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Econometric Modeling of Production Infrastrastructures' Effects on The Industrial Network In The Navoi Region

By

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Abstract

The article sets the task to determine the impact of the production infrastructure on the volume of the gross regional product and industrial output of the Navoi region, as well as the dependence model of the indicators of electricity supply, natural gas, water disposal and freight turnover, which are part of the developed industrial infrastructure, in terms of the volume of the gross regional product and industrial output. The relationship between the factors of the constructed model, the reliability of the parameters of the model and the equation were tested according to various criteria. The dynamics of the structure of the production infrastructure of the region was revealed, the positive aspects of the factors influencing the volume of the gross regional product and industrial output were identified, forecasts were made and relevant scientific conclusions were given.

Key words: volume of industrial production, industrial infrastructure, price index, interdependence, modeling, correlation matrix, reliability indicators, regression equation, forecasting, infrastructure impact efficiency assessment.

Introduction

Serious attention is paid to the development of production infrastructure for the purposes specified in the decree of the President of the Republic of Uzbekistan "On the Development Strategy of New Uzbekistan for 2022 - 2026", including the strategic goal of "Development of the engineering-communication and social infrastructure system of the regions and service and service industries" paying special attention to the construction of communication and social infrastructure facilities, construction and renovation of nearly 80,000 kilometers of main and distribution power lines, more than 20,000 transformer points and more than 200 substations in the territories of the Republic, increasing the level of provision of drinking water to the population of the Republic to 87%, 32 large In cities and 155 district centers, tasks such as renewal of wastewater systems were defined [1]. The design of economic models for regional economic development strategies and forecasting, as well as the establishment of scientific and methodical bases for the economic evaluation of the development factors and trends of the production infrastructure, depend greatly on these tasks.

Indicators of electricity, natural gas, waste water supply, and freight turnover are taken in natural volumes for the purpose of determining and forecasting the dependence of industrial production volume and gross regional product in the Navoi region under the influence of the development of production infrastructure. Monetary expressions are shown in comparative prices for the purpose of forecasting, and economic-statistical models can be defined. The econometric model connecting the gross regional product and the industrial product is determined first, followed by the other models, in two steps. Several metrics, including Student, Fisher, and Darbin-Watson, are used to evaluate this model's reliability. The model of the region's industrial output's dependence on its production infrastructure is then taken into account. Different criteria are used to evaluate the generated model's dependability indicators. A particular model option is chosen and estimates of the volume of future industrial production are computed using this model based on the findings of the assessment.

Regression equations for production volume in the major production infrastructure sectors in the region are developed using data gathered by local engineering and communication organizations, statistical organizations, and academic research for the implementation of multi-variant forecasts of the Navoi region's production infrastructures. The volume of the regional gross product and the volume of industrial products are determined based on supply and production in the production infrastructure.

Economic-statistical and econometric methods are used to determine the role of the structural components of the Navoi region's production infrastructure in the socio-economic development of the region. The conclusions and recommendations on how to make these components' influence more powerful are then supported.

Literature review

Numerous economists have investigated the scientific-theoretical and methodological aspects of the econometric and statistical investigation of regional gross domestic product and industrial production patterns. One of the top economists in the world is Joseph Schumpeter. Green T.F., Konstantinova A., Alashbaeva A.N., Svetunkov S.G., Mirzaev I.K., [2], [3], [4], [5] and [6] The scholarly works of scientists such as [7] are devoted to the study of industrial production in the region and the factors impacting it.

Scientists from our nation's research have also noted some features of how infrastructure factors and regional socio-economic development affect the quantity of industrial products. The scientific works of [14] and others were specifically researched by Abdullaev Y.A. [8], Ghayibnazarov B.K. [9], Ataniyazov B. [10], Alimov R.Kh. [11], Shodiev T.Sh. [12], Begalov B.A. [13], and Ulashev I.O.

Methodology

To be able to foresee the negative effects of these factors, to scientifically base the effects of these factors, and to draw the appropriate conclusions, it is necessary to ascertain whether the development of the production infrastructure can be more positive on the volume of the gross regional product of the Navoi region. As a result, we will use data gathered by local engineering and communication organizations, statistical organizations, and during scientific research to determine the regression equations of the volume of production in the key areas of the regional production infrastructure used in the implementation of multivariate forecasts of the Navoi region's production infrastructures. We use the supply and production volume of the production infrastructure to determine the region's gross territorial product.

The following were chosen as the primary indicators for the Navoi region's gross regional product (GNI) and production infrastructure:

Gross regional product volume (billion soums) – Y;

The volume of products created in the industry – Y_1

The volume of electricity delivered to the population and wholesale consumers in the region during the year, mln. kWh, soum – X_1;

Natural gas supply delivered to the population and wholesale consumers in the region during the year, thousand cubic meters – X_2;

The volume of waste water delivered to the population and wholesale consumers in the region during the year, thousand cubic meters – X_3;

Volume of cargo turnover transported by transport organizations in the region during the year, mln. ton-km – X_4.

