

ECONOMETRIC MODELING OF THE VOLUME OF SERVICES PROVIDED IN
TASHKENT REGION



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Аннотация: мақолада Тошкент вилоятида кўрсатилган хизматлар ҳажмига таъсир этувчи асосий хизмат турлари бўйича эконометрик моделлаштириши амалга оширилган. Шу билан бирга вилоятда хизматлар ҳажмининг истиқболдаги прогноз қийматлари юзасидан таклифлар берилган.

Таянч сўзлар: хизматлар ҳажми, статистик маълумотларни тўплаш, жадвал ва графиклар, ўзгариш суръатлари, динамика қаторлари, эконометрик модел, детерминация коэффициенти, Стьюдент мезони, прогноз кўрсаткичлари.

Аннотация: в статье проведено эконометрическое моделирование основных видов услуг, влияющих на объем предоставляемых услуг в Ташкентской области. При этом были высказаны предложения относительно будущих прогнозных значений объема услуг в регионе.

Ключевые слова: объем услуг, сбор статистических данных, таблицы и графики, темпы изменения, ряды динамики, эконометрическая модель, коэффициент детерминации, критерий Стьюдента, прогнозные показатели.

Annotation: in the article, econometric modeling of the main types of services that affect the volume of services provided in Tashkent region is carried out. At the same time, proposals were made regarding the future forecast values of the volume of services in the region.

Key words: volume of services, collection of statistical data, tables and graphs, rates of change, dynamics series, econometric model, coefficient of determination, Student criterion, forecast indicators.

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Currently, the service sector in our country remains the main criterion for evaluating the socio-economic development of regions. In this regard, the President of the Republic of Uzbekistan on January 28, 2022 "Development Strategy of New Uzbekistan for 2022-2026" PF-60- number According to the decree "Development of the engineering-communication and social infrastructure system of the regions, as well as service and service industries"[1] is set as a goal.

In particular, the development of the service sector in our country is of great importance in ensuring economic growth, employment of the population (especially young people), and ultimately in improving living conditions. According to the end of 2022, the service sector in Uzbekistan made up 41.5% of the GNP, and the real growth rate of the sector in 2017-2022 increased 1.9 times [2].

In this article, the President of the Republic of Uzbekistan dated May 11, 2021 "On measures for rapid development of the service sector" No. PQ-5113[3] and PQ-104 No. [4] dated January 27, 2022 "On additional measures for the development of the services sector" on increasing the importance of the services sector in the economy of our country, fully utilizing the available opportunities in the field of

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services, expanding the types of services and improving their quality. It was specially noted that it is appropriate to solve the problematic issues that are waiting for their solution, to study the advanced experience of developed countries in fulfilling these tasks, and to apply their positive results in the republic.

LITERATURE REVIEW ON THE SUBJECT

A number of indicators have been developed in relation to scientific works on the topic, which are widely used in econometric modeling. One of them is the coefficient of determination, which takes the values [0;1] in the section. The closer the coefficient value is to 1, the stronger the relationship. In order to be able to compare the models with different number of factors, and this number of factors does not affect the R^2 statistic, a corrected coefficient of determination is usually used [5], that is:

$$R_{\text{текис}}^2 = 1 - \frac{s^2}{s_y^2}$$

We use Fisher's F-criterion to determine the statistical significance of the constructed multifactor econometric model and its compatibility with the studied process. The true value of the F-criterion is calculated using the following formula:

$$F_{\text{хисоб}} = \frac{R^2}{1 - R^2} \cdot \frac{n - m - 1}{m},$$

Here: R^2 - determination coefficient;

n - number of observations;

m - the number of factors.

If the actual value is greater than the value in the table, then the constructed multifactor econometric model is said to be statistically significant or adequate for the process being studied.

t-test is used to check the reliability of multifactor econometric model parameters and correlation coefficients. In this case, their value is compared with the values of random errors [6].

the calculated (t_{count}) and table (t_{table}) values of Student's *t*-criterion, we accept or reject the N_0 hypothesis. For this, we find the tabular value of α the *t*-criterion based on the conditions of the selected reliability probability (α) and degree of freedom (d.f. = $n - m - 1$). Here is n the number of observations; m - the number of factors.

