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Providing Accommodation and Food Services to the Population of the Region

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ABSTRACT

Analyzing development processes of each providing accommodation and food services to the population of the region, the sequence of choosing and modeling the main factors which influence their development are represented through simulation schemes in this article.

KEYWORDS: *multifactorial empirical models, regression equation, correlation coefficient, complex modeling, econometric modeling, differential equations, static and dynamic parameters, structural analysis, synthesis, optimization*

I. INTRODUCTION

The spread of digital technologies in Uzbekistan today is reflected in the" strategy of action on five priority areas of development of the Republic of Uzbekistan in 2017-2021", presented in Annex 1 to the Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. 4947, which States that"by expanding the scale of modernization and diversification of the regional economy, social growth will be ensured - accelerated development of comparable districts and cities by reducing differences in the level of economic development and, above all, improving the quality of public services".

In the implementation of these tasks, in terms of further deepening reforms, " in the future, there should be important tasks for the comprehensive development of not only the basic sectors of the economy, but also, above all, the regions, ensuring the vital interests of all citizens of the country and increasing their incomes»[1; 2].

Over the past 30 years, the issues of empirical modeling, the information technologies' influence on the activities of the service sector and the optimal management of the economic system of the territory have received much attention in the scientific works of foreign and domestic scientists.

II. Methods

There have been many discussions about building an empirical model for predicting the provision of services to the population of a territory using digital technologies In the scientific studies of R. Arens, N.R. Goodman and R.A. Wooding, it was noted that the use of complex numerical econometric models in forecasting economic growth is one of the most promising methods. Interest in regressive complex-numerical econometric models and complex-numerical variable functions with statistical observation arose in the 50-60s of the XX century. G. N. Tavares and L. M. Tavares in their research they also focused in this direction.

In the works of modern authors, a number of areas for assessing the implementation of information technologies in the service sector are distinguished, it can be divided into the following classification[9; 11; 12; 13]:

using the classical methodology for evaluating investment projects and programs based on international standards;

use of economic methods for calculating the inclusion of a factor in the overall result, cost savings, calculation of the system of financial indicators, assessment of the level and dynamics of indicators by industry (when using an information system)

Application of expert assessment methods (usefulness, prospects, accessibility, ease of use of information resources, etc.);

Use of information diagnostic methods (netmetry, webometry)

III. Results and Discussion

In econometric modeling, the task of control systems is considered change of the variable *y(t)* in given accuracy (with permitted error) in accordance with the law. When projecting and operating automatic control systems, it is necessary to select the parameters which can ensure the required control accuracy of the *S* system, as well as its stability during the transition process.

If the system becomes stable, then its behavior by time, the maximum deviation of the adjustment variable *y(t)* in the transient process, the transient process time, and others are of practical interest. The properties of different classes of automatic control systems can be concluded by the types of differential equations which most closely describe the processes in the system. The order of the differential equations and the value of the coefficients completely determine the static and dynamic parameters of the system.

Using Figure 1.gives opportunity to accept analytical or imitation approaches which are developed in the form of appropriate language for modeling continuous systems or using analog and hybrid computational techniques in forming the process of continuous-determined ***S*** systems activity and evaluating their basic characteristics.

The importance of econometric modeling of public service sectors is reflected in the followings:

The material, labor and monetary resources are rationally used;

It serves as a leading tool in the analysis of economic and natural processes;

it will be possible to make some adjustments during the forecasting of the development of public service sectors;

It gives opportunity not only in-depth analyzing service sectors, but also discovering their unexplored new laws.

They can also be used to predict the future development of service sectors;

It facilitates mental work along with the automation of computational work, creates the opportunity to organize and manage the work of personnel of service sector on the scientific basis.

In our opinion, there are the following actual issues which are waiting for their solution, in the development of the service sector: identifying classification of the types of services which are provided to the population, evaluating the nature of the service sector, developing a system of indicators of service sectors in current situation, improving the process of econometric modeling of development of public service sectors and forecasting it through them.

