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Article

Econometric Assessment of The Impact of Mining Industry Development on The Regional Gross Domestic Product of Surkhandarya Region

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Abstract: This article provides a statistical and econometric analysis of the development dynamics of the mining and quarrying industry in Surkhandarya Region and its relationship with gross regional product (GRP). The study examines changes in production volume and the industry's share in GRP based on data for 2010–2025. A linear regression model based on natural logarithmic transformations was estimated using the ordinary least squares method. The results indicate a strong statistical relationship between mining industry output and GRP. The study also highlights the importance of accounting for common trends in time series and the possibility of autocorrelation when interpreting the model results.

Keywords: Surkhandarya Region, Mining Industry, Quarrying, Gross Regional Product, Statistical Analysis, Econometric Assessment, Regression Model, Elasticity Coefficient

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1. Introduction

The efficient use of natural resources, expansion of industrial production, and identification of the factors influencing regional economic growth are among the key priorities for the economic development of Surkhandarya Region. In particular, examining the production volume of the mining and quarrying industry and its share in gross regional product (GRP) makes it possible to assess the role of this sector in the regional economy[1].

The increase in mining industry output in Surkhandarya Region from UZS 26.2 billion in 2010 to UZS 668.0 billion in 2025 highlights the need for an in-depth analysis of the sector's development dynamics. However, growth in production volume does not automatically demonstrate a relationship with GRP. Statistical and econometric methods are therefore required to quantify this relationship.

The aim of this study is to econometrically assess the statistical relationship between the output of the mining and quarrying industry and GRP in Surkhandarya Region and to provide a scientific interpretation of the results. The study employs statistical comparison, dynamic analysis, and regression modelling based on the ordinary least squares (OLS) method[2].

Regional economic development, the dynamics of gross regional product (GRP), and the assessment of factors influencing it through statistical and econometric methods

constitute important areas of research in regional economics. Studies in this field aim to identify the structure of regional production, the share of individual industries in GRP, and the relationships between key economic growth indicators.

In his study entitled "Econometric Modeling of Factors Affecting Regional Gross Product," D.I. Ismoilov examines the econometric modeling of factors affecting regional gross product. The study is closely related to the quantitative assessment of regional economic growth, the identification of relationships between economic indicators, and econometric analysis based on time-series data. This approach provides a methodological basis for assessing the relationship between mining industry output and GRP in Surkhandarya Region using a regression model [3].

In his article entitled "Trends in the Sustainable Development of the Economic System," D.I. Ismoilov explores issues related to the sustainable development of the economic system and its underlying trends. The study of economic development trends is important for identifying structural changes in the regional economy, assessing the dynamics of production indicators, and analyzing the factors contributing to economic stability [4].

In his article entitled "Correlation and Regression Analysis of the Share of Construction Works in the Gross Regional Product of Surkhandarya Region," B.E. Turaev examines the share of construction works in the region's GRP using correlation and regression analysis. The relevance of this study to the present research lies in its quantitative assessment of the relationship between a specific type of economic activity and GRP in Surkhandarya Region. A similar methodological approach can be applied to identify the statistical relationship between mining industry output and the region's GRP [5].

In his study entitled "Statistical Assessment of the Efficiency of Fruit and Vegetable Production," O.A. Juraev investigates the efficiency of fruit and vegetable production, an important segment of agriculture, using statistical methods. This study highlights the importance of statistical analysis in evaluating regional production processes. However, rather than directly examining the relationship between the mining industry and GRP, the study is relevant as a methodological source on the statistical assessment of sectoral production [6].

In his conference paper entitled "Statistical Analysis of Gross Regional Product in Surkhandarya Region for 2010–2024," D.I. Ismoilov examines the long-term dynamics of the region's GRP using statistical methods. The study focuses on assessing changes in GRP over time and identifying trends in regional economic development. This line of research provides a basis for interpreting statistical data and analyzing regional economic changes when investigating the relationship between mining industry output and GRP [7].

2. Materials and Method

Industrial sectors, particularly those based on natural resources, play an important role in ensuring the sustainable development of the economy of Surkhandarya Region. The efficient utilization of the region's mineral and raw material resources, the expansion of industrial production, and the identification of the main drivers of economic growth necessitate a statistical and econometric investigation of the regional economy. In this context, particular attention should be paid to the mining and quarrying industry, which constitutes an important component of the region's industrial sector. This industry is directly associated with Surkhandarya Region's natural resource potential, and its development dynamics may influence overall industrial output and regional economic growth.[8]

According to official data from the Regional Statistics Department, between 2010 and 2025, the output of the mining and quarrying industry increased from UZS 26.2 billion to UZS 668.0 billion. This indicates that the industry's output grew by approximately 25.5

times, with an estimated compound annual growth rate (CAGR) of around 24.1%. These dynamics highlight the need for an in-depth analysis of the industry's development trends, the economic factors influencing it, and its role in the regional economy. From this perspective, the statistical analysis of development indicators in the mining and quarrying industry, the identification of their changing trends, and the assessment of their relationship with regional economic growth constitute important components of the present study.[9]

3. Results and Discussion

The The data presented in Table 1 indicate that the output of the mining and quarrying industry in Surkhandarya Region increased significantly between 2010 and 2025. In particular, the industry's output amounted to UZS 26.2 billion in 2010, rising to UZS 668.0 billion by 2025. As a result, production volume increased approximately 25.5-fold. This demonstrates the expansion of mining activities and the growing development of the region's mineral and raw material resources.

