



STATISTICAL ASSESSMENT AND FORECASTING OF BUSINESS ACTIVITY IN THE TERRITORIES OF THE REPUBLIC OF UZBEKISTAN

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Аннотация: Мақолада ҳудудларни инновацион ривожланишида кичик бизнес ва хусусий тадбиркорлик фаолияти статистик баҳоланиб, кўп вариантлик асосида прогност қилинган. ЯИМга КБХТнинг ҳудудлар бўйича таъсири таҳлил қилинган. Ушбу таҳлиллар натижасида ҳудудларни инновацион муҳитини яхшилашга доир хулосалар қилинган.

Аннотация: В статье оценивается деятельность малого бизнеса и частного предпринимательства в инновационном развитии регионов и прогнозируется их на основе множественных вариантов. Анализируется влияние КПТС на ВВП по регионам. В результате этих анализов были сделаны выводы по улучшению инновационной среды регионов.

Abstract: The article evaluates the activities of small businesses and private entrepreneurship in the innovative development of regions and predicts them on the basis of multiple options. The impact of the CPPTS on GDP by regions is analyzed. As a result of these analyzes, conclusions were drawn on improving the innovative environment of the regions.

Калит сўзлар: кичик бизнес, хусусий тадбиркорлик, кичик бизнес субъектлари, инновацион ривожланиш, ҳудудларда инновацион муҳит, ЯИМ, ЯҚҚ.

Ключевые слова. малый бизнес, частное предпринимательство, субъекты малого бизнеса, инновационное развитие, инновационный климат в регионах, ВВП, ВДС.

Key words: small business, private entrepreneurship, subjects of small business, innovative development, innovative climate in the regions, GDP, GVA.

INTRODUCTION. Innovative development of small business and private entrepreneurship and state regulation of this sector are becoming more active in the regions of our country. The continuous expansion of the business environment in the regions of the country leads small business entities to support their activities through innovative development. As a result, the contribution of small business entities in all sectors to the growth of gross domestic product (GDP) and gross regional product (GDP) is increasing.

In today's innovative developing countries, as well as in our country, detailed analysis of the socio-economic development of regions is becoming more relevant than ever in making important and rational economic decisions.

For the stable and rapid development of the regions of our country, in order to introduce a unified system for assessing their complex and proportionate socio-economic development, the efficiency of using natural raw resources, economic and investment potential, as well as other comparative advantages of the regions, the Presidential Decree of the Republic of Uzbekistan on May 1, 2020 - In accordance with the Resolution No. 4702 "On the introduction of the system of rating the socio-economic development of regions" [1], a

system of rating the socio-economic development of regions was introduced based on the results of statistical indicators and questionnaires. This, in turn, serves as a practical solution to the problems of analyzing the socio-economic development indicators of the republic's regions.

Analysis of literature on the subject. Foreign scientists who have studied the field of small business and entrepreneurship, its development and trends: A. Marshall [2], Y. Schumpeter [3], V. Vales [4] are the scientific founders of entrepreneurship.

D.A.Karimov "Essence and advantages of the rating evaluation system in the analysis of the socio-economic development of the regions of the republic" [5], O.A.Aripov "Development of small business and private entrepreneurship and creation of business environment" [6] .

Research methodology. Several research methodologies and methods were used in the preparation of the scientific article. In particular, forecasting methods based on scientific abstraction, expert assessment, induction and deduction, systematic analysis of socio-economic phenomena, economic-statistical analysis, comparative analysis, multivariate analysis are widely used.

Analysis and results . In the innovative development of the regions, KBXT as a component of the national economy, it is necessary to pay attention to the following directions in forecasting the dynamics of socio-economic development: scientific-technical, economic and labor resources of the regions. All of them are interrelated and interdependent, reflecting logical integrity. However, the relative role of these directions in terms of the scope of forecasting is not the same.