Human creates and serves the object of service to himself. Because of this, it is possible to introduce the belief that services are for the human and performing the service is also a human. This means that both the producer of the services and its consumer are also human. This can be expressed as follows:

It is known that as a result of the service, the GDP (Gross Domestic Product) of country will increase. This will be done in the following directions: a gross domestic product will be created in the conditions of market relations, as a result of service, irrespective of creating or non-creating a material wealth. Therefore, it is expedient to look at services not from the point of view of the creation of material wealth, but from the point of view of the creation of gross domestic product.

In the modern era of development of social and service sectors, the provision of services is gaining popularity. Therefore, the labor efficiency per unit of achieved output is required to be able to calculate fixed assets, material and financial costs.

Production and services have long been a part of human economic activity, social community life. The interaction among people as a social community institution of services, the existence of useful activities - are considered necessary condition of society and life of human. It should be noted that it is not exaggeration if we say that services will increase the level of development of society, not only at the level of its productive forces, but also taking into account its spiritual and enlightenment status.

In this study, we will mark public service sectors as a system by improving the development models of public service sectors as a basis for systematic analysis. At the same time, we consider a single object and the types of services as a collection of collected elements in order to achieve the goal. Namely, we will systematically study to increase the efficiency of public services and living conditions. These researched types of services are understood as interconnected integrity in their integrity. As a result of systematic analysis, the economic-effectiveness indicator will be determined.

In the condition of market economy, service enterprises operate in a variety of forms of ownership, full economic independence and competitiveness. This market involves the flexible use of different methods of house holding management and the choice of econometric models of service, in this case, it creates opportunity for rapid adaptation to changes in the external environment in a competitive environment.

Our goal consists of analyzing the service sectors in the region and improving its models.

I. First of all, modeling gives opportunity to express a large and complex system using a simple model. The process of providing services to the population is a difficult system. It can be expressed through a systematic analysis scheme.

The mechanism of public service can be described graphically. Of course, this creates many problems.

II. The wide field is created for making experiments with the structure of the econometric model of public service sectors. We can determine the most optimal state of activity of service enterprises by changing several times the parameters of the model. We can experiment on electronic computing machines through this model and then we can apply it in life.

Experimenting on real objects can lead to many mistakes and huge costs.

III. The service sectors will be studied and analyzed in detail in order to create a model. After the model is created, it can be obtained new information about processes of service sector with using it. Thus, the process of service sector becomes a continuous process.

A systematic methodology of complex problems in the field of services is developed on the basis of a systematic approach and general concepts. During the analysis, we take into account the internal and external environment of the service sectors. This means that it must be taken into account not only internal factors, but also external factors such as economic, geopolitical, social, demographic, environmental and other factors.

Each system of the service sector includes its own service elements, while at the same time it reflects the low-level subsystem elements. In other words, the elements of the service sector will be interconnected with different systems in many ways, without interfering with each other.

The systematic approach is expedient for each element of its structural structure in ensuring the completeness of the public service system.

In order to do this, the service sector is considered as a complex system, quantitative and qualitative aspects of its expression laws are studied. Imitation has important role in the analysis of the activities of the service sector which is considered as a complex economic process[19; 20].