The Navoi region is not just industrialized but also home to significant key industrial businesses that support the national economy. In statistical bulletins for the Navoi region, gold and uranium produced by the state companies "Navoi uranium" and "Navoi mining-metallurgical combine" JSC As a closed system, the Navoi mining-metallurgical combination is not counted in the region's gross regional product. In this closed system, businesses that are part of the manufacturing infrastructure in the Navoi region deliver their products and services to businesses. Therefore, items produced in a closed system were also considered while analyzing the volume of industrial products in the Navoi region.

Table 1: *The dynamics of the main indicators representing the production infrastructure in the Navoi region* (at current prices)

Years	**Volume of gross regional product, billion, soums**	**Industrial production volume (with closed system), billion soums**	**Electricity supply, million kWh**	**Natural gas supply, thousand cubic meters**	**Waste water supply, thousand cubic meters**	**Shipping turnover, million ton-km**
	Y	Y_1	X_1	X_2	X_3	X_4
2010	4325,6	4038,5	7242,300	4256,890	1028,000	1223,075
2011	5285,4	4865,7	7326,900	4402,293	1028,000	1262,979
2012	6528,8	5761,1	7308,100	4556,266	816,500	1227,430
2013	7708,5	7087,3	7269,100	4538,471	695,500	1280,691
2014	9181,7	8238,9	7342,700	4630,802	701,000	1264,690
2015	10545,2	9286,9	7402,000	4753,874	632,300	1386,432
2016	11959,3	10657,9	7213,900	4662,185	632,300	1481,406
2017	14681,5	13072,9	7287,600	4897,730	631,100	1517,180
2018	22677,2	22892,4	7463,300	4440,956	633,100	1589,459
2019	36661,9	44438,1	7808,800	4687,413	632,100	1642,181
2020	50605,8	65116,7	8325,000	4994,711	632,900	1653,890
2021	59357,7	73631,1	8596,600	5093,334	632,900	1674,067

Source: *Prepared by the author based on the data of Navoi Region Statistics Department, Navoi Territorial Electric Networks JSC, Hududgaz Navoi LLC, Navoi Water Supply LLC*

It is appropriate to calculate all monetary value indicators at the prices of 2021 in order to increase the indicators' dependability in identifying and predicting the dependence of the volume of industrial production and the volume of the gross regional product in the Navoi region under the influence of the development of the production infrastructure. Since the indicators for electricity, natural gas, waste water supply, and load circulation are collected in natural volumes, the forecasting monetary expressions are displayed in comparable prices, which helps to boost the model's accuracy.

The indicators from 2010 to 2021 were calculated using the Navoi region's GNI growth rate indicators and divided by the price index corresponding to the base year 2021. The price index in Navoi region for 2010-2021 is presented in Table 2.

Table 2: *Price index for the year 2021 based on price level changes in Navoi region during the years 2000-2021*

Years	Price index according to GNI	Price index of industrial products	Years	Price index according to GNI	Price index of industrial products
2010	0,124	0,073	2016	0,258	0,175
2011	0,141	0,086	2017	0,312	0,220
2012	0,167	0,100	2018	0,459	0,379
2013	0,189	0,122	2019	0,706	0,705
2014	0,213	0,138	2020	0,914	0,946
2015	0,236	0,154	2021	1,000	1,000

Source: *Calculated by the author based on the data of Navoi Region Statistics Department*

The indicators for the volume of gross regional product and industrial product in the data of Table 1 were calculated by dividing the price index for the corresponding year in Table 2 when the volume of gross regional product and industrial product in the Navoi region was recalculated in accordance with prices in 2021.

For instance, in 2014, the gross regional product was 9 trillion. The volume in 2021, which is soum, can be calculated by dividing the 181.7 billion 2014 price index in Table 2 by 0.213. Consequently, 43 trillion. An indication of 122.7 billion soum is discovered.

The influence of the Navoi region's production infrastructure on the gross regional product is estimated and forecasted using the natural volume and recalculated indicators in Table 3 at comparable pricing. The data in Table 3 are used to determine the correlation between each factor. A regression equation is developed using the determined correlation matrix to show the dependence of the key indicators in the model on the outcome variables.

The models are determined in two steps, starting with the definition of the econometric model between the gross regional product and the industrial product. This model's dependability is put to the test. The model of the region's industrial output's dependence on its production infrastructure is then taken into account. Different criteria are used to evaluate the generated model's dependability indicators. Based on the results of the assessment, a certain model option is selected, and forecasts of the future industrial production volume are calculated using this model.