The diversity of data processing requires the use of several models. The generality of the conclusions related to all methods shows the reality of the research, the difference of the conclusions by methods shows the subjectivity of the research. We sometimes recommend using non-parametric statistical methods to manage KBXT objects. It is especially recommended to use them for short-term forecasting in the management of KBXT enterprises.

The linear equation of multivariate regression is generally written as:¹

$$\hat{y}_{1,2,\dots,k} = a_0 + a_1x_1 + a_2x_2 + \dots + a_nx_n = a_0 + \sum_{j=1}^k a_jx_j \quad (1)$$

Here:

$U_{1,2,\dots}$ is the variable average of the resulting sign, and its indices indicate the ordinal numbers of the factors included in the regression equation;

a 0 - free name

a_j - of the regression equation coefficients.

of the multiple factor regression equation parameters " the most small squares " method based on h osil q is attached this normal equations of the system solution is:

[illegible]

(2) if we replace the model by the natural logarithm, then we will have the following form:

(3)

$$y' = a_0' + a_1' x_1' + a_2' x_2' + \dots + a_n' x_n'. \quad (4)$$

[illegible]

In model 5, multicollinearity should be tested to study how the outcome and factor characteristics change and the interrelationship between them. For this, we will make its correlation table. We will analyze the impact of KBXT on GDP by regions. Affecting factors Republic of Karakalpakstan (X_1), Andijan (X_2), Bukhara (X_3), Jizzakh (X_4), Kashkadarya (X_5), Navoi (X_6), Namangan (X_7), Samarkand (X_8), Surkhandarya (X_9), Syrdarya (X_{10}), Tashkent (X_{11}), Fergana (X_{12}), Khorezm (X_{13}) regions (option 1).

To create an econometric model on the GDP of innovative products created in the field of ICT and the factors affecting them: introduced innovations (X_1), produced innovative goods, works and services (X_2), expenditures on technological, marketing organizational innovations (X_3) and least squares method was used for analysis. Fisher's F test was used to determine the statistical significance of the constructed multifactor $Y_{valM} = 11,9 + 0,13x_1 + 0,10x_2 + 0,10x_3$ (option 2) econometric model and its compatibility with the process under study.

Regression model and quality criteria of KFST to GDP and GNP in the regions of the Republic of Uzbekistan

	b₀ (Standard error)	r_{x,y}	F (Essence of F)	R-squared	t-statistics (P-essence)
Option 1	18091.5 (0.0 2)	0.90	99.6 (0000)	0.81 39	463.2 (0000)
Option 2	1203.6	0.92	37.3	0 , 8461	56.5

	(0.13)		(0000)		(0000)
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The true value of the F criterion is the $F_{charge.} = 99.6$ (option 1), $F_{fee.} = 37.3$ (option 2). If the calculated value is higher than the value in the table, the constructed multifactor econometric model is said to be statistically significant. $F_{is\ right.} > F_{ch.}$ Satisfied the condition, so it can be used in forecasting for future periods.

t when checking the confidence level of multifactor econometric model parameters and correlation coefficient from criteria was used. Here too, t is the value for the estimated parameters in the multifactor econometric model. $t > t_{jad.}$ $t = 463.2$ (option 1), $t = 56.5$ (option 2).

It is known that the coefficient of determination takes values from 0 to 1. If the value of the selected factor is close to 1, the influence of the factor is strong. In this case, the coefficient of determination is equal to $R^2 = 0.8139$ (option 1), $R^2 = 0.8461$ (option 2), and it was determined that the influence of the selected factor indicators on the result (Y) is equal to 81.4 and 84.6 percent.

According to the results of the implemented forecast (at the price of 2021), the volume of GDP by 2026 will be 900458.1 billion soums in the 1st option, 877654.8 billion soums in the 2nd option. It was concluded that the share of KBXT in GDP may be 64.5 percent in 2026 according to the 1st option, and 61.5 percent in the 2nd option, and that KBXT's activity is one of the stable, competitive and important sectors in the economy of our country.

