



## Regression Model of the Total Volume of Products (Work, Services) Created by the Construction Sector in Our Country

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**Abstract:** *This article is about the classification of construction enterprises, special features of its activity processes and special features of construction enterprises as an object of economic analysis.*

**Keywords:** *Construction enterprises, analysis, construction industry, object of economic analysis, purpose of economic analysis in construction enterprises, state, joint-stock, joint-stock, private, joint and other contract construction and installation organizations.*

### Enter

In the conditions of the digital economy, it is important not only to collect information, but also to read and analyze it. The President of the Republic of Uzbekistan Sh.M. Mirziyoyev named his report at the extended meeting of the Cabinet of Ministers dedicated to the main results of the socio-economic development of our country in 2016 and the most important priorities for 2017 as "Critical analysis, strict order - discipline and personal responsibility - should be the daily rule of every leader's activity"<sup>1</sup>. In this case, each field and the managers responsible for this field should regularly study the results of their activities and trends of change. For this, analysis is necessary. Analysis of the financial status of construction enterprises is very important due to the fact that construction activities have different aspects from other types of activities and are important in the development of the country's economy.

### Analysis of literature on the topic

Analysis of domestic and foreign literature sources on this topic, among fundamental researches in the field of construction, ISStepanova [1], Arens EA [2], DJ.K. Foreign scientists such as Lobbek [3], Serov VM [4], Gurkov IB [5], MKPardaev [6], NTTukhliev [7], EVGolysheva [8], M. Mirakhmedov [9], AAEShtaev [10], KBurazov [11], such as local economists are conducting scientific research on various issues in the field of construction.

### Research methodology

The methods of statistical and economic analysis, analysis, synthesis, abstract-logical analysis, as well as selective observation, sociological survey, SWOT-analysis, comparative methods were used in the research work.

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<sup>1</sup>From the report of the President of the Republic of Uzbekistan at the extended meeting of the Cabinet of Ministers on the main results of social and economic development of our country in 2016 and the most important priorities for 2017.



## Analysis and results

Mathematical functions and statistical indicators and statistical methods are important tools in the analysis of the financial situation in enterprises. What tasks does statistics serve in the process of analysis?

Statistics, as a science in the analysis of enterprises, serves to determine the relationships between factors and results, observation methods and expected error levels in the analysis of the financial situation of enterprises, while as an activity, it serves the task of collecting information for the analysis process and providing the main macroeconomic indicators. does.

The effect of factors on the result can be of two types.

1. Functional division;
2. Correlation division.

In some cases, both types can be mixed.

Functional bol an i s hda one change c hi of the sign each which to the value of another change ch i of the sign sure one value suitable will come. Such it 's all there is to it important feature is that in this everyone of factors full iq list \_ \_ \_ \_ and their bol an i sh ini with the result sign full a it is possible to write the equation representing <sup>2</sup>. Take, for example, the effect of the number of employees and labor productivity on the total construction work in construction enterprises. In this case, the total construction works performed by the enterprise and the number of employees of the enterprise are counted functionally and correctly. As the number of employees of the enterprise increases and labor productivity is maintained, the construction works of the enterprise will increase proportionally.

Functional all of them \_ \_ \_ \_ full iq there is no work \_ \_ \_ \_ too that is called

Correlative ( or incomplete q \_ ) bo l ani shd a each value of the factor symbol corresponds to different values of the resultant symbol, not the exact value. For example, a company of the manager information , \_ \_ \_ \_ \_ his work productivity ta 'si r does. Or take the constructor. Salary with his rank is average a lot \_ \_ \_ there is, i.e discharge increased to go with the work right many a yib to go possible But to us I know that \_ \_ \_ the builder's discharge is paid in full be iq \_ it's not. Second, it has the same discharge builders, working oby ek t ig a depending on the amount of work they receive. The main reason for this is that the amount of salary depends not only on the job title, but also on other factors (for example, personal ability, working conditions , tax level \_ \_ \_ \_ financial of the enterprise status and etc. ) \_ \_ \_ \_ \_<sup>3</sup>

If we rely on the above considerations, if the influence of factors on the result in the enterprise is functional, it will not be difficult for us to observe the resulting factor and forecast it, but if the relationship between the result and the factors is correlated, this analysis will pose several difficulties. Because analysis is the study of the past and the present and forecasting the future.

