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РИВОЖЛАНТИРИШНИНГ  
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# MEHNAT IQTISODIYOTI VA INSON KAPITALI

## 2023

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# MEHNAT IQTISODIYOTI VA INSON KAPITALI

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## IMPROVING THE EFFICIENCY OF CORPORATE GOVERNANCE BASED ON THE MODELING OF AGRICULTURAL MACHINERY ENTERPRISES

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**Annotation.** In this article, it is required to carry out economic policy, carry out specific calculations that are carefully developed in making managerial decisions and rely on scientific theories, work on the determination of development plans, relying on their results. As a result, the importance of modeling economic processes using various statistical, econometric, economic mathematical methods of managing economic processes, ensuring efficiency, developing strategic plans is increasingly increasing.

**Keywords.** corporate governance, Correlation-regression methods, agricultural machinery enterprises, efficiency.

## QISHLOQ XO‘JALIGI MASHINASOZLIGI KORXONALARINI MODELLASHTIRISH ASOSIDA KORPORATIV BOSHQARUV SAMARADORLIGINI OSHIRISH

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“Korporativ boshqaruv” kafedrasida katta o‘qituvchisi.

**Annotatsiya.** Ushbu maqolada iqtisodiy siyosatni olib borish, boshqaruv qarorlarini qabul qilishda puxta ishlab chiqilgan va ilmiy nazariyalarga tayanadigan aniq hisob-kitoblarni amalga oshirish, ularning natijalariga tayangan holda rivojlanish rejalarini belgilash ustida ishlash talab etiladi. Binobarin, iqtisodiy jarayonlarni boshqarishning turli statistik, ekonometrik, iqtisodiy matematik usullaridan foydalangan holda iqtisodiy jarayonlarni modellashtirish, samaradorlikni ta’minlash, strategik rejalarini ishlab chiqishning ahamiyati tobora ortib bormoqda.

**Kalit so‘zlar.** korporativ boshqaruv, korrelyatsiya-regressiya usullari, qishloq xo‘jaligi mashinasozligi korxonalarini, samaradorlik.

## ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ КОРПОРАТИВНОГО УПРАВЛЕНИЯ НА ОСНОВЕ МОДЕЛИРОВАНИЯ ПРЕДПРИЯТИЙ СЕЛЬСКОХОЗЯЙСТВЕННОЙ ТЕХНИКИ

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**Аннотация.** В данной статье требуется проводить экономическую политику, проводить конкретные расчеты, тщательно разрабатываемые при принятии управленческих решений и опирающиеся на научные теории, работать над определением планов развития, опираясь на их результаты. В результате все более возрастает значимость моделирования экономических процессов с использованием различных статистических, эконометрических, экономико-математических методов управления экономическими процессами, обеспечения эффективности, разработки стратегических планов.

**Ключевые слова и фразы.** корпоративное управление, корреляционно-регрессионные методы, предприятия сельскохозяйственной техники, эффективность.

### Introduction:

Today, such processes as the rapid development of the world economy, the expansion of commodity turnover between states ensure the aggravation of the competitive struggle in the world and national markets. Currently, the acceleration of economic processes, the aggravation of market relations have made the use of econometric and statistical methods and economic mathematical modeling in solving



such issues as the development and adoption of management decisions of any network or enterprise, the organization of optimal distribution of resources, the study and adaptation of market conditions, the analysis and selection of optimal alternative investment options.

At the present stage of the development of the industry of Uzbekistan, the effectiveness of the introduction of corporate governance is assessed on the basis of econometric methods of the management system of the agricultural machinery industry and its socio-economic indicators. Correlation-regression methods were used to carry out our analyzes. Initially, in order to assess the interaction of general and private indicators with each other, their impact on indicators that are important in determining the volume of production and efficiency of products, the correlation analysis method was used to determine the pair correlation coefficients.

### Literature Review:

By the 50s and 70s of the 19th century, there were major turning points in the evolution of corporate management. By this time, large multinational corporations, banking industry groups began to develop in the world. There is a need to use new ideas, approaches, principles, methods to manage them effectively. In particular, in the last quarter of the 20th century, foreign scientists Ansoff, P. Drucker, M. Porter, A. Marshal and others, Teraniznikov, Gvishiani, Agenbegan, Popov, Fatkhuddinov, Gerchikov from Russian scientists made a worthy contribution to the evolution of corporate management methodology.

One of our Uzbek economists S. Ghulamov, B. Khodiev, M. Khamidulin, Sh. Yuldashev, D. Suyunov, M. Aliev, A. Hoshimov, B. Berkinov, L. Turikova, D. Begmatova, B. Orinov, Z. Ashurov and others made a significant contribution to the development of the theory of corporate governance with their doctoral and candidate theses.