Table 1.

Mining and Quarrying Output and Its Share in Gross Regional Product (GRP) of Surkhandarya Region (2010–2025)[10]

	46,2		
	21,8		
	68,0		

The development of the industry did not follow a uniform growth pattern throughout the period under review. Between 2010 and 2015, output increased from UZS 26.2 billion to UZS 75.6 billion, reaching UZS 122.2 billion in 2016. Growth continued in 2018–2019, when production amounted to UZS 175.0 billion and UZS 240.3 billion, respectively. However, in 2020, the indicator declined to UZS 212.5 billion. Although the upward trend subsequently resumed, output decreased to UZS 220.0 billion in 2022 compared with the previous year. The industry recorded UZS 521.8 billion in output in 2024 and UZS 668.0 billion in 2025, indicating a substantial acceleration in its development during the final years of the period.

To assess the role of the mining and quarrying industry in the regional economy more comprehensively, its share in gross regional product (GRP) was also analyzed. The table shows that the industry accounted for 0.77% of GRP in 2010. This share reached 1.00% in 2016, stood at 0.94% in 2019, and amounted to 0.96% in 2024. By 2025, it had increased to 1.07%. Thus, alongside the long-term growth in the industry's output, fluctuations were observed in its relative contribution to the structure of the regional economy.[11]

A comparison of these indicators shows that the growth in mining industry output did not follow the same rate as the growth in GRP. Specifically, between 2010 and 2025, mining industry output increased approximately 25.5-fold, whereas GRP grew approximately 18.3-fold based on the values presented in the table. Consequently, the industry's share of GRP increased from 0.77% in 2010 to 1.07% in 2025. However, this change alone does not fully reflect the extent of the mining industry's impact on GRP. A statistical and econometric analysis that takes other economic factors into account is therefore required.

Accordingly, the natural logarithms of both indicators were used to quantitatively assess the relationship between mining industry output and GRP. The logarithmic form makes it possible to estimate the elasticity relationship between the variables. The single-

factor linear regression model constructed using this approach serves to identify the statistical relationship between changes in mining industry output and GRP. The results of the regression model estimated using the ordinary least squares (OLS) method are presented in Table 2.[12]

To assess the impact of mining industry output on regional GRP, a linear regression equation was formulated using the natural logarithms of both indicators, as follows:

$$\ln(YaHM) = \gamma 0 + \gamma 1 \cdot \ln(TogKon) + \varepsilon t \quad \textbf{(1)}$$

The results of the model estimated using the ordinary least squares (OLS) method are presented in Table 2.

Table 2.

Regression Analysis Results for Assessing the Impact of Mining Industry Output on GRP[13]

According to the model results, a very strong relationship (r = 0.978) was identified between the natural logarithm of mining industry output and the natural logarithm of GRP. The elasticity coefficient, γ_1 = 0.896 (t = 17.35; p < 0.0001), is statistically highly significant and indicates that a 1% increase in mining industry output is associated with an average increase of 0.896% in regional GRP. The high F-statistic (F = 301.07; p(F) ≈ 7.3×10^{-11}) confirms the overall statistical significance of the model.

Nevertheless, the high R^2 value should be interpreted with caution, as both time series (GRP and mining industry output) exhibit a common upward trend over the period under investigation, which may give rise to the risk of spurious correlation. The Durbin–Watson statistic is DW = 1.224, indicating a certain degree of positive autocorrelation in the residuals. Therefore, it is more appropriate to interpret this relationship not as a definitive structural conclusion, but rather as evidence that the mining sector is an important driver that tends to move in tandem with regional economic growth.[14]

In future research, it is recommended that this relationship be further examined using the Engle–Granger or Johansen cointegration tests.

As shown by the data in Table 1, the share of the mining industry in GRP declined from 0.77% in 2010 to 0.52% in 2023. However, a recovery trend was observed in 2024–2025, with the share increasing to 0.96–1.07%. On the one hand, this development may be explained by the relatively faster growth of other sectors, such as services and construction. On the other hand, it may be associated with increased investment activity in mining and extraction projects and the commissioning of new mines during the last two years.[15]

4. Conclusion

The research results indicate that the output of the mining and quarrying industry in Surkhandarya Region increased significantly between 2010 and 2025. Specifically, production volume rose from UZS 26.2 billion to UZS 668.0 billion, representing an approximately 25.5-fold increase. The industry's share of gross regional product (GRP) also increased from 0.77% in 2010 to 1.07% in 2025.

