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THE ROLE OF THE CHEMICAL INDUSTRY IN THE MANUFACTURING INDUSTRY AND ITS RELATIONSHIP WITH OTHER SECTORS

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Abstract:

This article analyzes the links between the chemical industry and other manufacturing industries. The role of the chemical industry in the manufacturing industry and in the economy of our country today was also discussed. The study then obtained the results of correlation-regression analysis and empirical analysis using the VIF-criterion, Jarque-Bera Statistic and Fisher criteria. The last part of the article presents proposals for the development of the chemical industry, as well as short-term forecast values.

Keywords: chemical industry, manufacturing industry, model, trend model.

INTRODUCTION

Today, the chemical and petrochemical industry in our country is one of the priority sectors of the economy, producing mineral fertilizers, inorganic substances and chemical reagents for energy, gold and chemical industries, organic chemistry, synthetic fibers and polymeric materials, plant protection chemicals. as well as soda ash producers. The products of these enterprises make up a significant share (9.3%) of the country's industrial output and serve as a unique catalyst for accelerating the transition of the entire economy to new equipment and technological base.

Resolution of the President of the Republic of Uzbekistan dated 13.02.2021 №PP-4992 "On measures to further reform and financial rehabilitation of enterprises of the chemical industry, development of production of high value-added chemical products" directly related to the development of biochemistry, gas and petrochemical industries (hereinafter - the chemical industry). Also, the potential of the basic chemical industry created in the industry in recent years can provide stable growth dynamics for the next 3-5 years. However, in order to create a solid foundation for the long-term sustainable development of all areas of the chemical industry, it is necessary to accelerate the process of transformation of the industry, based on the best international practices [1].

At present, Maksam-Chirchik, Navoiazot and Ferganaazot joint-stock companies produce nitrogen fertilizers - ammonium nitrate, urea, ammonium sulfate. Ammophos, Samarkandkimyo and Kokand Superphosphate Plant produce phosphorus fertilizers - ammophos, suprefos, simple ammonium superphosphate, ammonium sulfophosphate and nitrocalcium phosphate. They are supplied with raw materials by the Kyzylkum phosphorite plant. JV "Elektrokhimzavod" manufactures plant protection chemicals. The development of the chemical industry directly As the above-mentioned joint-stock companies and our President have noted, there is a growing need to transform the industry and analyze the industry.

In January 2022, the enterprises of the chemical industry operating in the Republic of Uzbekistan produced goods worth 1,970.7 billion soums. The physical volume index of the industry compared to January 2021 was 102.8%. The Republic of Karakalpakstan (41.6%), Navoi region (19.2%), Kashkadarya region (17.1%) and Tashkent region (9.0%) have the highest share in the total volume of products produced by enterprises of the chemical industry.[1]

ANALYSIS OF THE RELEVANT LITERATURE

Several studies have been conducted on modeling and forecasting of industrial production processes, multidimensional optimization of production, regional development of the chemical industry and the classification of its multidimensional dynamics.

A.N. Achilov's research highlights the priorities of creating and improving a solid base of chemical inventories in demand in the economy of the Republic of Uzbekistan, research of ore areas, identification of reserves and improvement of inventory in the chemical industry. There are scientific views on the grouping and

[1] https://www.stat.uz/uz/matbuot-markazi/qo-mita-yangiliklar/18139-o-zbekiston-respublikasida-kimyo-mahsulotlari-ishlab-chiqarish-sanoati-3

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improvement of inventory of chemical enterprises based on the specifics of the industry [2].

Yu.D. Peresunko, on the other hand, does not stand still in modern science. Every day there are many changes in the chemical industry, which are determined by its scientific and technological progress. From all this we can distinguish the main directions of the development of chemistry in our time: computer chemistry and nanochemistry [3].

Z.A. Ashurov said that "the practice of diversifying production in the chemical industry, focusing on technical and technological equipment of investment potential enterprises, marketing research, development of long-term strategic plans for the development of new products. In this regard, each enterprise of the chemical industry should develop and approve a "Strategic Plan for Enterprise Development" as a separate document. " commented [4].

Kh.N. Sabirov's research also modeled the production volume of the food industry using the Cobb-Douglas function. Initially, the article provides a brief description of the scientific sources on the subject. Issues such as the regression model, determination, correlation coefficients, Darbin-Watson test, and data on the empirical probability of the Fisher criterion are then described [5].

RESEARCH METHODOLOGY

The study used data from the Statistics Committee of the Republic of Uzbekistan. Data on the structure of the manufacturing industry and the volume of production of chemical products for 2010-2021 were collected. In the study, the remaining components of the manufacturing industry as Y and the manufacturing industry as Xs were collected as a percentage of previous years and used in empirical analysis.

In this study, data on the empirical probability of the assumptions of the multivariate linear regression model (CLRM), determination (R^2), correlation coefficients ($r_{y/x}$), VIF-criterion, Jarque-Bera Statistic (JB) and Fisher criterion (F-distribution) considered [6]. The system of trend models was also used to forecast the volume of chemical production.