### Research Methodology:

The article used methods of scientific abstraction, mathematical-statistical, economic, financial, quantitative, structural analysis and mathematical modeling. In industrial production, an important factor is socio-economic relations in the process of increasing the efficiency of corporate governance. The theoretical and methodological basis of this article is the analysis of literature and scientific articles covering mixed teaching in the digital educational environment, the analysis of the views of scientists, and the observation of processes.

### Results And Discussion:

The correlation coefficients between the main indicators of the industry, which primarily represent the general economic development of the industry, such indicators as the volume of production of products in the metallurgical industry, its share in the industry, in particular the amount of production of cars, buses, tractors, tractors, tractors and cultivators, were determined. To carry out this analysis, data from 2000-2022 were used as well as the data given in the form of value 2000 was converted to real values without being selected as a base year (Table 1).

**Table 1.**

### Double correlation coefficients between the industrial development of the metallurgical industry and the indicators of the production of products in it.

	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>	X <sub>7</sub>	X <sub>8</sub>	X <sub>9</sub>	X <sub>10</sub>	X <sub>11</sub>	X <sub>12</sub>
X <sub>1</sub>	1.00											
X <sub>2</sub>	0.76	1.00										
X <sub>3</sub>	0.74	0.59	1.00									
X <sub>4</sub>	0.12	-0.16	-0.07	1.00								
X <sub>5</sub>	0.33	0.49	0.53	-0.18	1.00							
X <sub>6</sub>	-0.26	-0.01	-0.02	-0.01	0.48	1.00						
X <sub>7</sub>	0.45	0.27	0.54	0.65	0.29	0.20	1.00					





► Tadbirkorlikni rivojlantirish

$X_8$	0.63	0.48	0.91	0.02	0.35	-0.07	0.51	1.00				
$X_9$	0.29	0.20	0.66	-0.15	0.10	-0.37	0.21	0.82	1.00			
$X_{10}$	0.50	0.36	0.86	0.08	0.32	-0.01	0.54	0.98	0.84	1.00		
$X_{11}$	-0.43	-0.54	-0.34	0.52	-0.06	0.54	0.34	-0.39	-0.56	-0.28	1.00	
$X_{12}$	0.81	0.51	0.70	0.50	0.22	-0.16	0.75	0.71	0.39	0.68	-0.07	1.00

Here:  $X_1$ -produced cars, thousand units;  $X_2$ -produced buses units;  $X_3$  - produced battery and battery batteries, thousand units;  $X_4$ -produced tractors units;  $X_5$ -production tractor trailers units;  $X_6$ -production tractor cultivators, units;  $X_7$  - growth rates of production in industry, percentage;  $X_8$  - industrial product at prices of 2000, billion sums;  $X_9$  - number of production personnel in industry, (thousand people);  $X_{10}$  - the cost of fixed assets of industrial production by the end of the Year at prices of 2000, billion sums;  $X_{11}$ -the share of percentage;  $X_{12}$ - the share of Mechanical Engineering and metal processing, percentage.

The share of Mechanical Engineering and metal processing in total industrial products to the results obtained has a high correlation relationship with a number of indicators. In particular, the production of cars (0.81), the growth rate of industrial production (0.75), the production of industrial products (0.71), the value of the main funds of industrial production by the end of the year (0.68) were determined to have a high dependence. But we can see that the correlation coefficient (0,39) between the number of employees of industrial production and the share of machine and metal processing in industrial products has a positive value, but is rather weak.

We want to focus on the indicators that affect the production of basic agricultural techniques. During the period under analysis, the amount of tractor production is quite unstable, and it can be seen that its connection with the main indicators of the main industrial and machine-building industry is much weaker. Among such indicators as the growth rates of industrial production with the amount of tractor production, the share of metallurgy in the total industrial output, the share of Mechanical Engineering and metal processing, a much higher correlation relationship was observed, and their values were 0.65, 0.52 and 0.50, respectively.

It was also established that the production of tractor sediments and cultivators, which are considered important products in agricultural machinery, does not have high correlation dependence with any significant indicators. Labor, which is considered an important factor in production, that is, between the number of employees of industrial production and the volume of production of a tractor and a cultivator, there is an inverse, and with the production of a sawfly there is a very weak correct relationship. A similar situation can be observed with the cost of fixed assets of industrial production by the end of the year.