Dependence on the volume of industrial output, electricity, natural gas, waste water supply, transport load turnover indicators for determination

In order to assess the growth patterns of the region's gross regional product, we found it necessary to utilize the regression model. We developed n-index and linear regression models in this instance. We did this by building process regression models using the least squares method.

Table 4: *The dynamics of the main indicators representing the production infrastructure in the Navoi region (at comparative prices in 2021)*

Years	Volume of gross regional product, billion, soums	Industrial production volume (with closed system), billion soums	Electricity supply, million kWh	Natural gas supply, thousand cubic meters	Waste water supply, thousand cubic meters	Shipping turnover, million ton-km
	Y	Y_1	X_1	X_2	X_3	X_4
2010	34948,0	55619,600	7242,300	4256,890	1028,000	1223,075
2011	37394,4	56732,000	7326,900	4402,293	1028,000	1262,979
2012	39151,9	57469,600	7308,100	4556,266	816,500	1227,430
2013	40874,6	57986,800	7269,100	4538,471	695,500	1280,691
2014	43122,7	59668,400	7342,700	4630,802	701,000	1264,690
2015	44761,4	60205,400	7402,000	4753,874	632,300	1386,432
2016	46417,5	60927,900	7213,900	4662,185	632,300	1481,406
2017	47113,8	59404,700	7287,600	4897,730	631,100	1517,180
2018	49375,3	60474,000	7463,300	4440,956	633,100	1589,459
2019	51942,8	63074,300	7808,800	4687,413	632,100	1642,181
2020	55371,0	68814,100	8325,000	4994,711	632,900	1653,890
2021	59357,7	73631,100	8596,600	5093,334	632,900	1674,067

Source: *Prepared by the author based on the data of Navoi Region Statistics Department, Navoi Territorial Electric Networks JSC, Hududgaz Navoi LLC, Navoi Water Supply LLC*

We assess the outcomes using the following evaluation standards:

$Y_x = a_0 + a_1 x + a_2 x^2 + \cdots + a_k x^k$ to create a regression model, need to do the following:

$F = \sum (Y - Y_x)^2 \to \min$ or $F = \sum \left(Y - a_0 - a_1 x - a_2 x^2 - \cdots - a_k x^k\right)^2 \to \min$ if we take the special derivative from it, the following system of equations is formed.

$$\begin{cases} \sum Y = a_0 n + a_1 \sum x + a_2 \sum x^2 + \cdots + a_k \sum x^k \\ \sum Yx = a_0 \sum x + a_1 \sum x^2 + a_2 \sum x^3 + \cdots + a_k \sum x^{k+1} \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \\ \sum Yx^k = a_0 \sum x^k + a_1 \sum x^{k+1} + a_2 \sum x^{k+2} + \cdots + a_k \sum x^{2k} \end{cases} \quad (1)$$

To assess the "significance" of the regression equation, Fisher's F-test is used. The magnitude of Fisher's F-criterion is related to the coefficient of determination as follows:

$$F_{haqiqiy} = \frac{r_{xy}^2}{1 - r_{xy}^2} \cdot (n-2), \quad n \geq 3. \ (2)$$

Агар $\alpha = 0{,}05$ (беш фоизли маънодорлик даражаси) ва эркинлик даражаси $k_1 = 1$ ва $k_2 = n-2$ бўлса, тасодифий миқдорлар Фишернинг тақсимоти келтирилган жадваллардан F– белгисининг жадвал қиймати - F_{jadv} топилади. Агар ушбу $F_{haqiqiy} > F_{jadv}$ тенгсизлик ўринли бўлса, регрессия тенгламаси статистик аҳамиятли ҳисобланади. If the degrees of freedom are $k_1 = 1$ and $k_2 = n-2$ and the significance level is $\alpha = 0{,}05$, the Fisher's distribution of random variables tables show that the tabular value of the F-sign is - F_{jadv}. The regression equation is statistically significant if this $F_{\text{haqiqiy}} > F_{jadv}$ inequality is true.

Регрессия тенгламасидаги хатоликларга "a" va"b" параметрларни ҳамда r_{xy}- корреляция коэффицентини ҳисоблашдаги тасодифий хатоликлар ҳам таъсир этади. Шунинг учун "a" va "b"параметрларни ҳисоблашдаги стандарт хатоликлар m_a, m_b лар билан аниқланди. Random mistakes in the computation of parameters "a" and "b"as well as correlation coefficient r_{xy} have an impact on the regression equation's errors. As a result, m_a, m_b were used to calculate the standard errors for the parameters "a"and "b".

