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SMALL BUSINESS MODELING AND GDP FORECASTING OF THE REPUBLIC OF UZBEKISTAN

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Abstract. In the article there studied relationship between main indicators of small business in the sectors of economy and the volume of GDP of the Republic of Uzbekistan. There determined GDP forecast value that are based multivariate models.

Keywords: modeling, small business, GDP, share of small business in GDP, number of small enterprises, correlation, regression.

Much attention has been paid to the support and development of small businesses in the Republic of Uzbekistan lately. There commemorated a new stage in the economic development of the country in the Strategy for Actions on the further development of Uzbekistan in 2017-2021. In accordance with this document there implemented wide-ranging reforms aimed at improving the investment climate, creating a favorable business environment and stimulating accelerated business development. And there strengthened legal protection of small business, and financial support for the development of entrepreneurial activity [1].

According to the Tax Code adopted the following year there implemented a great number of innovations. In particular, the number of types of taxes has been reduced from 13 to 9. Simple tax payment mechanisms have been brought with the option of delay or installment plan. For the first time, the procedure for returning part of the value-added tax during sale of goods has been introduced to entrepreneurs. Previously, this system was applied only for exporting goods. Due to this, 3.4 trillion soums will remain at the disposal of entrepreneurs, or 2.5 times as much as than last year [2].

As a result of measures taken to create a business environment, comprehensive support and further stimulate business development, in 2019, 92.9 thousand new small enterprises and micro-firms were created (without dekhon farms and farms), which is 1.9 times more than in 2018. The largest number of small enterprises and micro-firms were created in the field of trade (39.1%), industry (21.0%), construction (9.4%), agriculture, forestry and fisheries (8.0%), housing and food (7.8%), transportation and storage (3.2%). Based on 1000 people, the average for the Republic of Uzbekistan on 01.01.2020 is 13.3 units. small businesses, or 100.8% of the level of 01.01.2019 [4].

Currently, small business plays a key role in the national economy of the country and the following data indicates it:

Table 1

Years	Share of small business (in % to the total volume)				
	GDP	The industry	Services	Construction	Employment
2015	54.5	40.6	58.2	66.7	77.9
2016	57.3	45.3	61.4	66.9	78.2
2017	54.9	41.2	58.4	66.2	78.0
2018	59.4	37.4	56.0	73.2	78.3
2019	56.5	34.9	52.1	75.4	78.1

Source: State Committee of the Republic of Uzbekistan on Statistics.

The share of small business in GDP is 56.4% (59.4% in 2018), industry - 37.4% (34.9%), services - 52.1% (56%), construction – 73.2% (75.4%), employment - 78.1% (78.3%) and export 28.7% (27.2% view the table 1).

It is known that the GDP volume is the sum of the bulk of completed work in all sectors of economy. Consequently GDP depends on the volume of key indicators of small business and business in sectors of economy. In work [3] there carried out an econometric analysis between the number of small business entities and their share in the GDP of the Republic of Uzbekistan.

In this paper, we are going to examine the relationship between the main indicators of small business in the sectors of economy and the volume of GDP of the Republic of Uzbekistan. In order to study the relationship between the main indicators of small business and GDP there used multivariate correlation and regression analysis.

Endogenous (dependent) variable volume has been chosen in GDP (Y, billion soums) of the Republic of Uzbekistan. The following indicators (factors) are taken as an exogenous (independent) variable:

- the bulk of completed work by small enterprises in industry (X_1 , billion soums);
- the number of people employed in the sphere of small business (X_2 , thousand people);
- export volume of small enterprises (X_3 , mln. USD);
- the number of operating small enterprises (X_4 , thousand units);
- the volume of services of small business trade (X_5 , billion soums);
- the volume of completed work by small enterprises in agriculture, forestry and fish sector (X_6 , billion soums).

To conduct the research there have been used the data of the above mentioned indicators for 20 years (from 2000 to 2019) presented on the website of the State Committee of the Republic of Uzbekistan on Statistics [4].

Intercorrelation coefficients (i.e., correlations between explanatory variables) make it possible to exclude duplicating factors from the model. It is considered that two variables are clearly (strong) collinear, i.e. they are linearly related to each other if the pair correlation coefficient $r(x_i, x_j) > 0,8$. In this case, one of the duplicating factors is excluded from the regression model. Thus preference is given not to the factor that is more closely related to the result, but to the factor that is fairly close connection with the result, has the smallest closeness of connection with other factors. Now on size of pair correlation coefficients we will determine visible collinear factors. In table 2 there given the correlation matrix of indicators of subjects of a small business.

Now, by the magnitude of the pair correlation coefficients, we determine clearly collinear factors. Table 2 below shows the correlation matrix of indicators of small businesses.