By the end of the year, it can be seen that the relationship between the value of fixed assets of industrial production and the volume of production of tractors, sediments and cultivators is also quite weak, and their value is equal to 0.08, 0.32 and (-0.01), respectively. According to the above results, in the next period, it is observed that the indicators of the development of agricultural machinery in industry are much lower, and the level of use of production factors is also not in demand.

In addition, we must pay special attention to the fact that the share of metallurgy in the total industrial output has the opposite relationship with all indicators, except for the number of tractors, cultivators and the growth rate of industrial production. The lowest correlation dependence of this indicator was determined by the number of employees of industrial production, this value is equal to -0.56.

From the results of the analysis, it turned out that the indicators of the development of the metallurgical industry are rather unstable and not at the level of demand, that is, the indicators that represent industry change have a reverse relationship with the indicators that represent the development of the industry. However, the share in the industry of Mechanical Engineering and metal processing is quite stable and has a rather high positive relationship with the indicators that represent the development of industry, as well as the main factors in the production of products.

From the results of our research, it is known that the automotive and metallurgical industry in our country is one of the areas that are waiting for its development and today causes much controversy. A number of measures have been implemented by our government in such areas as ensuring network progress, the formation of a free competitive environment in the network, regulation of management. One of the main problems is that privatization is burdened precisely in such large enterprises, and its implementation is much more complicated than in other areas. The fact that the organization of Joint-Stock Companies is among the areas that are acceptable was given on the basis of the results of our previous research. Particular attention is paid to the issues of formation of the legal foundations of corporate governance and economic



mechanisms corresponding to our country, increasing its effectiveness.

From the results of the analysis, it is known that corporate governance is widely used in the industrial sector, where large enterprises are relatively large in our country. Taking this into account, the effectiveness of corporate management was looked at, assessing the processes of production of products in the industry, in particular, factors in the production of products, the role, influence of Labor and capital. At the next stage, it was on the basis of the method of regression analysis that the trends in the change in the production of products and the impact of important indicators on them were assessed in large enterprises, where corporate governance was widely implemented. Taking into account the object of research and the importance of the industry in the socio-economic development of the country, the analysis evaluated the results of the activities of the former JSC "Uzagrotexsanoatholding", that is, on the basis of a change in the volume of production of basic products at the enterprise.

Analysis, forecasting of the growth and development of the volume of products provided on the basis of the introduction of corporate management in production presupposes the creation of factor microeconomic models. Growing and predicting production volumes largely determines the relationship between production resources. There are many factor models for the study and research of this connection, which differ from each other in their uniqueness, advantages and disadvantages.

The construction of the model is also carried out by determining the influence of the volume and dynamics of resources used as the subject of factor analysis and forecasting on the volume and level of growth of the company's gross product, determining the connections between the factors of pre-production. From the analyzes carried out above, it is known that the analysis of the studied economic process or object on the basis of econometric and statistical methods, the development of a model of the object in the form of equations, inequalities, logical relationships and graphs, the study of which will allow new knowledge about the object to make the best decision in one.

According to the results of correlation analysis, the share of Mechanical Engineering and metal processing in industry, as well as the amount of tractor production, has a high correlation with the growth rates of industrial production. This in turn requires an analysis of the growth of industrial production, an assessment of the influence of production factors.

To assess the influence of factors on the production of products in the industry, a two-factor microeconomic model based on a popular level function of the Cobba-Douglas type was used. According to the results of Regression analysis, it was divided with the following equation:

$$Y=12.6*K^{0.58}*L^{0.08}$$

Here: *Y*-manufactured industrial products at prices of 2000 billion. sum; *k* - fixed assets of industrial production at the end of the Year at prices of 2000, mlrd.sum; *L*-the number of employees of industrial production (thousand people)

The model presented above was developed using the Gretl program, with the aim of checking the compatibility of the model, the results were presented in Table 2.

**Table 2.**

**Results of regression analysis carried out to assess the impact of capital and labor on the volume of production of products in industry.**

	Coefficient	Std. Error	t-ratio	p-value
Const	2.535270	0.989778	2.561	0.0202 **
L_Kindusreal	0.578562	0.0225504	25.66	<0.0001***
L_Lindus	0.0769054	0.171550	0.4483	0.6596
Mean de-pendent var		8.344793		S.D. dependent var 0.516047
Sum squared resid	0.063924			S.E. of regression 0.061321
R-squared	0.987366		Adjusted R-squared	0.985880
F(2, 17)	664.2981		P-value(F)	7.30e-17
Log-likelihood	29.07909		Akaike criterion	-52.15817
Schwarz criterion	-49.17098		Hannan-Quinn	-51.57504
Rho	0.194146		Durbin-Watson	1.498687



Based on the data of the table, focusing on the compatibility of coefficients by the St’udent criterion, we can see that it is not the adequacy of the coefficient that represents the impact of Labor on the production of products. And the coefficient representing the impact of capital is suitable, and its effect on the production of products was determined to be equal to 0.57, that is, an increase in the volume of capital by one percent serves to increase the volume of production of products by 0.57%.