ANALYSIS AND RESULTS

In this article, using the data of the State Statistics Committee of the Republic of Uzbekistan, a correlation analysis was performed (Table 1) and based on the specific correlation coefficient for the production of Y-chemical products X4-clothing, X10-basic pharmaceutical products and drugs, X14 has a straight-line link between the manufacture of prefabricated metal products in addition to machinery and equipment, X20-furniture manufacturing and X21-other prefabricated products (Table 2). Meanwhile, a multivariate linear regression was constructed:

$$Y = \alpha_0 + \alpha_1 \cdot X_4 + \alpha_2 \cdot X_{10} + \alpha_3 \cdot X_{14} + \alpha_4 \cdot X_{20} + \alpha_5 \cdot X_{21} + \varepsilon \quad (1)$$

Table 1
Several branches of the manufacturing industry [2]

	Manufacture of chemical products Y	Manufacture of wearing apparel X4	Manufacture of basic pharmaceutical products and preparations X10	Manufacture of fabricated metal products, except machinery and equipment X14	Furniture manufacture X20	Manufacture of other finished products X21
2010	6,8	2,0	0,6	2,0	0,6	0,8
2011	7,0	2,1	0,7	2,1	0,6	0,4
2012	6,6	2,2	0,7	2,4	0,5	0,4
2013	6,0	2,1	0,8	2,1	0,6	0,4
2014	6,1	1,9	0,8	2,1	0,7	0,5
2015	6,4	2,0	1,0	2,5	0,8	0,6
2016	8,1	4,7	1,3	2,5	1,5	1,2

[2] https://www.stat.uz/uz/rasmiy-statistika/industry-2

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2017	8,2	5,1	1,2	3,0	1,3	0,9
2018	8,0	4,1	0,9	2,7	0,9	0,7
2019	7,4	3,6	0,8	2,2	0,9	0,6
2020	6,9	3,4	0,8	2,3	0,7	0,6
2021	7,4	3,5	1,1	2,7	0,8	0,6

The analyzes show that the results of the double correlation coefficients are very closely related, which in turn gives rise to the concept of multicolinearity between them.

Table 2
Correlation analysis matrix [3]

	Y	***X4***	***X10***	***X14***	***X20***	***X21***
Y	1					
X4	0,925	1,000				
X10	0,625	0,749	1,000			
X14	0,669	0,741	0,708	1,000		
X20	0,752	0,848	0,855	0,555	1,000	
X21	0,710	0,707	0,670	0,366	0,862	1,000

To determine this, we use the VIF-criterion. If the result of the VIF-criterion found in the literature is less than 5, then multicollinearity is expressed as rejection. The results of the double correlation coefficients in our direct study turned out to be less than 5 and we conclude that there is no multicollinearity. We then construct the following multifactor model based on the results of the regression analysis.

$$Y = 4{,}96 + 0{,}65 * X_4 - 0{,}5 * X_{10} + 0{,}19 * X_{14} - 0{,}75 * X_{20} + 1{,}11 * X_{21} + \varepsilon \quad (2)$$

As a result of the regression analysis, the coefficient of determination was equal to R ^ 2 = 0.89, which in turn indicates that Equation 2 is close to the actual values. Also, the Fisher criterion in the model was equal to F = 9.95, which is significant based on the p-value value and indicates that the shape of our multi-factor linear model was constructed correctly. Both the Jarque-Bera Statistic (JB = 1.14) and Chi-square (5.99) tests tested the normal distribution of the multi-factor linear model residues.

Then, based on the model, a short-term forecast value of the volume of chemical production was obtained. Systematic trend models for the factors influencing the forecast value were developed (Table 3) and their forecast values were plotted.

Table 3
Trend model system[4]

Manufacture of wearing apparel	$X_4 = 1{,}7919e^{0{,}073t}$	$R^2 = 0{,}5141$
Manufacture of basic pharmaceutical products and preparations	$X_{10} = 0{,}629t^{0{,}1914}$	$R^2 = 0{,}4062$
Manufacture of fabricated metal products, except machinery and equipment	$X_{14} = 1{,}9618t^{0{,}1108}$	$R^2 = 0{,}4045$
Furniture manufacture	$X_{20} = -0{,}0141t^2 + 0{,}2175t + 0{,}1646$	$R^2 = 0{,}4523$
Manufacture of other finished products	$X_{21} = -0{,}0053t^2 + 0{,}0813t + 0{,}3887$	$R^2 = 0{,}1066$

[3] Execel дастури асосида муаллиф ҳисоб-китоби.
[4] Ўзбекистон республикаси давлат статистика қўмитасининг статистик маълумотлари асосида муаллиф ишланмаси.

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Short-term forecast values were found based on the trend model system, and they were obtained on the basis of a 3-year probability of linking to a basic multivariate linear regression model (Equation 2).

CONCLUSIONS AND SUGGESTIONS

Based on the results of the above analysis, it is necessary to increase the volume of chemical production, its development and modernization, as well as investment in the industry. This will ensure the implementation of the decisions made by our President. It was also reflected in the growth of chemical production through the growth of several sectors of the manufacturing industry, ie the industrial composition selected in the study.

If in 2022 the production of clothing will increase by 4.6%, the production of basic pharmaceuticals and drugs by 1%, the production of finished metal products other than machinery and equipment by 2.6%, the production of furniture by 0.6% and other finished products. If the production is equal to 0.5%, then the production of chemical products will increase by 8.1% (compared to 2021) on an empirical basis.

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