RESEARCH METHODOLOGY

The Dickey-Fuller (DF) test, Fisher's F-test, Student's *t*-test were used to create an econometric model for the main service areas that affect the volume of services presented in the scientific article, and the future forecast values were determined, and the author gave conclusions and suggestions.

RESULT AND DISCUSSION

Thirteen types of services affecting the change in the volume of services provided in Tashkent region were selected as factor indicators. Accordingly, the output symbol is the volume of services (Y), the factor symbols are services in the field of information and communication (X_1), financial services (X_2), transport services (X_3), accommodation and food services (X_4), trade services (X_5), real estate services (X_6), education services (X_7), health storage services (X_8), rental and leasing services (X_9), repair services for computers, personal items and household goods (X_{10}), personal services (X_{11}), architectural, engineering research, technical testing and analysis services (X_{12}) and In order to study the impact of other services (X_{13}), econometric analysis and models were created.

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Based on these indicators, data on the rate of change of service sectors affecting the growth of the service volume in Tashkent region for 2010-2022 are presented in Table 1.

Table 1

Rates of change in the volume of services for the main types of economic activity in Tashkent region (compared to last year, %)¹

ears		1	2	3	4	5	6	7	8	9	10	11	12	13
010	26.7	32.5	28.2	34.2	22.5	19.2	68.8	8.7	37.0	15.2	13.9	18.3	32.8	20.6
011	13.8	22.7	24.2	11.3	34.4	12.4	16.8	13.2	18.5	17.9	18.1	24.2	1.8	31.9
012	15.6	68.5	03.2	11.6	27.4	12.6	28.1	03.5	38.5	15	23.5	24.3	14.0	58.3
013	18.4	24.9	85.1	15.3	25.9	12	12.2	03.7	30.7	14.2	16.0	23.0	33.0	06.7
014	17.2	29.6	22.3	17.0	20.5	17.2	16.6	08.2	26.8	17.3	12.3	22.6	2.3	19.5
015	13.2	19.9	28.7	07.5	24.3	13.0	19.7	18.6	28.3	11.9	23.2	05.9	25.5	08.5
016	16.9	17.8	16.3	21.9	19.9	13.3	15.6	06.5	05.9	19.4	11.8	18.6	09.3	13.5
017	05.1	29.8	27.1	01.4	06.3	00.2	03.5	15.5	22.3	04.2	02.2	02.5	42.5	06.4
018	07.0	23.8	27.6	00.5	9.5	04.0	06.1	16.8	28.4	02.2	01.8	02.5	75.1	04.9
019	13.4	07.9	41.2	04.0	11.0	17.2	06.4	39.1	14.4	02.5	03.8	03.4	04.0	8.8
020	02.0	43.1	31.5	02.0	7.5	9.4	9.3	1.6	7.0	9.6	2.7	0.8	8.9	21.2
021	17.8	30.9	14.5	17.5	23.2	09.7	22.5	19.6	65.4	23.4	19.7	27.1	55.0	22.1
022	13.2	28.0	28.6	07.1	08.9	12.2	15.9	27.5	26.8	15.3	12.9	08.8	0.1	49.9

¹ Source: calculated based on the data of the Statistics Department of Tashkent region .

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From the indicators presented in the table above, it can be seen that the service sector in Tashkent region had a growing trend until 2020, and in 2020, due to the pandemic, a downward trend was observed in all sectors, especially in the service sector. Starting from 2021, the trend of growth in these areas began to occur again.

Correlation analysis of the indicators presented in Table 1 was carried out between each other and on the impact of these indicators on the volume of service .