From the results of correlation analysis it is known that there is a high correlation relationship between the number of production personnel in the industry and the value of the main funds of industrial production by the end of the year, this value is equal to 0.84. This leads to the problem of multicollinearity in the inclusion of both indicators as a factor influencing a single function.

For this reason, the influence of factors was assessed on the basis of models with a separate factor. The results of the regression analyzes performed are presented in Table 3.

**Table 3.**

**Regression analysis results.**

Nº	Model	se	t-statistics	R <sup>2</sup>	Elastic coefficients
1	$Y = 19.7 * K^{0.58}$	$b_1=0,144$ $b_2=0,015$	20.56 32.28	0.98	0.58
2	$Y = 4.2 * 10^{-6} * L^{3.2}$	$b_1=4.905$ $b_2=0.749$	-2.5 4.2	0,49	3.2

Based on the analyzes presented, it can be seen that all the coefficients determined are suitable according to the Styudent criterion, therefore, according to the Fisher criterion, the indicators are also at the required level. However, in our second model, one can see that the determinant coefficient (0,49), which represents the relationship between the indicators, is much lower.

Focusing on the results, we can see that the coefficient of elasticity of production in industry by Capital is equal to 0.58, and by Labor it is equal to 3.2. The coefficient of Labor elasticity is coming out with a much higher value and sharply differs from the figure determined on the basis of the multi-factor model. At the same time, the coefficient that serves to assess the overall effectiveness of factors is equal to 12.6 in a multi-factor function, while in a one-factor function this indicator is equal to a much smaller value, that is,  $4,2 * 10^{-6}$ .

The general conclusion is that the coefficient of elasticity of industrial production by Capital is equal to 0.58, the elasticity of Labor can be viewed as equal to 3.2, relying on the results of one factor function. However, it should also be remembered that the determinant in this function has a much smaller value.

In our opinion, increasing the efficiency of corporate governance in turn requires creating the necessary environment, ensuring the development of institutions that serve it, in particular the capital market, liberalizing processes in this market, further improving the activities of stock exchanges. If the existing conditions are maintained without the implementation of work on this, we will cite short-term forecast indicators of the volume of industrial products, the amount of production of tractors, tractor drills, tractor cultivators in order to determine what the situation will be.

For the development of forecast indicators, the ARIMA model was used, which is widely used in time series, and the results received the following appearance Table 4.

**Table 4.**

**Regression analysis results**

Nº	Model	se	t-statistics	R <sup>2</sup>
1	$\Delta Pin_t = 561.37 + 0.84 * \Delta Pin_{t-1} + 0.54 * \epsilon_{t-1}$	$b_1=302,986$ $b_2=0.171$ $b_3=0.232$	1.85 4.89 2.31	0.99
2	$Ptr_t = 2498.07 + 0.47 * Ptr_{t-1}$	$b_1=325,576$ $b_2=0.228$	7.67 2.07	0.18



3	$\Delta Pcul_t = -5.016 + 0.55 * \Delta Pcyt_{t-1} - 1.0 * \epsilon_{t-1}$	$b_1 = 33,359$ $b_2 = 0.205$ $b_3 = 0.138$	-0.15 2.76 -7.225	0.26
3	$Pcul_t = 759.22 + 0.44 * Pcul_{t-1}$	$b_1^3 = 126,725$ $b_2^1 = 0.191$	5.99 2.28	0.14

Here: *P<sub>in</sub>* - industrial products at prices of 2000 years; *P<sub>tr</sub>* - the number of tractors produced, *PC<sub>s</sub>*; *P<sub>cul</sub>* - the number of cultivators produced, *PC<sub>s</sub>*; *P<sub>drill</sub>* - the number of trailers produced, *PC<sub>s</sub>*

