- distribution and delivery of goods by rail;
- adjustment and maintenance of railway wagons;
- passenger, tourist transportation;
- maintenance, renewal of the locomotive and wagon fleet.

The priority direction for the society is the implementation of the following investment projects:
- strengthening communication channels using optical fiber lines;
- purchase of new rolling stock (electric locomotives and wagons) and modernization of existing ones;
- construction of new railway lines;
- electrification of railways;
- implementation of road capital repair projects, organization of production of road surface elements at community factories, etc.

Specific measures are being implemented to increase the capacity of the main transport routes, to modernize the moving and carrying parts of railway transport, which accounts for the largest share of foreign trade cargo transportation. During the pandemic, about 5,600 closed wagons, 1,280 refrigerated and special wagons were involved in international cargo transportation.

At the same time, according to preliminary estimates, the railway industry will need an additional 7,000 freight cars in the next 5 years. In this regard, it is planned to launch the activities of private logistics operators with wagons and containers. From now on, the state will only regulate issues related to railway infrastructure and locomotive services, the supply of freight cars will be carried out on the basis of market principles. In this regard, the privileges granted to private entrepreneurs in the import of railway wagons have been extended until January 1, 2025.

Uzbekistan is a country located inside the continent, where the share of transport costs in the value of export contracts is high. In order to successfully compete in world markets, it is necessary to reduce the weight of export cargo, increase the share of high-tech products, and significantly expand the types of finished and deeply processed products. At the same time, we need to strengthen our positions in traditional markets located within a radius of 2-3 thousand km.

The steady annual growth of freight volume and the resulting increase in the number of missed trains make it a task to use new methods of analysis based on forecasting for the most efficient and cost-effective organization of the movement of trains with increased weight and length of freight transportation. eating It is necessary to develop a mathematical model of freight turnover forecasting based on operational indicators both for a specific railway section and for the entire network. In this study, correlation and regression analysis were used to build a mathematical model.
Correlation-regression analysis of economic processes consists of the following stages:
1. Define arguments and preselection of conditional variables.
2. Determination of the density and form of connection between several factors.

3. Modeling of the presented economic process and analysis of the obtained model.
4. Application of the final results to improve the planning and forecasting of the result indicator.
In this case, the following key questions should be answered:
- is there a connection between the factors;
- what is the bond density;
- whether the obtained model is correct or not [5].

When developing a correct economic-mathematical model, it is necessary to correctly and rationally determine its factor space, that is, determine the factors that can be regulated by the company's management, as well as uncontrollable factors that are difficult to control quickly .
The indicator of passenger transportation by railway in Surkhandarya region showed growth in 2012-2018. In 2019-2020, it entered a downward trend. One of the main reasons for this is the COVID-19 pandemic. The indicator went back to growth in 2021 (Fig. 1).

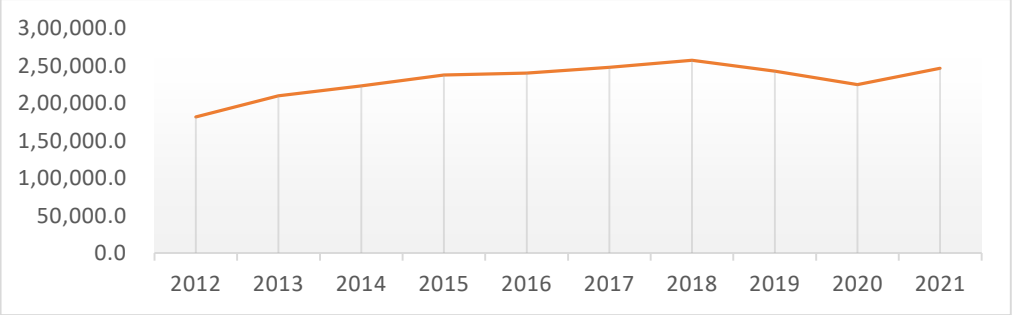


**Figure 1.** Indicator of passenger transportation by road of Surkhandarya region in 2012-2021

Gretl software was used to model the indicator of passenger transport by railway in Surkhandarya region. First, the stationarity of the time series was checked (Table 1).