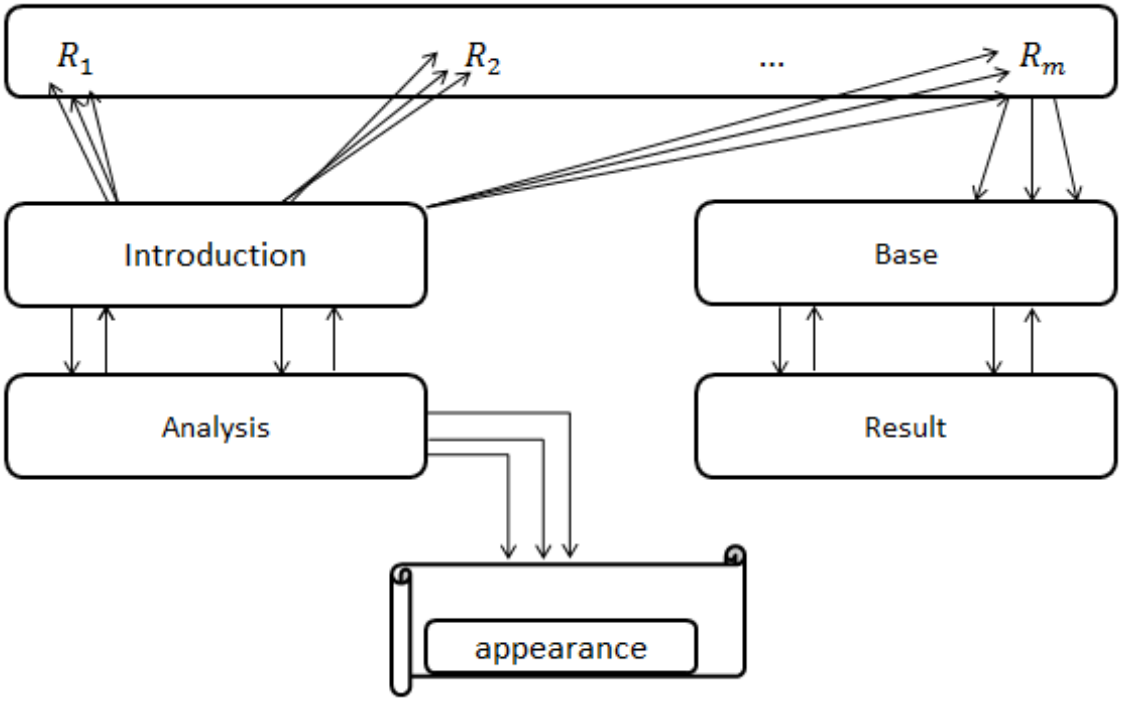

Fig.1. Scheme of systematic imitation of econometric modeling of the public service sector

The imitation model is constructed for each sector to predict the future state of the public service sector. The following tasks should be done in order to do this (Fig.1):

forming database of service sector networks and factors which influence it;

identifying the relationship between each service sector and the factors which influence it, the factors which influence it;

developing a separate model for each service sector;

examining developed models according to evaluation criteria;

forming a database forecast on the basis of certain legitimacies of factors which influence forecasting through models which are considered significant;

achieving outcome factors on the basis of databases and models.

In this case, special functions are reviewed, attention is paid to the algorithms of system operation. It is implied the properties which lead to the goal as function. In this case, performing functions of the system are evaluated on the basis of a functional approach. It creates opportunity to determine the activity of the system, to determine its status, to mark the management legitimacies of systems. An important aspect of this is considered appearing hierarchical subordination among these parts and reflecting it in the relative independence of these parts. This will help the population to develop an integrated systematic imitation model of all elements of its service sector on the basis of a single system.

It is expedient to study the correspondence of different values to the factors which influence to the social phenomena, not the same values, and the correlation connection of their interdependence. Because a characteristic feature of the social spheres is that it is impossible to determine a complete list (strength) of all the factors which affect this sphere.

Besides, only approximate expressions of the connections can be written using the formula. Because the number of factors which influence the living conditions of the population is so large, it is impossible to determine a complete list of them and write an equation which fully represents the connection with influencing outcome sign.

The development of the living conditions of the population is considered so incompletely connection, that different values of the results of the factor which influence it in the different time and space, correspond to each value of the factors. Hence, the total number of influencing factors will be unknown. It is expedient to study such a dependence through correlation connections.

Our task consists of evaluating the existence of strong and weak connections which influence the development of public service sectors. We use the correlation analysis method in order to perform this task. Because our goal is considered to evaluate the importance and reliability of the interdependencies which influence the development of each sector which serves the population. We measure the criterion of dependence which influences the living conditions of the population through correlation analysis, but we cannot determine the cause of the relationships.

We selected information which belong to the reporting years 2004 - 2018, these information identified the areas of service and the factors which influence them, on the basis of certain signs (Table 1).

