JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS
VOLUME 04, ISSUE 11
MOPNTHLY JOURNALS
ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

FACTORS OF REGIONAL INDUSTRIAL DEVELOPMENT AND THEIR STATISTICAL ASSESSMENT (CASE OF NAVOI REGION)

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Abstract. This article assesses the economic development of industrial enterprises in the Navoi region based on a multifactor statistical analysis. Using official data for 2010–2024, the dynamics of industrial output, employment, investment in fixed capital, and the number of industrial enterprises are analyzed in real terms. Nominal indicators are deflated using price indices, and correlation and regression methods are applied to identify the key drivers of regional industrial growth.

Keywords: multifactor analysis, statistical modeling, industrial development, real economic growth, deflation, investment, industrial output, employment, number of enterprises, correlation, regression model, Navoi region

Multifactor statistical analysis is one of the most effective approaches for assessing the economic development of industrial enterprises. This is because regional industrial growth is shaped not by a single factor, but by the combined influence of investment flows, the level of labor utilization, the number of enterprises and their structural renewal, the expansion of production capacities, and price dynamics [1]. In the case of the Navoi region, the application of a multifactor approach makes it possible, on the one hand, to identify the key drivers of development (such as the volume of real investment), and on the other hand, to reveal interrelationships among indicators and potential information redundancy (multicollinearity), thereby enabling the construction of a well-specified econometric model [2].

The results of statistical analysis make it possible to draw well-grounded conclusions regarding the growth rates of the industrial sector, structural changes, and the efficiency of resource utilization. For instance, an increase in industrial output does not necessarily imply an expansion of real production, as under conditions of high inflation nominal indicators may rise due to price increases. Therefore, the use of constant prices and index systems is scientifically essential. Furthermore, when constructing a multifactor regression model, industrial output is selected as the dependent variable, while the number of employees in industry, investment in fixed capital, and the number of enterprises are included as explanatory variables [3]. The estimated model coefficients allow for the quantitative assessment of factor effects; for example, they indicate how much industrial output may change, on average, when investment increases by 1 billion soums in constant prices.

Table 1.
Key Indicators Characterizing the Industrial Sector of the Navoi Region (2010–2024)

Year	Industrial Output (billion soums)	Industrial Employment (thousand persons)	Investment in Fixed Capital (billion soums)	Number of Industrial Enterprises
2010	4038.5	110.6	89.4	1,049
2011	4865.7	113.1	763.8	1,158
2012	5761.1	110.7	646.5	1,176

2013	7087.3	111.6	608.6	1,297
2014	8238.9	112.5	807.3	1,346
2015	9286.9	113.3	888.3	1,393
2016	10657.9	113.9	1507.1	1,382
2017	13072.9	114.0	2346.7	1,358
2018	22892.4	110.7	8591.9	1,515
2019	44438.1	112.9	13975.7	1,804
2020	65084.9	106.6	11444.5	2,828
2021	73633.5	105.8	10033.1	3,268
2022	84393.7	106.6	11496.9	3,636
2023	101841.9	109.8	19511.3	3,982
2024	145615.0	108.4	28443.6	3,092

Source: Compiled by the author based on data from the National Statistics Committee of the Republic of Uzbekistan [6].

The practical significance of multifactor statistical analysis lies in its ability to support evidence-based managerial decision-making. More specifically, it allows for a scientifically grounded assessment of priority directions in regional industrial policy, such as improving the investment climate, increasing the number of enterprises, or optimizing employment. In addition, regression and correlation results make it possible to develop forecasts, assess risks, and formulate recommendations for the optimal allocation of resources.

In this section, the main indicators characterizing the industrial sector of the Navoi region are examined for the period 2010–2024. Subsequently, these indicators are converted into constant 2024 prices using price indices, and the impact of key factors on economic development is evaluated through a multifactor regression model [4].

Below, the system of key indicators representing the industrial sector of the Navoi region is presented (Table 1), followed by an analysis of their dynamics.

According to the data in Table 1, industrial output in the Navoi region increased sharply in nominal terms over the period 2010–2024. Industrial output rose from 4,038.5 billion soums in 2010 to 145,615.0 billion soums by 2024. On the one hand, this growth can be explained by the expansion of the regional industrial base, the modernization of production capacities, and the implementation of large-scale investment projects. On the other hand, price factors (inflation) also played a significant role in the increase of nominal indicators [5].

Table 2.
Industrial Producer Price Index and Fixed Capital Investment Price Index in Uzbekistan

Year	Industrial Price Index (year-on-year, %)	Investment Price Index (year-on-year, %)	Industrial Index (relative to 2024)	Investment Index (relative to 2024)
2010	115.6	113.1	0.102364	0.170604
2011	119.6	116.3	0.122428	0.198412
2012	114.5	110.8	0.140180	0.219841
2013	111.7	112.0	0.156581	0.246222
2014	113.6	111.4	0.177876	0.274291
2015	113.5	110.5	0.201889	0.303091
2016	114.8	111.8	0.231768	0.338856
2017	117.5	136.0	0.272328	0.460844

2018	131.8	117.1	0.358928	0.539649
2019	143.2	119.0	0.513985	0.642182
2020	114.9	109.1	0.590569	0.700621
2021	109.3	112.4	0.645492	0.787498
2022	116.8	110.3	0.753935	0.868610
2023	112.5	108.1	0.881760	0.938967
2024	117.9	106.5	1.000000	1.000000

Source: Compiled by the author based on data from the National Statistics Committee of the Republic of Uzbekistan.