Table 2

Correlation of service areas in Tashkent region with the total volume of services²

Y	1.0	-0.0	0.0	0.9	0.7	0.9	0.9	0.1	0.6	0.7	0.7	0.8	0.1	0.2
x1	-0.0	1.0	-0.4	0.0	0.0	-0.2	0.2	-0.5	0.1	0.1	0.2	0.2	-0.1	0.7
x2	0.0	-0.4	1.0	-0.1	-0.0	0.0	-0.2	-0.0	-0.1	-0.2	-0.2	-0.1	0.1	-0.5
x3	0.9	0.0	-0.1	1.0	0.6	0.7	0.8	-0.2	0.4	0.7	0.5	0.7	0.0	0.1
x4	0.7	0.0	-0.0	0.6	1.0	0.7	0.6	0.2	0.6	0.8	0.9	0.9	0.0	0.2
x5	0.9	-0.2	0.0	0.7	0.7	1.0	0.7	0.4	0.4	0.6	0.6	0.6	-0.2	0.1
x6	0.9	0.2	-0.2	0.8	0.6	0.7	1.0	0.0	0.6	0.5	0.6	0.5	0.2	0.3
x7	0.1	-0.5	-0.0	-0.2	0.2	0.4	0.0	1.0	0.5	0.1	0.3	0.1	0.1	-0.2
x8	0.6	0.1	-0.1	0.4	0.6	0.4	0.6	0.5	1.0	0.6	0.7	0.7	0.5	0.2
x9	0.7	0.1	-0.2	0.7	0.8	0.6	0.5	0.1	0.6	1.0	0.8	0.9	-0.1	0.4
x10	0.7	0.2	-0.2	0.5	0.9	0.6	0.6	0.3	0.7	0.8	1.0	0.8	0.0	0.4
x11	0.8	0.2	-0.1	0.7	0.9	0.6	0.5	0.1	0.7	0.9	0.8	1.0	0.1	0.4
x12	0.1	-0.1	0.1	0.0	0.0	-0.2	0.2	0.1	0.5	-0.1	0.0	0.1	1.0	-0.5
x13	0.2	0.7	-0.5	0.1	0.2	0.1	0.3	-0.2	0.2	0.4	0.4	0.4	-0.5	1.0
	Y	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13

the analysis of the data in the table above , to the resulting sign according to the data of the correlation table of factors (volume of rendered services – Y) relatively strongly connected factors are transport services (X₃), accommodation and catering services (X₄), trade services (X₅) and services related to real estate (X₆) are .

Accordingly, in order to more clearly express the relationship between indicators, we create the following graph.

² Source: calculated based on the data of the Statistics Department of Tashkent region .

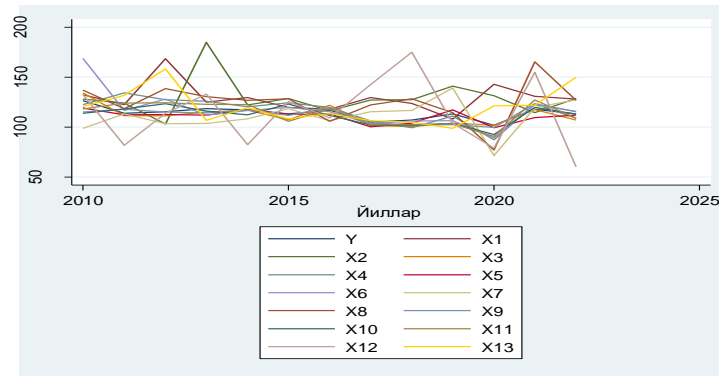


Figure 1. The impact of changes in the service sector in the Tashkent region in 2010-2022 on the volume of services provided³

$$Y_{service} = \beta_0 + \beta_1 \sum_{i=1}^{n=13} X_i + \varepsilon$$

For this, the Dickey-Fuller(DF) test is used[7]. This test was developed by Dickey and Fuller and is based on equality (1) and (2) and is called the Unit Root Test:

$$\Delta Lny_t = \delta Lny_{t-1} + u_t \quad (1),$$

or

$$Lny_t = (1 + \delta)Lny_{t-1} + u_t \quad (2),$$

These thirteen services have different effects on the volume of general services. We selected the four most basic and statistically significant types of services.