**Table 1:-** ADF test results

| |
|---|
| Extended Dickey-Fuller test for y |
| test. starting from 3 lags, AIC criterion |
| sample size 6 |
| unit root null hypothesis: a = 1 |
| test without constant |
| including 3 lag(s) for (1-L)y |
| model: (1-L)y = (a-1)*y(-1) + ... + e |
| score for (a - 1): -0.0177501 |
| test statistic: tau_nc(1) = -0.367922 |
| asympt. p-value 0.5524 |
| coefficient 1st order autocorrelations for e: -0.149 |
| difference lag: F(3, 2) = 1.345 [0.4534] |
| constant test |
| including 2 lag(s) for (1-L)y |
| model: (1-L)y = b0 + (a-1)*y(-1) + ... + e |
| score for (a - 1): -1.1182 |
| test statistic: tau_c(1) = -3.49755 |
| asympt. p-value 0.008078 коэф. автокорреляции 1-го порядка для e: -0,095 |
| лаг для разностей: F(2, 3) = 2,262 [0,2518] |

It was compiled based on the data of the Surkhandarya Regional Statistics Department.
Author development

From Table 1, we can see that the p-value of the univariate ADF test is 0.5524, which is greater than the 0.05 level of significance. The p-value of the univariate ADF test is equal to 0.008078. The results of the univariate ADF test show that the time series is stationary. It is known that if the time series is stationary, AR, ARMA, ARIMA models can be created [16]. We determine the order of the model in the correlogram in the figure below (Figure 2).

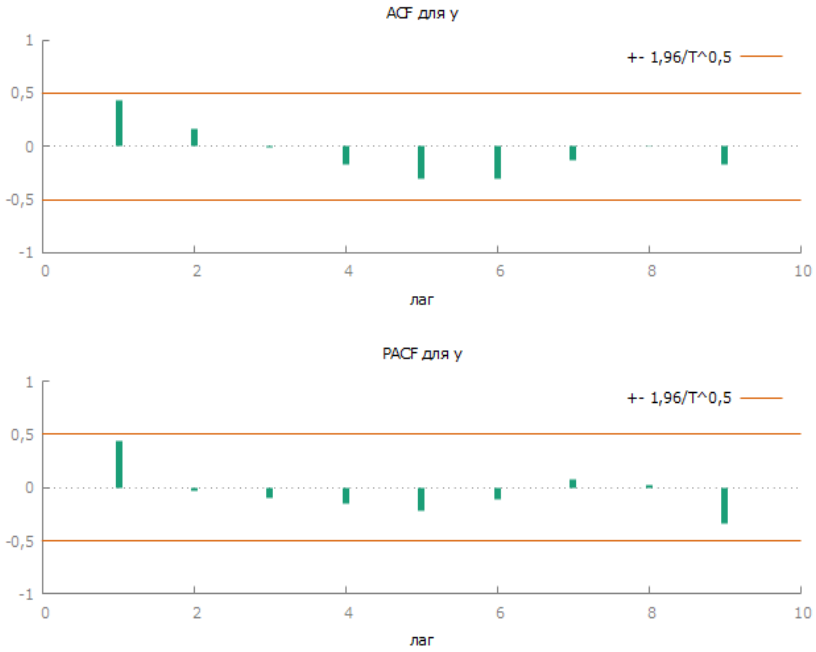


**Figure 2.** Time series correlogram

In Figure 2, ACF is decreasing, while PACF has a break after lag 1. This means that the order of the autoregression model is 1 and the order of the moving average is 0.
The results of model parameter estimation are given in Table 2 (Table 2).
Table 2

**Model parameter estimation results**

Model 1: ARMA, 2012-2021 observations used (T = 10)
Dependent variable: y
Standard errors calculated from the Hessian

| | | | | | |
|---|---|---|---|---|---|
| *p-value* | | | | | |
| const | 223842 | 19166,5 | 11,68 | <0,0001 | *** |
| phi_1 | 0,796988 | 0,220895 | 3,608 | 0,0003 | *** |

| | | | |
|---|---|---|---|
| Average hang change | 231350,9 | Art. off stuck change | 22362,09 |
| Secondary innovation | 5034,380 | Art. off innovation | 15684,83 |
| R-square | 0,521248 | Correct. R-square | 0,521248 |
| Log. credibility | −111,2981 | Crete. Akaike | 228,5961 |
| Crete. Schwartz | 229,5039 | Crete. Hennana-Quinna | 227,6003 |

| | *Real part* | *imaginary part* | *Module* | *Frequency* |
|---|---|---|---|---|
| AR | | | | |
| Root 1 | 1,2547 | 0,0000 | 1,2547 | 0,0000 |

From Table 2, the general view of the ARMA(1,0) model is as follows:
y_t=223842+0.796988·y_(t-1) (1)
We can see in Table 2 that the parameters of the model are significant. It was also known that MAPE=6.4837. In addition, it was found that the residuals obey the normal distribution law and there is no autocorrelation in the residuals.
Using the model (1), the forecast values of the indicator of passenger transportation by railway of Surkhandarya region until 2026 were determined (Table 3).