## Conclusions and suggestions

We can achieve correlation analysis of results and factors in enterprises or the construction sector of the whole country, and predict the resulting indicator through the regression equation.

Changes in the volume of construction work in the country are influenced by the following factors, and these factors are:

<sup>2</sup> Khashodiyev. "Statistics" is a textbook. Tashkent - 2004. Page 161.

<sup>3</sup> Khashodiyev. "Statistics" is a textbook. Tashkent - 2004. Page 161.



X<sub>1</sub> - Number of construction enterprises (units) ;

X<sub>2</sub> - Number of workers employed in the construction industry (units);

X<sub>3</sub> - Average value of fixed assets used by construction enterprises (thousand soums);

X<sub>4</sub> - Average value of working capital used by construction enterprises (thousand soums);

X<sub>5</sub> – Population in the country (thousands of people);

X<sub>6</sub> - Average value of intangible assets used by construction enterprises (in thousand soums);

X<sub>7</sub> - Amount of investments in construction (thousand soums);

X<sub>8</sub> - Changes in the average price of construction materials (in soums);

X<sub>9</sub> - Inflation rate (in percent);

U – Total completed construction works (billion soums).

When determining the impact of these factors on the result, that is, on the total construction work, we develop a regression equation, since the relationships between the result and the factors are correlated.

For this purpose, we show all the factors and the trend of change of the result over the years in the table (Table 1).

**Table 1. Factors affecting total construction works and total construction works in the Republic of Uzbekistan ( based on data from 2000-2021 )<sup>4</sup>**

	Y	X1	X2	X3	X4	X5	X6	X7	X8	X9
2001	571.00	11,874	882.00	542,652.00	1,245,642.00	24,813.10	98,540.00	1 320.80	144.00	26.60
2002	731.00	12372	895.00	652,324.00	1,459,874.00	25115.80	112,589.00	1 526.60	136.70	21.60
2003	831.10	12,975	904.00	756,874.00	2,542,874.00	25,427.90	142,652.00	1 978.50	127.10	3.80
2004	1121.90	13475	925.00	845,645.00	3,542,652.00	25,707.40	168,474.00	2,629.00	126.50	3.70
2005	1453.10	13,873	963.00	894652.00	4,698,784.00	26,021.30	179,652.00	3 165.20	128.10	7.80
2006	1938.40	14,072	984.00	942,543.00	5,698,654.00	26,312.70	182,984.00	4,041.00	124.00	6.80
2007	2,733.50	14576	986.00	963521.00	5,987,474.00	26,663.80	195,874.00	5,903.50	110.90	6.80
2008	3575.90	15172	998.00	987452.00	6,522,988.00	27,072.20	195,987.00	9,559.50	107.70	7.80
2009	7,067.40	15479	1002.00	993652.00	8,747,210.00	27,533.40	201,000.00	12,531.90	129.50	7.40
2010	8245.80	15,874	1033.70	1,254,622.00	8,982,230.00	28,001.40	224,542.00	16,463.70	116.40	7.30
2011	9,504.80	16370	1068.80	1,322,584.00	9,745,654.00	29123.40	236,698.00	19,500.00	120.40	7.60
2012	11,753.90	16,775	1105.70	1,356,550.00	10,524,654.00	29,555.40	239,875.00	24,455.30	110.80	7.00

<sup>4</sup> stat.uz developed by the author based on his data.