The random error of the regression coefficient was determined by the following formula:

$$m_b = \sqrt{\frac{\sum (y - y_x)^2 / (n-2)}{\sum (x - \bar{x})^2}}. \quad (3)$$

The following formula was used to calculate the random error of the "a" parameter of the regression equation:

$$m_a = \sqrt{\frac{\sum (y - y_x)^2}{n-2} \cdot \frac{\sum x^2}{n \cdot \sum (x - \bar{x})^2}}. \quad (4)$$

The random error of the linear correlation coefficient was determined based on the following formula:

$$m_r = \sqrt{\frac{1 - r^2}{n-2}} \quad (5)$$

The Student-t criterion can be used to determine whether the regression equation's parameters are statistically significant (when the number of degrees of freedom is n-2 and $\alpha = 0{,}05$, the tabular values of the t symbol are found from the Student distribution table). It consists of the following:[1]

$$t_a = \frac{a}{m_a}, \quad t_b = \frac{b}{m_b}, \quad t_r = \frac{r_{xy}}{m_r}. \quad (6)$$

If the original values of t are found to be greater than their table value (i.e. $t_a > t_{jadv}$, $t_b > t_{jadv}$, $t_{rxy} > t_{jadv}$), and the parameters are statistically significant.

Result and discussion

In order to develop trend models, values obtained as a consequence of observations were connected to the time factor t. The volume of industrial product output in the Navoi region was calculated as Y1 (together with the closed system). Based on the statistical data (2010-2021) (Table 3), multiple possibilities of trend models of industrial product volume were

[1]Econometrics: Textbook./Edited by I.I.Eliseeva. -M.: Finance and statistics, 2003-p. 344.

generated and the optimal models were selected by evaluation criteria. Eviews 9 software was used to compute the results.

Following a process analysis, the outcome is shown in Table 5.

Table 5: *Regression model according to the change of the size of the gross regional product of Navoi region under the influence of the volume of industrial products of the region.*

Variable	Model coefficients	Standard errors	t- Student criterion	P- value
C	-34440,27	9997,387	-3,4449	0,0063
Y_1	1,312131	0,162903	8,0547	0,0000
R^2- Coefficient of determination	0,8664	The mean value of the dependent variable		45819,26
Flattened R^2- Coefficient of determination	0,8531	The standard deviation of the dependent variable		7343,26
Standard error of the regression	2814,543	Akaike's information criterion		18,87400
Sum of Squares of Residuals	79216543	Schwartz's information criterion		18,95482
The value of the maximum similarity function	-111,2440	Hannan-Quinncriter		18,84408
F- Fisher's criterion	64,8781	DW- Darbin-Watson criterion		1,442565
Prob (F- Fisher's criterion)	0,000011			

Source: *compiled by the author using EViews 9 software*

The analysis of the results obtained in Table 4 shows that the determination coefficient R^2 = 0.8664 in the regression model of the regional gross regional product development process; $F_{account}$= 64,878; (when, F_{tab}=2.17) is equal to. When we compared each coefficient according to the student criterion, it was found that the calculated values are greater than the table values. Therefore, we chose the following regression model as adequate:

$$\mathbf{Y = -34440{,}27 + 1{,}3121 * Y_1;} \ (7)$$
$$t\ (-3{,}445)\ (8{,}054)$$

The volume of natural gas, the amount of waste water produced, the volume of power provided to the population and wholesale users, and the volume of freight transportation were taken into account as the elements affecting the production infrastructure in the Navoi region. Our objective was to use these factors to build a multifactor regression model.

Determine the density of connections between the components chosen for the model, or evaluate the multicollinearity issue of the connection between the selected factors, is one of the key principles of developing a multifactor regression model.

MS Excel was used to build the correlation matrix between the influencing elements for the result component. We use a correlational analysis to check whether these factors aren't multicollinear (Table 6).

All of the aforementioned components are taken into consideration, and their behavior in the model is examined, in order to develop a multi-factor empirical model on the fundamental supplies of production infrastructure to the level of industrial output in the Navoi region.

Table 6: *Correlation matrix between the volume of industrial products of Navoi region and the factors of production infrastructure*

	Y_1	X_1	X_2	X_3	X_4
Y_1	1,000				
X_1	0,954	1,000			
X_2	0,838	0,733	1,000		
X_3	-0,566	-0,372	-0,704	1,000	
X_4	0,806	0,735	0,697	-0,701	1,000

Source: *compiled by the author using MS Excel*

Following a correlation analysis, it was discovered that there is no multicorrelation between the variables, and that there is a dense and medium-density relationship between each variable and the resulting factor, as well as an inverse medium-density relationship with the third variable. The economic model can take into account these elements. To build and analyze an econometric model between the amount of industrial production and the variables influencing them, we employ the least squares method.