Table.1 Providing Accommodation and Food Services to the Population of the Region

$Yj0_x$-Providing Accommodation And Food Services	A_s-population	A_d-icome	K_m-capital	TFO_{bx}-cost
Y1	X1	X2	X3	X4
7.9	2378.2	541.7	339.3	20.3
10.4	2419.8	653.5	437.3	26.1
17.2	2462.2	850.3	697.9	34.5
18.1	2506.2	1068	830	43.9
18.9	2565.9	1376.6	1630.7	79.2
29.6	2615.5	1803.4	2193	108.3
31.4	2671	2380.4	1598	128.1
27.8	2713.2	2692.1	1802.8	127.3
26.3	2762.3	3186	2030.3	149.4
26.9	2895.5	3723.5	2257.6	136.5
20.9	2958.9	4304.4	2484.5	147.1
25.4	3025.6	4928.9	2711.4	165.6
146.9	3089.4	5597.1	2938	150.7
185.1	3148.1	6308.6	3164.5	165.6
220.8	3186.8	7063.8	3390.8	239.9

We created the following functional view on the basis of the service sectors in Table 1 and the factors which influence them (Table 2).

$$Y_jO_x = \varphi_5(A_s, A_d, K_m, TFO_{bx}) + \varepsilon_5$$

Y_jO_x−providing accommodation and food services to the population of the region.

In this case, the factors which influence the development of each service sector are separately divided in the modeling. Therefore, we took the development of some service sectors as a factor which influences to other service sectors. The impact of influencing factors affects service sectors in different degrees. Selected factors may be involved in modeling once or more. Because we consider one factor as the main factor which influences each service sector, and we can consider another factor as the main factor which influences only one service sector.

Table 2 Correlation matrix

Covariance					
	Y_5	X_1	X_3	X_7	X_{12}
Y_5	4449.870				
Коррелация	1.000000				
SSCP	66748.06				
t-Стьюдент мезони	-----				
Probability	-----				
X_1	13389.11	70201.80			
Коррелация	0.757537	1.000000			
SSCP	200836.7	1053027.			
t–Student criteria	4.184087	-----			
Probability	0.0011	-----			
X_2	113451.0	544619.2	4299322.		
Correlation	0.820228	0.991331	1.000000		
SSCP	1701765.	8169289.	64489825		
t–Student criteria	5.169905	27.20475	-----		
Probability	0.0002	0.0000	-----		
X_3	45670.95	240924.0	1851442.	897866.4	
Correlation	0.722538	0.959622	0.942333	1.000000	
SSCP	685064.2	3613860.	27771631	13467996	
t–Student criteria	3.768302	12.30018	10.15195	-----	
Probability	0.0023	0.0000	0.0000	-----	
X_4	2753.150	14807.64	115695.1	54162.45	3648.468
Correlation	0.683284	0.925245	0.923761	0.946318	1.000000
SSCP	41297.25	222114.7	1735426.	812436.7	54727.01
t–Student criteria	3.374106	8.793548	8.696946	10.55573	-----
Probability	0.0050	0.0000	0.0000	0.0000	-----

One of the main rules of constructing a multi-factorial empirical model is considered to determine the connection densities among the factors which are selected for the model, namely, to investigate the problem of multicollinearity of the connection among the selected factors. To do this, the correlation coefficients among the factors are calculated in order to do this, and when x_i and y_i variables accept the values of $i = 1,\ldots,n$, they are considered the most common indicator

which shows the linear relationship between x and y, and the correlation coefficient. It is calculated as follows[20].

$$r_{xy} = \frac{Cov(x,y)}{\sqrt{Var(x)}\sqrt{Var(y)}} \quad (1)$$

The value $Cov(x,y)$ $Cov(x,y)$ in the dividend of the fraction of equation (1) is determined by the following ratio:

$$Cov(x,y) = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}) \quad (2)$$

and it is called the covariance of the variables x and y and it is found as follows:

$$Cov(x,x) = Var(x), Cov(y,y) = Var(y) \quad (3)$$

The correlation matrix among the factors which influence the development of each sector of the service sector in Kashkadaryaregion, was calculated in the program Eviews 9. For example, we have selected the number of teachers per thousand students in the region, the total expenditures of improving the living standards of the population of the region, the expenditures for public education in the region and providing household goods and computer repair services to the population of the region as factors which influence modeling quality education services. We carry out an autocorrelation analysis in order to determine if there is not multicollenity among these factors (Table 3).