Table 2

The forecast of the GDP of the Republic of Uzbekistan and the GDP of the Republic of Uzbekistan
(as of 2021)

Y years	GDP , billion soum		KBXT's GPA , bln. soum		in GDP of KBXT share , %	
	Option 1	Option 2	Option 1	Option 2	Option 1	Option 2
2021*	734587.7	734587.7	403288.7	403288.7	54.9	54.9
2022	749714.3	756264.6	464273.8	460384.1	61.9	60.9
2023	784758.9	784927.8	490881.3	479091.5	62.6	61.0
2024	821507.8	814685.5	519052.9	498559.1	63.2	61.2
2025	860044.8	845579.9	548881.6	518817.8	63.8	61.4
2026	900458.1	877654.8	580465.6	539899.6	64.5	61.5

To forecast the GDP of the Republic of Uzbekistan in the regions of the Republic of Uzbekistan, the GDP of 2010-2021 (Y), industrial products (X_1), agriculture (X_2), construction (X_3), investment (X_4), retail trade (X_5), export (X_6), import (X_7), employed population (X_8), services (X_9) indicators were obtained (option 1, table 3).

Table 3

Correlation-regression models of the influence of the KBST on the NQQ in the regions of the Republic of Uzbekistan

Areas	b_0	b_1 x_1	b_2 x_2	b_3 x_3	b_4 x_4	b_5 x_5	b_6 x_6	b_7 x_7	b_8 x_8	b_9 x_9
Karakalpakstan	-5.31	0.39	0.93	0.39	0.44	0.41	0.31	0.22	2.35	0.32

Republic			-							
Andijan	6.21	0.49	1.5	0.79	0.66	0.66	0.44	0.44	4.11	0.44
Bukhara	4.99	0.56	1.35	0.54	0.54	0.56	0.39	0.29	1.75	0.40
Jizzakh	5.69	0.40	1.22	0.47	0.25	0.47	0.16	0.23	2.17	0.35
Kashkadarya	6.66	0.38	1.53	0.70	0.47	0.45	0.32	0.15	2.6	0.38
Navoi	5.94	0.30	0.45	0.18	0.03	0.30	0.30	0.03	1.65	0.15
Namangan	-4.83	0.37	0.97	0.44	0.31	0.44	0.17	0.28	1.83	0.31
Samarkand	6.22	0.48	1.84	0.49	0.35	0.49	0.42	0.33	2.66	0.31
Surkhandarya	6.04	0.40	1.25	0.44	0.29	0.42	0.35	0.19	3.13	0.32
Syr Darya	4.52	0.28	0.96	0.25	0.19	0.39	0.16	0.19	1.39	0.25
Tashkent	-4.48	0.42	1.38	0.24	0.26	0.33	0.06	0.15	1.5	0.23
Ferghana	6.03	0.42	1.18	0.64	0.43	0.55	0.37	0.34	3.56	0.36
Khorezm	5.81	0.44	1.16	0.50	0.38	0.50	0.24	0.36	2.81	0.36

the constructed multifactor (Republic of Karakalpakstan)
 $Y_{YQQ} = -5,31 + 0,39x_1 + 0,93x_2 + 0,39x_3 + 0,44x_4 + 0,41x_5 + 0,31x_6 + 0,22x_7 + 0,35x_8 + 0,32x_9$ (option 1) econometric model and its compatibility with the researched process.

According to innovative activity in KBXT: introduced innovations (X_1), volume of produced innovative goods, works and services (X_2), volume of expenditures on technological, marketing organizational innovations (X_3) (option 2, table 5). We transferred these indicators to the values of 2021 and made a forecast.