The Eviews 9 program was used to calculate a number of options in order to create multifactorial empirical models of their processes, and the desired outcomes were produced. An empirical model for the expansion of the Navoi region's industrial output is constructed in Table 7, and utilizing evaluation criteria, the significance of this model and its parameters is demonstrated.

Table 7: *Building a regression model between the volume of industrial products of Navoi region and the factors of production infrastructure*

Dependent variable: Y_1				
Method: least squares method				
Row: 2010 – 2021				
Number of rows: 12				
Variable	Model coefficients	Standard errors	t- Student criteria	P- value
C	-16385,87	11728,82	-1,397060	0,2051
X_1	8,735268	1,611999	5,418905	0,0010
X_2	3,021159	2,974145	1,015808	0,3435
X_3	-5,357594	4,535117	-1,181358	0,2760
X_4	0,988335	4,089635	0,241668	0,8160
R^2- Coefficient of determination	0,967398	The mean value of the dependent variable		61167,33
Flattened R^2- Coefficient of determination	0,948769	The standard deviation of the dependent variable		5209,350
Standard error of the regression	1179,101	Akaike's information criterion		17,27723
Sum of Squares of Residuals	9731946	Schwartz's information criterion		17,47927
The value of the maximum similarity function	-98,66337	Hannan-Quinn criter		17,20242
F- Fisher's criterion	51,92822	DW- Darbin-Watson criterion		2,435242
Prob (F- Fisher's criterion)	0,000027			

Source: *compiled by the author using EViews 9 software*

The DW criteria value, which was computed to create a regression model for the growth of industrial products in the Navoi region, was discovered to be greater than the table value. The value of the computed DW criteria will be close to 2 if there is no autocorrelation in the residuals of the resulting factor. The estimated DW criteria in this instance has a value of 2.43. This suggests that there isn't any autocorrelation in the residuals of the resulting factor.

The magnitude was calculated using the table values and Fisher's and Student's criterion, then the calculated value was compared to the table values. We developed the next empirical model.:

$$\mathbf{Y_1 = -16385,87 + 8,7353 * X_1 + 3,0212 * X_2 - 5,3576 * X_3 + 0,9883 * X_4}; \quad (8)$$

The coefficient of determination typically accepts values between [0;1]. The strength of the link increases as the coefficient approaches 1. The coefficient of determination in this instance is equal to **0.9674**, indicating that the model's economic indicators have a sufficiently strong link.

To assess the multifactor econometric model's statistical significance and applicability for the process under study, we employ Fisher's F-criterion.

The F-tabular criterion's value is equivalent to F_{tabl}=5.06 and $F_{account}$=51,928.

$F_{account} >> F_{tabl}$ The table meets the condition, which is statistically significant because the calculated value of the F-criterion is higher than the value in the table, and it can be used to forecast the volume of industrial products in the region for subsequent time periods based on the amount of goods and services provided by production infrastructure organizations.

The multifactor econometric model's parameters and correlation coefficients are validated using the Student's t-test (8). Their worth is in this instance contrasted with the values of random errors.

Different indicators make up the parameters considered in the models built (for linear regression equations). As a result, the analysis requires the calculation of the elasticity coefficients. built in Table 8, we calculated the coefficients of elasticity.

Table 8: *Efficiency coefficients of the model built on the basis of the volume of industrial products of Navoi region and the factors of production infrastructure*

Variable	Model coefficients	Standardized coefficient	Coefficient of elasticity
C	-16385,87	11728,82	-0,2679
X1	8,735268	1,611999	1,0780
X2	3,021159	2,974145	0,2301
X3	-5,357594	4,535117	-0,0634
X4	0,988335	4,089635	0,0231

Source: *compiled by the author using EViews 9 software*

The influence of the parameters of the created model on the final result is presented in Table 7, according to which, an increase in the use of electricity (X_1) delivered to the population and wholesale consumers in Navoi region by 1%, an increase in the volume of industrial products (Y_1) by 1.08%, natural gas supply (X_2) increase of 1 percent will increase the volume of industrial products (Y_1) by 0.23 percent, increase of wastewater supply (X_3) by 1 percent, impact on the volume of industrial products (Y_1) by -0.06 percent, and freight traffic turnover

(X_4) by 1 percent It was determined that the increase will cause an increase in the volume of industrial production (Y_1) in the region by 0.02 percent.

The use of water-efficient, cutting-edge technology by production companies and the adoption of intensive methods for the use of drinking water and technical water are the major causes of the negative indicators of the elasticity of wastewater usage in the model.

Table 9 shows forecast alternatives of the industrial output volume and its influencing elements that were created using the designed models.