The econometric analysis revealed a strong statistical relationship between mining industry output and GRP. The elasticity coefficient of 0.896 in the regression model indicates that a 1% increase in mining industry output is associated with an average increase of 0.896% in GRP. The coefficient of determination (R^2) was 0.9556, indicating that 95.56% of the variation in the logarithmic values of GRP is explained by the relationship captured in the model. However, caution is required when interpreting these results because both time series exhibit a common upward trend and the residuals may be subject to autocorrelation. Further analysis using cointegration tests and multivariate models incorporating additional economic factors would therefore be appropriate.

Overall, regular statistical monitoring of the mining industry's development, the efficient utilization of mineral resources, and a more comprehensive assessment of the relationship between the sector and regional economic growth can contribute to improving the effectiveness of efforts to realize the economic potential of Surkhandarya Region.

REFERENCES

[1] D. I. Ismoilov, "Econometric modeling of factors affecting regional gross product (based on data for 2010–2025)," *American Journal of Economics and Business Management*, pp. 297–302, 2026. [Online]. Available: https://www.globalresearchnetwork.us/index.php/ajebm

[2] D. I. Ismoilov, "Trends in the sustainable development of the economic system," *Tadqiqotlar: International Scientific and Methodological Journal*, no. 77, pt. 1, pp. 36–39, Dec. 24, 2025. [Online]. Available: https://journalss.org/index.php/tad/article/view/12746

[3] B. E. Turaev, "Correlation and regression analysis of the share of construction works in the gross regional product of Surkhandarya region," *Economics and Innovative Technologies*, no. 6, pp. 215–224, Nov.–Dec. 2021. [Online]. Available: https://iqtisodiyot.tsue.uz/sites/default/files/maqolalar/25_Turayev.pdf

[4] O. A. Juraev, "Statistical assessment of the efficiency of fruit and vegetable production," *Bulletin of the Khorezm Mamun Academy*, no. 3/2, pp. 73–79, 2023. [Online]. Available: https://scholar.google.com/citations?view_op=view_citation&hl=ru&user=VsX5l6IAAAAJ&citation_for_view=VsX5l6IAAAAJ:UeHWp8X0CEIC

[5] D. I. Ismoilov, "Statistical analysis of gross regional product in Surkhandarya region for 2010–2024," in *Proc. Republican Scientific and Practical Conf. on Current Issues in the Socio-Economic Development of Regions*, 2025, pp. 372–377.

[6] J. Cust and S. Poelhekke, "The local economic impacts of natural resource extraction," *Annual Review of Resource Economics*, vol. 7, pp. 251–268, 2015, doi: 10.1146/annurev-resource-100814-125106.

[7] M. Ericsson and O. Löf, "Mining's contribution to national economies between 1996 and 2016," *Mineral Economics*, vol. 32, pp. 223–250, 2019, doi: 10.1007/s13563-019-00191-6.

[8] A. K. Sahoo, D. Sahoo, and N. C. Sahu, "Mining export, industrial production and economic growth: A cointegration and causality analysis for India," *Resources Policy*, vol. 42, pp. 27–34, 2014, doi: 10.1016/j.resourpol.2014.09.001.

[9] L. C. Stilwell, R. C. A. Minnitt, T. Monson, and G. Kuhn, "An input–output analysis of the impact of mining on the South African economy," *Resources Policy*, vol. 26, no. 1, pp. 17–30, 2000, doi: 10.1016/S0301-4207(00)00013-1.

[10] R. F. Engle and C. W. J. Granger, "Co-integration and error correction: Representation, estimation, and testing," *Econometrica*, vol. 55, no. 2, pp. 251–276, 1987, doi: 10.2307/1913236.

[11] D. A. Dickey and W. A. Fuller, "Distribution of the estimators for autoregressive time series with a unit root," *Journal of the American Statistical Association*, vol. 74, no. 366, pp. 427–431, 1979, doi: 10.1080/01621459.1979.10482531.

[12] S. Johansen, "Statistical analysis of cointegration vectors," *Journal of Economic Dynamics and Control*, vol. 12, nos. 2–3, pp. 231–254, 1988, doi: 10.1016/0165-1889(88)90041-3.

[13] D. Kwiatkowski, P. C. B. Phillips, P. Schmidt, and Y. Shin, "Testing the null hypothesis of stationarity against the alternative of a unit root," *Journal of Econometrics*, vol. 54, nos. 1–3, pp. 159–178, 1992, doi: 10.1016/0304-4076(92)90104-Y.

[14] S. J. Brown, N. E. Coulson, and R. F. Engle, "Non-cointegration and econometric evaluation of models of regional shift and share," *National Bureau of Economic Research Working Paper*, no. 3291, 1990, doi: 10.3386/w3291.

[15] R. W. Jackson, G. J. D. Hewings, S. Rey, and N. Lozano-Gracia, *Regional Development: Challenges, Methods, and Models*. Regional Research Institute, West Virginia University, 2020. [Online]. Available: https://researchrepository.wvu.edu/rri-web-book/2/