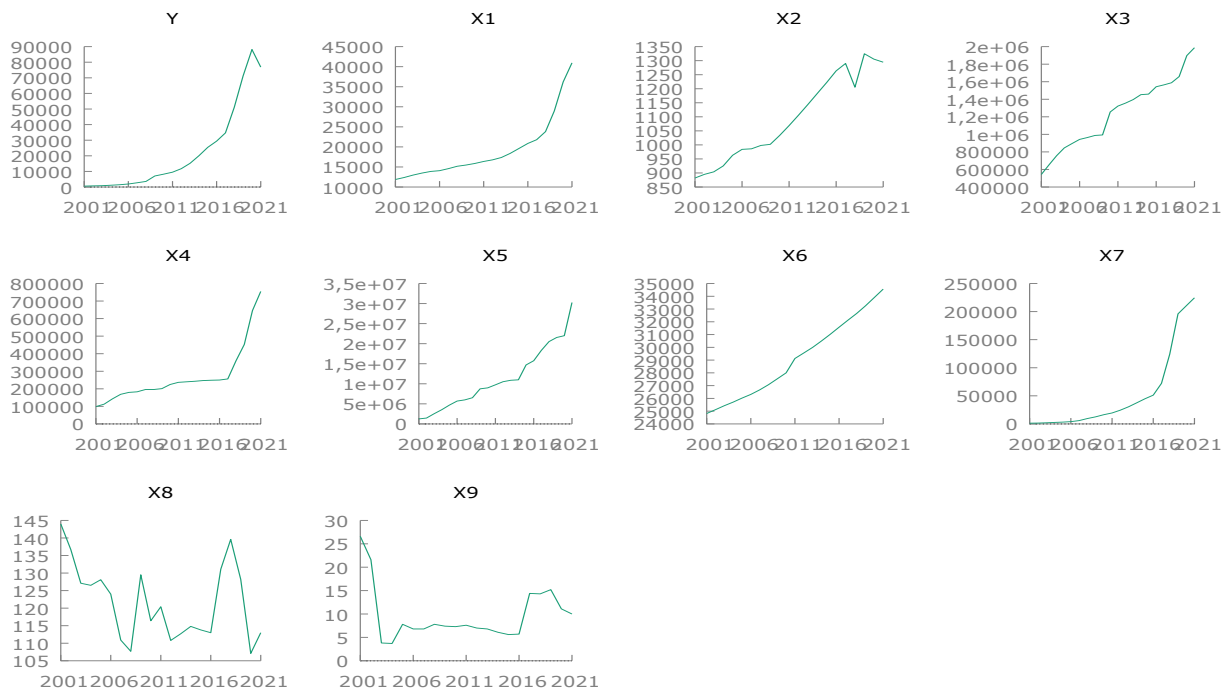


2013	15,219.30	17352	1144.00	1,396,542.00	10,876,640.00	29,993.50	242,875.00	30,490.10	112.70	6.80
2014	20,060.40	18374	1183.30	1,452,658.00	10,987,587.00	30,492.80	246,987.00	37,646.20	114.80	6.10
2015	25423.10	19616	1222.20	1,458,754.00	14,698,574.00	31,022.50	248,784.00	44,810.40	113.80	5.60
2016	29,413.90	20,863	1263.60	1,542,698.00	15,742,362.00	31,575.30	249,854.00	51,232.00	113.00	5.70
2017	34,698.00	21,790	1,290.00	1,563,875.00	18,324,897.00	32120.50	256,323.00	72155.20	131.10	14.40
2018	51129.30	23807	1205.50	1,587,960.00	20,514,654.00	32,656.70	359,874.00	124231.30	139.60	14.30
2019	71156.50	28,955	1324.60	1,658,794.00	21,548,966.00	33,255.50	452,698.00	195,927.30	128.20	15.20
2020	88130.30	36199	1305.60	1,897,654.00	21,987,888.00	33,905.20	645,874.00	210195.00	107.10	11.10
2021	76,890.70	40,950	1294.50	1,987,422.00	30,254,879.00	34,558.90	754,874.00	224,542.00	113.00	10.00

Usually, when the change of the result is stochastically (indirectly) related to several factors, such a relationship is called a correlational relationship in statistics. In this case, it will be possible to determine the influence of factors using correlation and regression methods. However, many factors affect the result. But in practice, determining the influence of all factors is somewhat complicated. Firstly, it is difficult to take into account a large number of factors, and it is difficult to express them in numbers, and secondly, calculations cannot be made on all factors. Due to this, only factors that can be taken into account in the analysis process and are considered to be the main ones are analyzed. Signs that affect a certain result are factors, a sign formed under the influence of factors is called a result <sup>5</sup>.

We consider the above-mentioned factors and the dynamic change of the result in the cross-section of periods.

<sup>5</sup>Khudoyberdiyev UX, Aliyev BR Statistics. Samarkand. SamISI 2006 - page 88 .



**1 . Graphs of the trend line of the resultant and factor symbols <sup>6</sup>.**

As can be seen from the figure 1, we can see that the graph of the trend line of the factor symbols X1, X2, X3, X4, X5, X6 and X7 is close to the change trend of the resulting sign.

Pair correlation is mainly used to determine the influence of factors on the final indicator. Pairwise correlation detection allows us to identify factors that repeat each other and is used to identify factors that have a weak influence on the outcome measure. With this method, we can determine the factors to be included in the regression equation by determining the pairwise correlation and enter them into the regression equation.