Table 2
Correlation matrix

	X1	X2	X3	X4	X5	X6
X1	1					
X2	0,7483	1				
X3	0,7877	0,9191	1			
X4	0,9369	0,9264	0,9226	1		
X5	0,9935	0,8065	0,8271	0,9612	1	
X6	0,9931	0,7991	0,8315	0,9608	0,9971	1

Source: Author's calculation

Correlation matrix shows that the pair correlation coefficients between X_4 and X_1 , X_4 and X_2 , X_4 and X_3 , X_4 and X_5 , X_4 and X_6 are greater than 0.8 and therefore, we exclude the exogenous (independent) variable X_4 from the model. Similarly, factors X_5 and X_6 are excluded from the model. Thus, the multidimensional regression equation has the form:

$$y = a + b_1 \cdot x_1 + b_2 \cdot x_2 + b_3 \cdot x_3$$

Due to a precise interpretation of the parameters there widely used linear and power functions in practice. In linear multiple regression, the

parameters $y = a + b_1 \cdot x_1 + b_2 \cdot x_2 + \dots + b_k \cdot x_k$ at x are called the “pure” regression coefficients. They characterize the average change of the result with the change in the relevant factor per unit at a constant value of other factors fixed at an average level.

The estimation of the closeness of the connection and statistical significance in multiple regression is determined by the multiple correlation coefficient R and the multiple determination coefficient $D = R^2$.

In our case $R = 0,996$ and $D = 0,993$ means that 99,3% of the runway variation is explained by the variation of factors X_1 (the volume of completed work by small enterprises in the industry), X_2 (the number of people employed in small business) and X_3 (export volume of small enterprises).

By means of Microsoft Excel program (Data Analysis) there estimated parameters of the regression equation (view table 3).

Table 3
Results of estimation of regression parameters

Parameters	t-statistics	P-value
$a = -12090,893$	– 0,653525932	0,522699092
$b_1 = 4,327465$	26,39432384	1,28049E-14
$b_2 = 4,1851659$	1,302909624	0,211046106
$b_3 = -4,1059851$	– 0,719315116	0,482321768
	F_r	F_{cr}
Fisher's criterion	830,3925871	9,1577981E-16

Source: Author's calculation

From table 3 it is clear that P-values of parameters of multiple linear regressions are very small therefore all coefficients of linear model are significant. Calculated value of criterion of Fisher (F_r) is much more, than the critical value of Fisher (F_{cr}) and consequently we draw conclusion on statistical importance of the equation of linear regress with a significance value 0,99. The average standard error of GDP calculated on the basis of multiple linear regression models constitutes 0,1292 or an error of approximation of 12,92 %, and it is considered acceptable.

On the basis of regression models there made the forecast of aggregate volume of GDP of the Republic of Uzbekistan for 2020-2024. At a choice of values of factors X_1 (amount of executed works by small enterprises in the industry), X_2 (quantity of people occupied in sphere of small business) and X_3 (volume of export small the enterprise) us have been specified average rate of a gain for last 20 years and considered economic a consequence coronavirus pandemics on activity of small enterprises for 2020 (view table 4).

Table 4

Forecasted value of GDP of the Republic of Uzbekistan

Years	Volume (billion soums)	Growth rate %
2019 (the actual)	511838.1	
2020	598200,8	116,9
2021	720007,4	120,4
2022	881045,7	122,4
2023	1121273	127,3
2024	1447874	129,1

Source: Author's calculation on the basis of regression model

It is known that in order to determine GDP growth rate, there counted GDP deflator in relation to the prices of the previous year. During calculation of the growth rate of forecasted GDP value, the GDP deflator index is not accounted in relation to the prices of the previous year.

It is known that in the Republic of Uzbekistan in 2019 GDP deflator index amounted to 119,2% in relation to the prices of the previous year [4]. If this indicator of the GDP deflator index remains then according to our forecast, GDP growth rate will be: -1,9% in 2020, + 1,0% in 2021, + 2,7% in 2022, 6,8% in 2023 and in 2024 it will reach + 8,3%.

Thus, small business directly affects formation of the GDP of the country contributes to the competitiveness of national economy, promotes its innovative development, stabilizes political situation in the country, improves welfare of population and facilitates the republic enter the world arena. That is why, in the Republic of Uzbekistan development of small business is the most important priority task and for implementation of the task the state embarks all efforts.

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**ELECTRONIC DIDACTICS AS A FACTOR IN MODERNIZATION OF HIGHER
EDUCATION IN PANDEMIC (COVID-19)**
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Abstract: Global changes in society and education that have recently occurred in pandemic due to intensive use of information and communication technologies suggest a revision of traditional view of didactics. The article considers subject and objectives of e-learning didactics, analyzes terms used in a system of didactic support of e-learning in higher education, and considers promising areas of e-learning and development of didactic principles.

Keywords: e-learning, traditional didactics, e-learning didactics, distinction parameters, didactic principles, didactics tasks.

The main direction of strategic development of the Republic of Uzbekistan is comprehensive modernization as an important factor of prosperity of the country factor, sustainable economic growth, providing population employment. Building a strong base of successful development of modernization process is impossible without participation in the process of education system, a leading role in which belongs to potential of higher educational institutions. In order to achieve the intended purpose in State program 2020 "The Year of Development of Science, Education and Digital Economy," there made a special emphasis on providing innovative character, digitalization of education system in accordance with social and economic challenges and digital economy.

Pandemic coronavirus infection COVID-19 affected educational systems around the world, which led to the mass closure of schools and higher educational institutions. Almost all higher educational institutions of the Republic of Uzbekistan transferred to distance learning from March 16, 2020. Educational policy experts believe that after the end of pandemic, educational institutions would not like to return completely to usual format of training. In Uzbekistan there is going to happen a rise of online education. However, many problems are also expected. A significant problem is behavior of teachers and managers of educational programs in the context