Table 4

Correlation-regression models of the influence of the KBST on the NQQ in the regions of the Republic of Uzbekistan

Areas	b_0	$b_1 x_1$	$b_2 x_2$	$b_3 x_3$
Karakalpakstan Republic	9.31	-0.11	0.14	0.02
Andijan	9.78	0.17	0.08	0.09
Bukhara	9.56	0.16	0.11	0.11
Jizzakh	9.17	0.13	0.11	0.11
Kashkadarya	9.89	0.08	0.10	0.01
Navoi	9.88	-0.01	-0.02	-0.01
Namangan	9.54	0.12	0.09	0.06
Samarkand	10,17	0.09	0.06	0.06
Surkhandarya	8.98	0.37	0.10	0.12
Syr Darya	8.77	0.12	0.06	0.05
Tashkent	10.29	0.06	0.04	0.05
Ferghana	9.43	0.22	0.10	0.14
Khorezm	9.43	0.11	0.11	0.02

the constructed multifactor $Y_{YQQ} = 11,9 + 0,13x_1 + 0,10x_2 + 0,10x_3$ (option 2) econometric model and its compatibility with the process under study.

Table 5

Regression model and quality criteria of GNP of regions of the Republic of Uzbekistan

Areas	b_0 (Standartnaya oshibka)	$r_{x,y}$	F (Mainly F)	R-squared	t-statistics (P- Znachenie)
Option 1					
Black cap Republic	713.6 5 (0.04)	0.8877	71.69 (0000)	0.7880	150, 40 (0000)
Andijan	1814.46 (0.04)	0.8890	71.52 (0000)	0.7904	197.03 (0000)
Bukhara	1376.5 5 (0.04)	0.6355	26.66 (0000)	0.4040	161.62 (0000)
Jizzakh	824.31 (0.04)	0.8412	80.31 (0000)	0.7076	152.43 (0000)
Kashkadarya	1232.73 (0.05)	0.8542	49.50 (0000)	0.7297	139.59 (0000)
Navoi	865.75 (0.06)	0.6825	23.99 (0000)	0.4658	120.88 (0000)
Namangan	1510.95 (0.04)	0.9158	104.10 (0000)	0.8386	181.82 (0000)
Samarkand	2432.82 (0.04)	0.8932	59.82 (0000)	0.7979	192.70 (0000)
Surkhandarya	1074.83 (0.05)	0.9009	73.09 (0000)	0.8116	146.38 (0000)
Syr Darya	672.69 (0.05)	0.7759	40.23 (0000)	0.6020	138.57 (0000)
Tashkent	3231.72 (0.04)	0.5032	130.96 (0000)	0.2532	180.92 (0000)
Ferghana	2047.84 (0.04)	0.9153	84.3461 (0000)	0.8378	197.73 (0000)
Khorezm	894.68 (0.04)	0.9309	918871 (0000)	0.8666	176.95 (0000)
Option 2					
Black cap Republic	24.21 (0.19)	0.4356	2.52 (0000)	0.1898	16.50 (0000)
Andijan	16.87 (0.81)	0.8422	15.04 (0000)	0.7093	9.87 (0000)
Bukhara	39.82 (0.55)	0.8559	17.78 (0000)	0.7326	18.93 (0000)
Jizzakh	33.58 (0.22)	0.7715	13.44 (0000)	0.5953	16.19 (0000)
Kashkadarya	9.25 (0.39)	0.5261	3.00 (0000)	0.2768	5.70 (0000)
Navoi	59.15 (0.23)	0.8726	24.49 (0000)	0.7615	18.02 (0000)
Namangan	59.72 (0.21)	0.8444	20.93 (0000)	0.7131	19.19 (0000)
Samarkand	42.64 (0.28)	0.8469	16.03 (0000)	0.7172	13.23 (0000)
Surkhandarya	46.62 (0.13)	0.8966	26.01 (0000)	0.8039	28.97 (0000)
Syr Darya	60.19 (0.25)	0.8179	13.49 (0000)	0.6687	16.39 (0000)

Tashkent	99.88 (0.35)	0.8418	15.46 (0000)	0.7087	13.30 (0000)
Ferghana	97.75 (0.10)	0.8847	42.37 (0000)	0.7827	44.51 (0000)
Khorezm	16.83 (0.26)	0.3380	0.98 (0000)	0.1142	10.70 (0000)

The actual value of the criterion F of the Republic of Karakalpakstan is the fee $F_{\text{right}} = 71.69$ (option 1), $F_{\text{charge}} = 2.52$ (Option 2). If the calculated value is higher than the value in the table, the constructed multifactor econometric model is said to be statistically significant. $F_{\text{is right}} > F_{\text{ch}}$ satisfied the condition, so it can be used in forecasting for future periods.

t when checking the confidence level of multifactor econometric model parameters and correlation coefficient from criteria was used. Here too, t is the value for the estimated parameters in the multifactor econometric model. $t > t_{\text{jad}}$ should be higher than the value of t_{jad} . $t = 150.4$ (option 1), $t = 16.5$ (option 2).