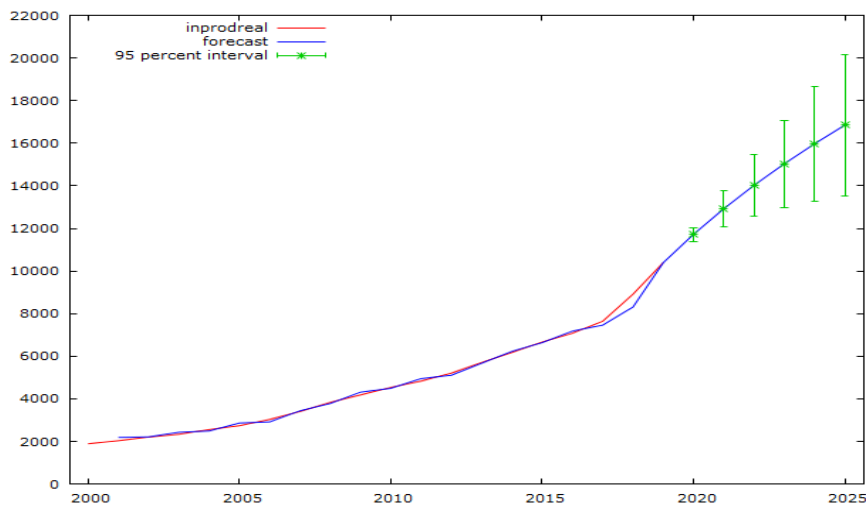
Model 28: ARIMA, using observations 2000-2026 (T = 19)

Dependent variable: (1-L) inprodreal

Standard errors based on Hessian

	Coefficient	Std. Error	z	p-value	
Const	561.370	302.976	1.853	0.0639	*
phi_1	0.836656	0.170930	4.895	<0.0001	***
theta_1	0.536998	0.232037	2.314	0.0207	**
Mean dependent var		447.2421	S.D. dependent var		351.5293
Mean of innovations		21.45295	S.D. of innovations		166.6303
R-squared		0.995844	Adjusted R-squared		0.995599
Log-likelihood		-125.3027	Akaike criterion		258.6055
Schwarz criterion		262.3832	Hannan-Quinn		259.2448

		Real	Imaginary	Modulus	Frequency
AR	Root 1	1.1952	0.0000	1.1952	0.0000
MA	Root 1	-1.8622	0.0000	1.8622	0.5000



**Fig. 1. Chart of test and criterion indicators and forecast indicators to check whether the listed models are adequate.**

To check the adequacy of the presented models, all test and criterion indicators and forecast indicators are presented in the graph. Despite the fact that the determinants of the models of the tractor, tractor cultivators and sediments are much lower, the forecast indicators were given taking into account the fact that the actual and model-based indicators are close to one and have a general trend.



**Table 5.**

**Forecast indicators of product sales revenue and product cost.**

Years	Size of industrial products (mlrd.s)	Number of tractors (PCs)	Number of tractor cultivators (PCs)	Number of tractor drills (PCs)
2022 in truth	12920	2843	1118	760
2023	14019	2661	1099	760
2024	15030	2575	1086	760
2025	15968	2534	1077	760
2026	16844	2515	1069	760

According to the forecast results, by 2026, an increase in the real volume of industrial products by 1.62 times compared to 2022 will be ensured, with an increase of 16844 billion soums. In the case when other cases have not changed, there is a decrease in the volume of production of agricultural machines compared to 2022, there is a decrease in the number of tractors produced by 38%, the number of cultivators by 11%, the number of workshops by 9%. In our opinion, there is an opportunity to change these indicators in a positive way for this, it is required to increase the efficiency of Management in the production network of agricultural machinery and to establish efficient use in labor resources.

**Conclusions:**

Based on the results of the conducted study, the following scientific and practical conclusions were developed:

In conclusion, the use of economic mathematical methods to correctly define any economic processes in corporate production gives an effective result. In the practice of science, many models, methods of mathematical modeling of macroeconomic indicators associated with economic spheres have been developed. But at the microeconomic level, there is little practice of factor modeling that concerns the development of enterprises.

In modeling the efficiency of corporate production or economic growth, a mathematical model was proposed based on a multi-factor form. In the model, the correlation of variable indicators can be assessed only quantitatively, in which the parameters of the forecast can also be seen. But it can be noted that any model has an abstract character. Because studying the most necessary factors in the object under study, they can change the development of the object in relation to other factors, in which the object is the determinant of laws.

Improving the efficiency of corporate governance requires, first of all, the creation of a favorable environment, the development of institutions that serve it, in particular the capital market, the liberalization of processes in this market, the further development of the activities of stock exchanges.

Technologically update, rearmament, diversification, digitization and effective management of these processes in the field of Agricultural Mechanical Engineering make it possible to create import substitutes and exportable competitive products.

Mathematical modeling is a necessary way to develop corporate production, to determine its promising directions. In the course of the study, the author proposed to use his method of mathematical modeling in multi-factor microdistrict using functional practice in determining the effectiveness of corporate governance. This method can be used in the development of production, in the study of the dynamics of economic indicators and in determining the prospects.

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