Table 3

Types of services that had a high impact on the growth of the total volume of services in Tashkent region in 2010-2022⁴

	Demonstrators	Coefficient	R ²	t test	F test	Darbir Watsin	Brooch Pagan
1	C audio services	0.88	0.74	5.64	31.87	1.96	0.11
		0.15		0.000	0.00		
2	Transport services	0.603	0.82	7.13	50.85	2.4	0.15
		0.08		0.00	0.000		
3	Accommodation and dining services	0.36	0.55	3.70	13.69	2.16	0.19
		0.09		0.0004	0.0035		
4	Services related to real estate	0.29	0.73	5.45	29.76	2.35	0.45
		0.05		0.000	0.0002		

Models that meet all tests according to the Gaussian Markov conditions, which determine the statistical and economic significance of the model, were selected. Based on scientific research, the

³ Source: calculated based on the data of the Statistics Department of Tashkent region .

⁴Calculated by the author based on STATA software.

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selected models were systematized according to the impact on the overall service delivery. According to it, trade services, transport services, accommodation and catering services, real estate related services are ranked accordingly.

Analyzing Figure 2, we learned that a one percent increase in services related to trade, transportation, living and dining, and real estate in the region is 0.88 of total services, respectively; 0.603; 0.36 and 0.29 percent increase. For us to draw such a conclusion, the statistical significance of the coefficient was the basis, the probability value is equal to 0.000. The F-test probability is also 0.000, and we accept the alternative hypothesis.

We have determined that the future forecasting of economic development options is based on the hypothesis that the previous development factors and directions will be preserved during the forecasting period. Such a hypothesis is caused by the insufficient inertia of the economic situation and processes.

In order to develop the economy of the Tashkent region, it is necessary to develop specific plans and calculations on the growth of the volume of services provided in the coming years, fully mobilizing the existing potential and opportunities.

Based on the results of the research, the options for forecasting the volume of services in Tashkent region are presented in Table 4.

Table 4 _

Forecast indicators of service volume in Tashkent region⁵

Years	Pessimistic	Average	Optimistic
2023	102.6	112.2	120.0
2024	103.0	112.9	122.5
2025	103.8	113.5	122.9
2026	104.1	113.7	123.2
2027	104.9	114.0	123.8

Accordingly, the volume of services in Tashkent region will increase from 13.2 percent in 2022 to 23.8 percent in 2027 according to the optimistic forecast. For this, in the area, trade services, transportation services, accommodation and catering services, and real estate it is required to increase the share of types of services.

CONCLUSION

One percent increase in services related to trade, transportation, living and dining, and real estate in the region is 0.88 of total services, respectively; 0.603; 0.36 and 0.29 percent increase. For us to make such a conclusion, the statistical significance of the coefficient was the basis, the probability value is equal to 0.000. The F-test probability is also 0.000 and we accept the alternative hypothesis.

It is determined that the volume of services in Tashkent region will increase from 13.2 percent in 2022 to 23.8 percent in 2027. For this, the area has trade, transport, accommodation and catering services, as well as real estate an increase in the share of services is required.

⁵ Author's account.

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Thus, in order to ensure the development of service industries in Tashkent region, we believe that it is appropriate to implement the following tasks:

- increase the capacity of personnel in the regions in order to provide services;
- to improve the standard of living of the population by directing innovative technologies to this area;
- expanding the demand for services in domestic and foreign markets, thereby ensuring the level of employment of the population;
- it is necessary to increase the flow of tourists through the development of this sector in the regions;

By developing the service sector in the region, the level of unemployment in the labor market will decrease, and the standard of living of the population will improve from year to year, as well as the growth of the gross regional product.

The implementation of the above-mentioned ideas and opinions in practice serves as an important factor in the improvement and development of the service sector.

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