It is known that the coefficient of determination takes values from 0 to 1. If the value of the selected factor is close to 1, the influence of the factor is strong. In this case, the coefficient of determination is equal to $R^2 = 0.7880$ (option 1), $R^2 = 0.1898$ (option 2), it was determined that the influence of the selected factor indicators on the result (Y) is equal to 78.80 and 18.98 percent.

Table 6

The forecast of the GNP in the regions of the Republic of Uzbekistan by the National Agricultural Research Service, (estimated in 2021)

		2021*	2022	2023	2024	2025	2026
Karakalpakstan Republic	Option 1	14805.4	15220.1	15984.8	16790.1	17638.2	18531.4
	Option 2	14805.4	15314.2	15957.2	16627.3	17325.4	18052.9
Andijan	Option 1	31441.8	34760.9	37140	39685.2	42408.2	45321.6
	Option 2	31441.8	32740.3	34224.1	35777.1	37402.4	39103.6
Bukhara	Option 1	29211.8	29657.6	31359	33168.7	35093.7	37141.8
	Option 2	29211.8	29815.6	31123.7	32489.2	33914.6	35402.6
Jizzakh	Option 1	18959.6	19421.3	20545	21739.6	23009.7	24360.1
	Option 2	18959.6	20520.3	21673.9	22892.4	24179.4	25538.7
Kashkadarya	Option 1	30245	30789.4	32542.4	34403.2	36379.1	38477.2
	Option 2	30245	30619.8	32034.7	33515.1	35063.8	36684.1
Navoi	Option 1	16085.9	18504.8	18812.8	19129	19453.5	19786.6
	Option 2	16085.9	17882.7	17791.4	17700.7	17610.6	17521.2
Namangan	Option 1	25342.7	26225.7	27573.9	28994.9	30492.7	32071.5
	Option 2	25342.7	26055.7	27136.4	28262	29434.2	30655.1
Samarkand	Option 1	39452.4	42516.7	44528.2	46635.8	48844.2	51158.1
	Option 2	39452.4	40626.3	41809.4	43027	44280.3	45570.2
Surkhandarya	Option 1	23260	24095.7	25398.1	26773.6	28226.4	29761
	Option 2	23260	23663.7	24653.9	25686	26761.7	27882.9
Syrdarya	Option 1	10783.5	10461.8	10792.5	11134.8	11489	11855.6
	Option 2	10783.5	11102.3	11500.8	11913.6	12341.2	12784.2
Tashkent	Option 1	38445.5	39734	40818.6	41940.6	43101.4	44302.3
	Option 2	38445.5	42405.4	43431.7	44483	45559.8	46662.7
Ferghana	Option 1	33085	34235.8	36268.5	38422.8	40706.1	43126.2
	Option 2	33085	34618.3	36418.6	38312.5	40304.9	42400.9

Khorezm	Option 1	19879.3	21279.1	22433.4	23650.9	24934.9	26289.1
	Option 2	19879.3	20505	21175.9	21868.8	22584.3	23323.2

In conclusion, in recent years, in a number of countries developing on the basis of innovative economy, the process of implementation of many previous tasks performed by giant enterprises by mobile, that is, compact, small enterprises is being observed. Due to these reasons, the number of large industrial enterprises is decreasing and the number of small enterprises is increasing rapidly. This process ensures the dynamic, mobile, news-responsive growth of the market economy, rapid adaptation to market demand and its changes.

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