**Table 3:-** Surkhandarya region forecast values of passenger transportation by railway until 2026

| For 95% confidence intervals, z(0.025) = 1.96 | | | | |
|---|---|---|---|---|
| Obs. | y | forecasting | Art. error | 95% confidence interval |
| 2012 | 181643, | 207131, | | |
| 2013 | 209922, | 190210, | | |
| 2014 | 223244, | 212748, | | |
| 2015 | 237704, | 223365, | | |
| 2016 | 240467, | 234890, | | |
| 2017 | 248011, | 237092, | | |
| 2018 | 257466, | 243104, | | |
| 2019 | 243143, | 250640, | | |
| 2020 | 224994, | 239224, | | |
| 2021 | 246916, | 224761, | | |
| 2022 | | 242231, | 15684,8 | (211490,, 272973,) |
| 2023 | | 238498, | 20056,9 | (199187,, 277809,) |
| 2024 | | 235523, | 22395,0 | (191629,, 279416,) |
| 2025 | | 233152, | 23761,0 | (186581,, 279722,) |
| 2026 | | 231262, | 24589,3 | (183068,, 279456,) |

Table 3 shows that by 2026 it is expected to create 231,262 thousand people. This is 93.6601 percent compared to the figures of the current period. In other words, it shows that it is less than 6.3399 percent.

Conclusions and suggestions. In 2026, the indicator of passenger transportation by railway of Surkhandarya region will be 231,262 thousand people, and it can be observed that it will decrease by 6.34% compared to the current indicators.
Thus, based on the results of the above analysis, in order to further increase the indicators of the use of railway transport, it would be highly appropriate to define the following main directions:
- creation of a competitive environment in the field of railway cargo transportation by creating conditions for the establishment of private companies for the transportation of goods in railway transport, which have their own locomotives and wagons;
- to increase the share of electrified railways to 55% by 2030. For this, it is necessary to provide electric power to 168 km of railway every year, and the amount of investments is 5.34 billion. it should amount to one dollar.
- 1.2 billion to update locomotives and wagons with modern energy savers until 2030. dollar investment is required;
- in order to reduce the transport costs of cargo transported in containers by 10%, it is necessary to increase container transportation by 25-30%.

## References.

Abduazizov S.R., Kudbiyeva G.A., Abduraimov I.A., Ibrahimova O.J. The importance of railway transport in the economy of Uzbekistan. // scientific progress, volume 3, issue 1, 2022, P.1121-1130

Balashkina M. V. Reshenie problemy: povysyat tyajelovesnye train permeability. // Severnaya highway. - 2011.- S. 5.

Biloxa V. A. Povyshat effektivnost perevozok. // Railway transport. – 2011. – No. 5. – S. 20–27.

Ivanov P. A. Tyajelovesnoe dvigenie: opyt, problemy, zadachi. Poetapnogo razvitiya program. // Railway transport. - 2016 – No. 03.

Kleiner, G. B. Ekonometricheskie zavisimosti: principy i metody postroeniya. / G. B. Kleiner, S. A. Smolyak. - Moscow: Nauka, 2000. - 104 p.

Kolyshev A. S. Conceptual approach to the development of methodology for the calculation of the economic effect of labor, business resources and conditions tyajelovesnogo dvigeniya. // Vestnik Evrazyskoi nauki. – 2019.-№3.

Kolyshev, A. S. Financial and economic aspects of exploitation tyajelovesnykh prezdov v Rossii. // Financial economy. – 2018. – No. 5 (ch. 6). - S. 688–690.

Macheret D. A. General technical and economic course is indicated // Moscow: RUTH MIIT. - 2017. - 364 p.

Rakhimjanov D. M. Tyajelovesnoe dvigenie: opyt, problemy, zadachi. Krupnyy reserve osvoeniya rastushchego gruzopotoka. //Journal "Railway Transport" - 2016, No. 4. - c. 4-7.

Rakhmatov Z.N., Ergashev Sh.V. The importance of blockchain technology in increasing the efficiency of the cargo transportation process at Uzbekistan temir yollari JSC. // Economy and Education, 2023 No. 1, pp. 499-504.

Soldatkin V.I. i dr. Methodology upravleniya proizvoditelnostyu lokomotivov po ekonomicheskim kriteriyam. Samara: SamGAPS.- 2006.- 122 p.

Smehova N.G. Izderzhki i sebestoimost zheletnodorojnyx perevozok: flying. posobie. - Moscow, 2015. - 472 p.

Rachek S.V., Kolesnikov I.N. Global konkurensiya kak factor povyshenia roli transporta v sotsialno-ekonomicheskom razvitii obshchestva // Upravlenie ekonomicheskimi sistemami. – 2012. – No. 12 (48).

Rachek S.V. Makroekonomicheskie aspekti razvitiya gruzoperevozok // Science and business: puti razvitiya. – 2016. – No. 10(64).- S. 72–76.

Shchelokov AI, Shapkin IN, Zyabirov Kh. - Moscow: ISPI RAN, 2005. - 616 p.

Turaev B.E., Khatamov O.Q. Forecasting the volume of construction works using the ARIMA model (in the example of Surkhandarya region) / "UzBridge" electronic magazine, 2021, issue 1, pages 74-84