In order to provide forecast possibilities, trend equations of variables Y1, X_1, X_2, X_3, and X_4 in the model were determined using MS Excel. The time trend formulae for each factor are listed below.:

In 2010-2021, the volume of electricity delivered to the population and wholesale consumers in the region, mln. kWh, soum -X_1:

$$X_1 = 22{,}794t^2 - 198{,}41t + 7603{,}9 \quad R^2 = 0{,}8979 \quad (9)$$

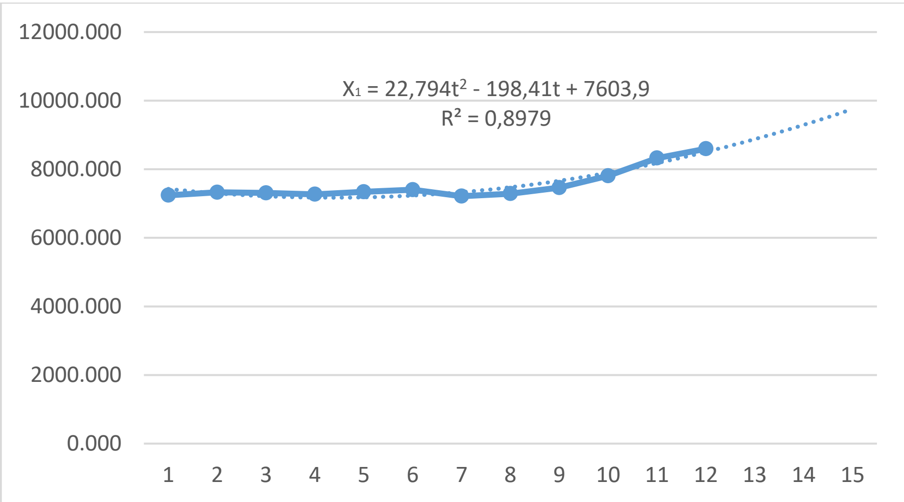

Figure 1. *Volume of electricity delivered to residents and wholesale consumers in Navoi region*

Natural gas supply to residents and wholesale consumers in the region in 2010-2021, thousand cubic meters – X_2:

$$X_2 = 4239{,}6\ t^{0{,}0559}\ ;\ R^2 = 0{,}6429 \quad (10)$$

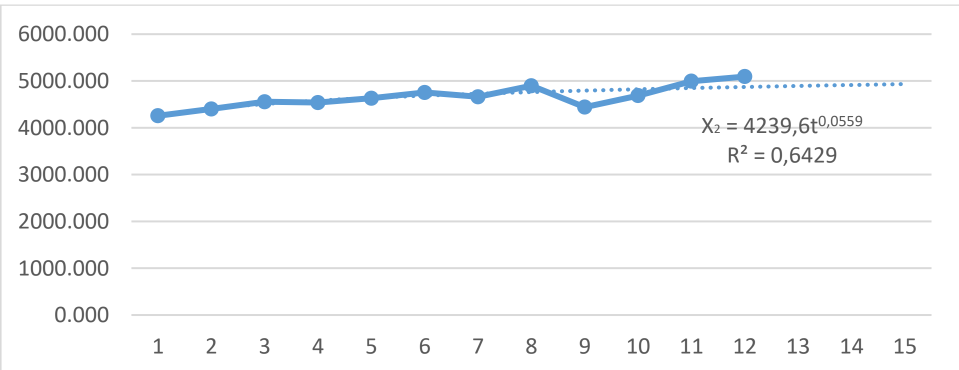

Figure 2. *The volume of natural gas delivered to the population and wholesale consumers in Navoi region*

In 2010-2021, the volume of wastewater delivered to the population and wholesale consumers in the region, thousand cubic meters – X_3;