The coefficient of correlation makes it possible to determine the degree of dependence in the range from (-1) to (+1). The amount of the coefficient can be as follows:

1. The closer the correlation coefficient is to (-1) and (+1), the stronger the relationship between the factors and the result.
2. If  $r = 0$ , then there is a basis for the conclusion that there is no connection between them.
3. If  $0 < r < 1$ , the relationship between these indicators is directly correct and has the same direction.
4. If  $-1 < r < 0$ , we see that the relationship between them is reversed.
5. If  $r = 1$  (-1), it is a basis for concluding that the relationship between them is functional.

Using this formula, a matrix of pair correlation coefficients was created as follows to determine the mutually recurring factors using the "Excel program" on the computer and some operations.

**Table 2. Double correlation of total construction work and factors influencing its change in the Republic of Uzbekistan**

<sup>6</sup> Author development based on table 1 data.



Koefficienty korellyastii, Nabludeniya 2001 - 2021

5% critical significance (two-sided) = 0.4329 for n = 21

Y	X1	X2	X3	X4	
1.0000	0.9667	0.8563	0.8671	0.9289	Y
	1.0000	0.8215	0.8743	0.9403	X1
		1.0000	0.9603	0.9300	X2
			1.0000	0.9529	X3
				1.0000	X4
X5	X6	X7	X8	X9	
0.9039	0.9332	0.9883	-0.1922	0.1576	Y
0.8840	0.9863	0.9727	-0.3046	0.0650	X1
0.9801	0.7511	0.8006	-0.3563	-0.0562	X2
0.9831	0.8429	0.8264	-0.4572	-0.1596	X3
0.9714	0.9004	0.9139	-0.2760	0.0047	X4
1.0000	0.8326	0.8620	-0.3358	-0.0321	X5
	1.0000	0.9522	-0.3527	0.0075	X6
		1.0000	-0.1615	0.1826	X7
			1.0000	0.6499	X8
				1.0000	X9

If the factors selected and included in the regression equation are in a cross-linear or very strong correlation relationship, the regression indicators will be distorted due to the fact that they repeat each other to a certain extent. Therefore, the correlation strength of all factors is determined by calculating the pairwise correlation coefficient, and overlapping factors are excluded from the equation.

As a result of the inspection, our factors X2 and X7 did not pass the normal distribution together. Therefore, we return to our data using factors X1, X2, X3, and X7, and drop the factor with the lowest correlation coefficient from the model. This factor is factor X2. Now we only have factor X7 left.

We are left with X7 factor indicators in the model. Therefore, we reanalyze the indicators using the Gretl program. Using the method of least squares, the following data were obtained:

	коэффициент	ст. ошибка	t-статистика	p-значение	
const	2577,02	1160,61	2,220	0,0388	**
X7	0,372412	0,0132068	28,20	5,73e-017	***

Среднее завис. перемен 21983,30 Ст. откл. завис. перемен 27324,80  
 Сумма кв. остатков 3,48e+08 Ст. ошибка модели 4282,699  
 R-квадрат 0,976663 Исправ. R-квадрат 0,975435  
 F(1, 19) 795,1582 P-значение (F) 5,73e-17  
 Лог. правдоподобие -204,3559 Крит. Акаике 412,7119  
 Крит. Шварца 414,8009 Крит. Хеннана-Куинна 413,1653  
 параметр rho 0,212392 Стат. Дарбина-Уотсона 1,414293  
 обратите внимание на сокращенные обозначения статистики

Тест Вайта (White) на гетероскедастичность -  
 Нулевая гипотеза: гетероскедастичность отсутствует  
 Тестовая статистика: LM = 10,6146  
 p-значение = P(Chi-квадрат(2) > 10,6146) = 0,00495533

### 5. Model data with outcome measure (U) and factor X7<sup>7</sup>

From the obtained data, it can be seen that the model constructed using the X3 factor for U is reasonable, since the r-value for the model is 0.0049.