Industrial employment remained relatively stable over the period under review, declining slightly from 110.6 thousand persons in 2010 to 108.4 thousand persons in 2024. This trend suggests that industrial output expansion has been achieved without a corresponding increase in employment, reflecting rising labor productivity and ongoing technological modernization. In addition, the moderate decline in employment observed during 2020–2022 may be associated with the effects of the COVID-19 pandemic, labor migration, and the intensification of automation processes in certain industries.

In contrast, investment in fixed capital exhibits a highly volatile dynamic. Investment volumes increased from 89.4 billion soums in 2010 to 8,591.9 billion soums in 2018, reached 13,975.7 billion soums in 2019, and rose further to 28,443.6 billion soums by 2024. Such sharp fluctuations in investment activity may be attributed to the implementation of large-scale industrial projects, the expansion of public–private partnerships, and the development of export-oriented production capacities.

The number of industrial enterprises increased from 1,049 in 2010 to 3,982 in 2023, followed by a decline to 3,092 in 2024. This decrease may be explained by enterprise re-registration, consolidation processes, or updates in statistical classification methods. Overall, while the indicators point to an expansion of industrial activity in the region, it is essential in the next stage of analysis to distinguish nominal growth from real growth.

In recent years, inflationary processes in Uzbekistan have remained relatively high; therefore, assessing industrial development solely on the basis of nominal indicators reduces the accuracy of scientific conclusions. Growth in nominal industrial output may reflect not only real production expansion but also increases in price levels. Similarly, the volume of investment in fixed capital may appear “artificially” inflated due to the influence of price indices. For this reason, deflation is applied in the analysis, and all indicators are converted into constant prices of the base year [5].

During the deflation process, the industrial producer price index and the fixed capital investment price index are used. These price indices allow nominal indicators to be transformed into real (constant-price) measures, thereby enabling an assessment of the true scale of economic development, that is, changes in physical output volumes. In this study, 2024 is adopted as the base year, and indicators for the period 2010–2024 are recalculated relative to 2024. Table 2 presents the industrial price index and the fixed capital investment price index for Uzbekistan, along with the corresponding coefficients expressed relative to 2024.

As shown in Table 2, during the period 2010–2024 the industrial price index and the investment price index generally fluctuated within the range of 110–140 percent. In particular, the increase of the industrial price index to 131.8–143.2 percent in 2018–2019 indicates a strong influence of price factors. The coefficients calculated relative to 2024 (with the base set equal to 1) show that in 2010 the index equaled 0.102 for industrial output and 0.171 for investments. This implies that nominal values for 2010 must be increased several times to be expressed in

constant 2024 prices. Therefore, deflation is a necessary condition for real analysis, and in the subsequent stage industrial output and investment are recalculated in constant 2024 prices.

In Table 3, the nominal indicators presented in Table 1 are converted into constant 2024 prices using the indices from Table 2, thereby revealing the physical content of real economic growth. In real terms (Y), industrial output amounted to 39,452.347 billion soums in 2010 and increased to 145,615.000 billion soums by 2024. Compared with nominal indicators, the real dynamics still demonstrate growth; however, its magnitude becomes more precise and is free from the influence of price factors.

During the period 2010–2017, real industrial output grew relatively slowly, rising from approximately 39.5 trillion soums to about 48.0 trillion soums (in constant 2024 prices). This phase can be explained by the gradual expansion of industrial capacity, the modernization of existing production facilities, and the initial stages of investment project implementation.

From 2018 onward, real growth accelerated significantly, with industrial output reaching 86.5 trillion soums in 2019 and 110.2 trillion soums in 2020. This phase of rapid growth may be associated with industrial support measures, the commissioning of large-scale projects, and an increasing share of export-oriented production.

Table 3.
Indicators Characterizing the Industrial Sector of the Navoi Region (in Constant 2024 Prices)

Year (t)	Industrial Output in Constant 2024 Prices (billion soums) (Y)	Industrial Employment (thousand persons) (X1)	Investment in Fixed Capital in Constant 2024 Prices (billion soums) (X2)	Number of Industrial Enterprises (X3)
2010	39,452.347	110.6	524.021	1,049
2011	39,743.359	113.1	3,849.566	1,158
2012	41,097.874	110.7	2,940.762	1,176
2013	45,262.835	111.6	2,471.753	1,297
2014	46,318.222	112.5	2,943.225	1,346
2015	46,000.030	113.3	2,930.803	1,393
2016	45,985.209	113.9	4,447.612	1,382
2017	48,004.245	114.0	5,092.179	1,358
2018	63,779.922	110.7	15,921.275	1,515
2019	86,457.971	112.9	21,762.834	1,804
2020	110,207.105	106.6	16,334.794	2,828
2021	114,073.451	105.8	12,740.477	3,268
2022	111,937.634	106.6	13,235.975	3,636
2023	115,498.435	109.8	20,779.538	3,982
2024	145,615.000	108.4	28,443.600	3,092

Source: Recalculated by the author based on data from the National Statistics Committee of the Republic of Uzbekistan [6].