$$X_3 = 1048{,}2t^{-0{,}232};\ R^2 = 0{,}8727 \quad (11)$$

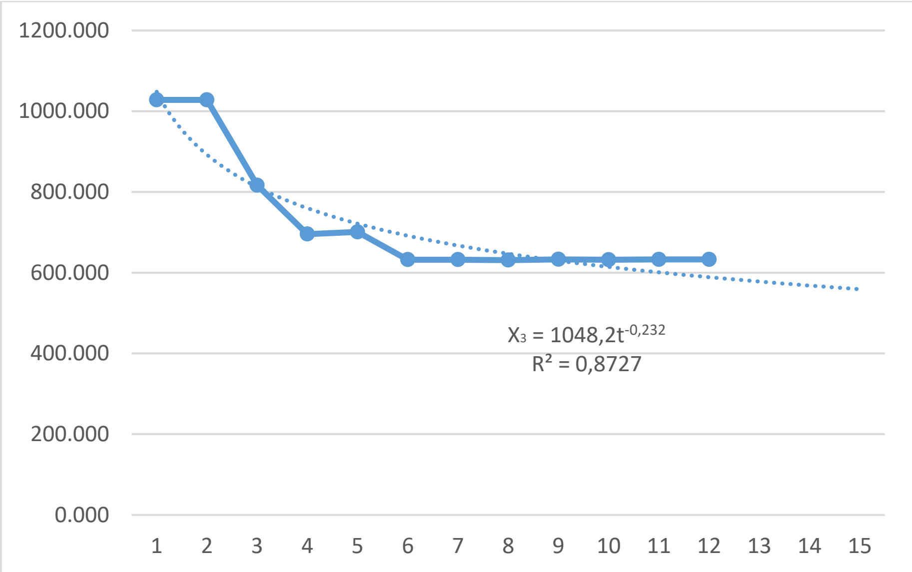

Figure 3. *Volume of wastewater supplied to residents and wholesale consumers in Navoi region*

In 2010-2021, the volume of freight transported by transport organizations in the region, mln. ton-km – X_4.

$$X_4 = 1{,}3219t^2 + 30{,}992t + 1160{,}6;\ R^2 = 0{,}9455 \quad (12)$$

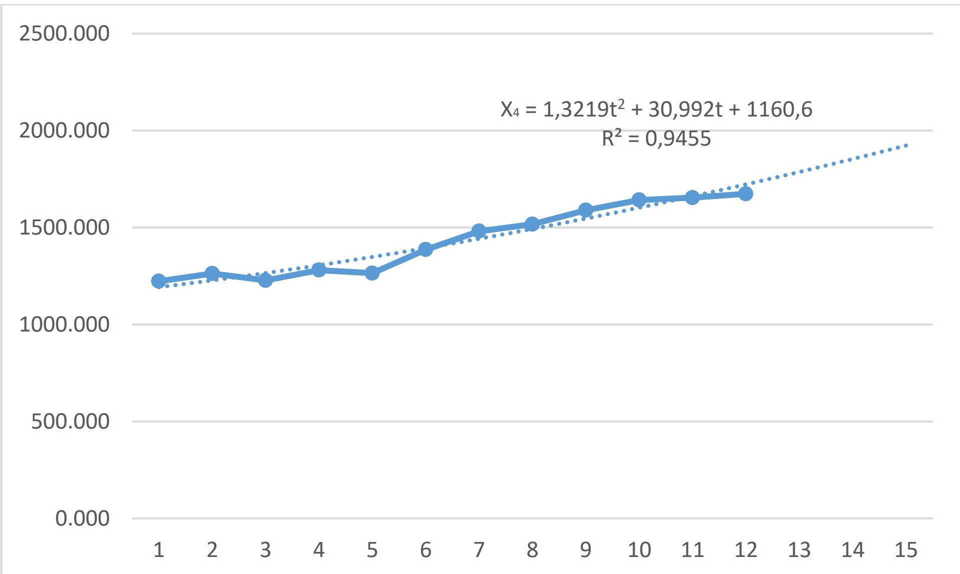

Figure 4. *Volume of freight transported by transport organizations in Navoi region*

Based on the trend equations defined in this MS Excel program and the regression equations in models (7) and (8) determined in the Eviews 9 program and checked by various statistical significance criteria, a forecast option for the gross regional product, the volume of industrial production and the factors of production infrastructure affecting it was developed (9 -table).

Table 9: *Forecast of the main indicators representing the production infrastructure in the Navoi region (at comparative prices in 2021)*

Years	Volume of gross regional product, billion, soums	Industrial production volume (with closed system), billion soums	Electricity supply, million kWh	Natural gas supply, thousand cubic meters	Waste water supply, thousand cubic meters	Shipping turnover, million ton-km
	Y	Y_1	X_1	X_2	X_3	X_4
2010	34948,0	55619,600	7242,300	4256,890	1028,000	1223,075
2011	37394,4	56732,000	7326,900	4402,293	1028,000	1262,979
2012	39151,9	57469,600	7308,100	4556,266	816,500	1227,430
2013	40874,6	57986,800	7269,100	4538,471	695,500	1280,691
2014	43122,7	59668,400	7342,700	4630,802	701,000	1264,690
2015	44761,4	60205,400	7402,000	4753,874	632,300	1386,432
2016	46417,5	60927,900	7213,900	4662,185	632,300	1481,406
2017	47113,8	59404,700	7287,600	4897,730	631,100	1517,180
2018	49375,3	60474,000	7463,300	4440,956	633,100	1589,459
2019	51942,8	63074,300	7808,800	4687,413	632,100	1642,181
2020	55371,0	68814,100	8325,000	4994,711	632,900	1653,890
2021	59357,7	73631,100	8596,600	5093,334	632,900	1674,067
2022*	63452,041	74607,355	8876,756	4893,215	578,108	1786,897
2023*	68468,112	78430,289	9293,784	4913,528	568,254	1853,580
2024*	73999,021	82645,599	9756,400	4932,515	559,231	1922,908

Gross regional product in Navoi region will reach 73 trillion by 2024. 999 billion 21 mln. soums (at 2021 prices), or 124.67 percent more than in 2021.