First, we check whether our equation has a normal distribution or not. To do this, we obtain a distribution graph for the regression equation obtained using the Gretl program:

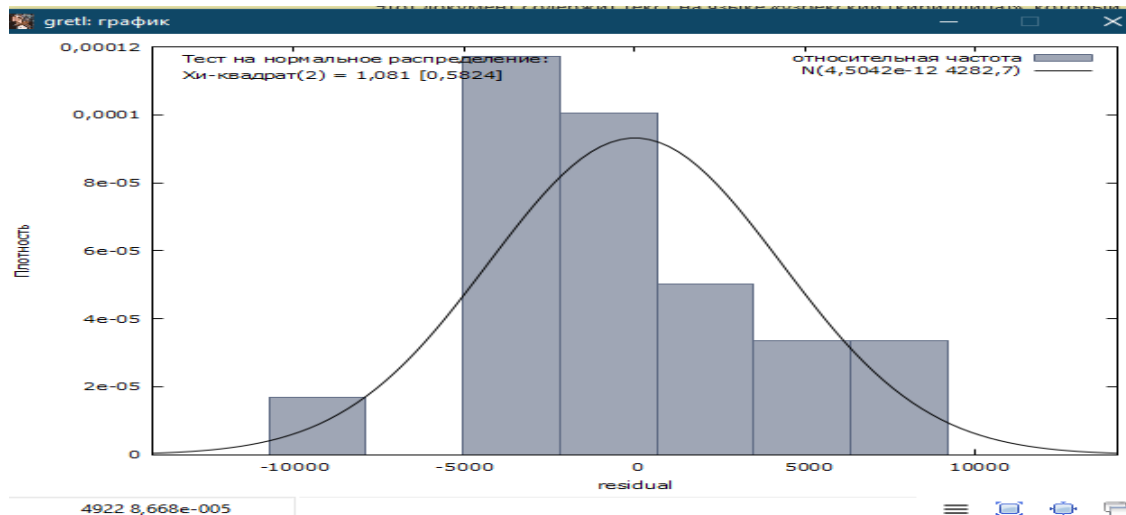


Figure 6: Distribution plot for the regression equation obtained using Gretl software .

As you can see from the data in the graph, our regression equation has a normal distribution because the chi-square belongs to the interval [-3;3].

Heteroskedastichnost (homogeneous variance) using White's test . To do this, we obtain the following information by conducting the White test for the regression equation obtained using the Gretl program:

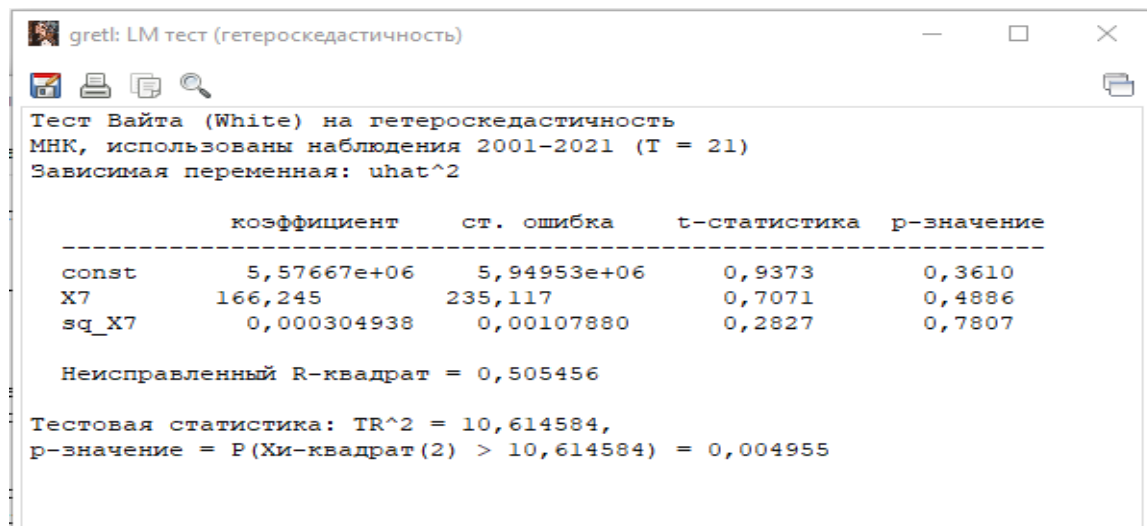


Figure 7. White's test with the participation of the outcome index (U) and X7 factors<sup>8</sup>

<sup>7</sup> Using Gretl software development of the author based on his data

<sup>8</sup> Data-driven authoring using Gretl software.



From the obtained data, it can be seen that our model is homogeneous (monoskidostichny), because the r-value for this test is equal to 0.0049.

As a result of the above analysis, we can say that the constructed regression equation is economically meaningful and it will have the following form.

$$Y=0.372412 * X7 + 2577.02$$

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