The results reported in Table 4 indicate a strong positive correlation between Y (real industrial output) and X2 (real investment), with a correlation coefficient of r = 0.887. This finding suggests that increased investment activity has a direct and significant impact on the growth of real industrial production. The relationship between Y and X3 (the number of

enterprises) is also very strong (r = 0.921), indicating that an increase in the number of industrial entities in the region constitutes an important factor in expanding industrial output.

A strong negative correlation is observed between Y and X1 (employment), with a correlation coefficient of r = −0.764. From an economic perspective, this relationship reflects the effects of modernization and automation in industrial production: as technological intensity increases, employment may decline or remain relatively stable, while real output grows at a faster pace. Consequently, the negative association between employment and real industrial output can be explained by rising labor productivity and a capital-intensive development model.

Table 4.
Matrix of Pairwise Correlation Coefficients among the Variables

	Y	X1	X2	X3
Y	1.000			
X1	-0.764	1.000		
X2	0.887	-0.487	1.000	
X3	0.921	-0.769	0.723	1.000

Source: Author's calculations based on MS Excel.

Examining the relationships among the explanatory variables, a positive correlation is found between X2 and X3 (r = 0.723), indicating that increased investment is accompanied by growth in the number of enterprises, including the establishment of new production units. In contrast, the correlation between X1 and X3 is negative (r = −0.769), suggesting that periods of enterprise expansion are not necessarily associated with a proportional increase in employment. This pattern may be linked to the growing share of small and medium-sized enterprises or to declining labor intensity under conditions of technological upgrading.

The correlation matrix also highlights the potential risk of multicollinearity in the regression model. Given the relatively strong relationship between X2 and X3, the stability of estimated coefficients should be verified when both variables are included simultaneously, using appropriate diagnostic tools such as variance inflation factors (VIF), t-tests, and residual analysis. Nevertheless, from an economic standpoint, both variables remain essential, and their inclusion in the model is justified provided that proper diagnostic procedures are applied.

General Conclusions

During the period 2010–2024, industrial output in the Navoi region increased at very high rates in nominal terms. However, under inflationary conditions, nominal growth does not fully reflect real growth; therefore, converting indicators into constant prices is a scientific necessity. Even in constant 2024 prices, industrial output rose from 39.5 trillion soums in 2010 to 145.6 trillion soums in 2024, confirming the presence of real industrial growth in the region.

Industrial employment remained relatively stable, indicating that industrial growth was driven not by employment expansion but primarily by capital investment and technological modernization, that is, by intensive development. The negative correlation between Y and X1 (r = −0.764) further supports this conclusion: despite declining labor intensity, production volumes continued to increase.

Real investment (X2) exhibits a strong positive relationship with real industrial output (Y), with a correlation coefficient of r = 0.887. A similarly strong positive relationship is observed between industrial output and the number of enterprises (X3), with r = 0.921. These results indicate that improving the investment climate, stimulating capital accumulation, and supporting the expansion of industrial enterprises constitute key priorities in industrial policy.

The significant correlation between X2 and X3 (r = 0.723) indicates a potential risk of multicollinearity in the regression model. Therefore, multifactor regression estimation requires the application of appropriate diagnostic tools, including variance inflation factors (VIF), tests for residual autocorrelation, and heteroskedasticity diagnostics. This approach ensures statistical robustness while preserving the economic interpretation of the model.

Policy Recommendations.

To ensure sustainable industrial growth, the selection of investment projects should prioritize their contribution to expanding real production capacity.

In order to strengthen the efficiency effects of enterprise growth, it is recommended to expand infrastructure development and financial support mechanisms for small and medium-sized industrial enterprises.

Given the potential for relative employment contraction under conditions of automation and digitalization, greater emphasis should be placed on labor retraining programs and the development of new competencies.

Future research should focus on developing forecasts based on multifactor regression results, estimating factor elasticities, and constructing sector-specific models (e.g., mining, chemicals, metallurgy). Such approaches would provide additional scientific support for the strategic planning of industrial development in the Navoi region.

Final Conclusion

In conclusion, the multifactor statistical analysis of the economic development of industrial enterprises in the Navoi region provides a reliable scientific framework for evidence-based industrial policy formulation, for evaluating the effectiveness of investment and institutional reforms, and for identifying the priority drivers of regional industrial growth.

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