Conclusion and recommendation

The methodical pursuit of opportunities to expand the scale of the regional production infrastructure's potential capacity, to identify more cost-effective sources of electricity, natural gas, and waste water supply, and to look for means to lessen the reliance of industrial production on the basis of the unit of production on the supply of infrastructure should be regarded as an object of continuous scientific research.

According to our scientific research, the Navoi region's industrial product volume by 2024—including the closed system—will be 82 trillion, of which 645 billion 599 million is soum. These findings are corroborated by the fact that the production infrastructure in the area will grow by 113.5% in comparison to 2021, that the supply of natural gas will grow by 96.84%, that the supply of wastewater will grow by 88.36%, and that the freight turnover will grow by 114.86%. We determine that

References

Decree of the President of the Republic of Uzbekistan "On the Development Strategy of New Uzbekistan for 2022-2026" dated January 28, 2022 No. PF-60. / "Khalk sozi" newspaper February 1, 2022, issue No. 23 (8085).

Schumpeter J. Theory of economic development. - M.: Progress, 1985. -159 p.

Green T.F. Cluster Planning And Cluster Strategy In Regional Economic Development Organizations /2014
4. Konstantynova A. Regional Cluster Policy and Economic Development Case study of the Basque Country and Upper Austria, A Dissertation for the Degree “Doctor Rerum Politicarum”(PhD) at Faculty for Economics and Social Policy Catholic University Eichstätt-Ingolstadt, Germany,2016
Alashbaeva A.N. Methodological approaches to the development of analysis and evaluation of development programs for the territories of the regions of the Republic of Kazakhstan. Thesis for the degree of Doctor of Philosophy (PhD), Astana, 2013,
Svetunkov S.G. et al. Complex-valued analysis and modeling of uneven socio-economic development of Russian regions. Monograph, - St. Petersburg. 2012:,
Mirzaev I.K. Productivity management in the real sector of the economy: Questions of measurement methodology: Abstract of the thesis. ... doctor of economic sciences. St. Petersburg State. University of Economics and Finance. - St. Petersburg, 1999. - 38 p.;
Abdullaev Y.A. Regional iқtisodiyot samarador-league statisticssidagi muammolar. iqt. fan. doc. dis. - M.: MESI, 1987;
Gayibnazarov B.K. Scientific-methodological foundations of the development of the system of national accounts of the Republic of Uzbekistan. doc. dis. - T.: TDIU, 2006;
Ataniazov B., Development management of ecological and economic systems (on the example of existing agriculture in Uzbekistan), autoref. diss. на соиск three step dr. economy Nauk. T. 1994
Alimov R.H. Forecast analysis and management of the development of cotton industrial complexes. Diss. dr. economy science - T.: ТЭУ, 1993
Shodiev T.Sh., Khodiev B.Yu. and others Econometrics. study allowance - T.: East. 1999 -240 p.;
Begalov B.A. Econometric modeling of trends in the formation and development of the information and communications market. i.f.d. dissertation work written for obtaining a scientific degree. - Vol.: TDIU, 2001.-330
Ulashev I.O., Bakoev H.N. Innovative development of small business and private entrepreneurship in the industrialized region: monograph - N.: A. Navoi - 152 p.;
Bakoev H.N. International Journal on Economics, Finance and Sustainable Development. Multiple econometric forecast of the development of small business activity in Navoiy region. Vol. 2 No. 12 (2020): IJEFSD. Pages 27-36
Baqoev H.N., Evaluation of the efficiency of small business entities in Navoi region using the method of multifactor indices Scientific electronic journal "Statistics Bulletin of Uzbekistan", issue 1, 2020
Mamadaliyeva N.A. Macroeconomic importance use and consumption of phosphate fertilizers Journal of Management valie & ethics Oct,-Dek, 20vol, №04
Bakoev H.N. Econometric assessment of the impact of the taxes on government support for entrepreneurship. Central Asian Journal of Innovations on Tourism Management and Finance Vol. 1. No. 2 (2020) / oct 2020 /CAJITMF/issue/view/11
Islamova R.A. Solving problems in the field of ecoturism development in Navoi region on the basis of innovative technologies. European journal of Molecular & Clinecal Medicine. Oct,-Dek,2020 vol, №04