Table 3 Empirical model

Method: the least squares method				
Variable	**Model coefficients**	**Standard errors**	**t-student criteria**	**P-value**
X1	-1.100206	0.216733	-5.076332	0.0005
X3	0.156436	0.023932	6.536683	0.0001
X7	0.075311	0.028979	2.598790	0.0265
X12	-0.858810	0.329852	-2.603623	0.0263
C	2561.479	506.0691	5.061520	0.0005
R – determination coefficient	0.919617	The average value of the dependent variable		54.24000
Flattened R – determination coefficient	0.887464	The standard deviation of the dependent variable		69.04867
Standard error of regression	23.16330	Akayke's information model		9.384217
The sum of the squares of the remains	5365.386	Schwartz's information model		9.620234
The value of the maximum similarity function	-65.38163	Hannan-Quinncriter.		9.381703
F–Fisher criteria	28.60123	DW-Darwin-Watson criteria		1.893988
Prob(F-Fisher criteria)	0.000019			

All above-mentioned factors are taken in order to create a multi-factorial empirical model on the factors which influence the development of each sector of the public service sector, and it is examined how their importance are in the model.

It is expedient to use a linear and hierarchical multi-factorial econometric model on the basis of its evaluation criteria according to its condition for each sector of the service sector.

We use the least squares method to construct and analyze an econometric model between public service sectors and the factors which influence them.

The linear multi-factorial econometric model has the following view:

$$Y = a_0 + a_1x_1 + a_2x_2 + \cdots + a_nx_n \quad (4)$$

Here:Y-the outcome factor;$x_1, x_2, \dots, x_n$ - Influencing factors.

The following system of normal equations is constructed to find the unknown parameters $a_0, a_1, a_2, \dots, a_n$ in the model (4):

$$\begin{cases} na_0 + a_1\sum x_1 + a_2\sum x_2 + \cdots + a_n\sum x_n = \sum y \\ a_0\sum x_1 + a_1\sum x_i^2 + a_2\sum x_1x_2 + \cdots + a_n\sum x_nx_1 = \sum yx_1 \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \\ a_0\sum x_n + a_1\sum x_1x_n + a_2\sum x_2x_n + \cdots + a_n\sum x_n^2 = \sum yx_n \end{cases} \quad (5)$$

The hierarchical multi-factorial econometric model has the following view:

$$Y = a_0 * x_1^{a_1} * x_2^{a_2} * \dots * x_n^{a_n} \quad (6)$$

Here:y- the outcome factor;$x_1, x_2, \dots, x_n$ - Influencing factors.

If we take the substitution in the model (6) by the natural logarithm, then we have the following view:

$$\ln(y) = \ln(a_0) + a_1\ln(x_1) + a_2\ln(x_2) + \cdots + a_n\ln(x_n) \quad (7)$$

In model (7), if we make the definitions $\ln(y) = \grave{y}$, $\ln(a_o) = \grave{a_0}$, $\ln(x_1) = \grave{x_1}$, $\ln(x_2) = \grave{x_2}$, ..., $\ln(x_n) = \grave{x_n}$,then we get the following view:

$$\hat{y} = \hat{a}_0 + a_1\hat{x}_1 + a_2\hat{x}_2 + \cdots + a_n\hat{x}_n \quad (8)$$

The following system of normal equations is constructed to find the unknown parameters $\hat{a}_0, \hat{a}_1, \ldots, \hat{a}_n$ in the model (8):

$$\begin{cases} n\hat{a}_0 + \hat{a}_1\sum\hat{x}_1 + \hat{a}_2\sum\hat{x}_2 + \cdots + \hat{a}_n\sum\hat{x}_n = \sum\hat{y} \\ \hat{a}_0\sum\hat{x}_1 + \hat{a}_1\sum\hat{x}_i^2 + \hat{a}_2\sum\hat{x}_1\hat{x}_2 + \cdots + \hat{a}_n\sum\hat{x}_n\hat{x}_1 = \sum\hat{y}\hat{x}_1 \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \hat{a}_0\sum\hat{x}_n + \hat{a}_1\sum\hat{x}_1\hat{x}_n + \hat{a}_2\sum\hat{x}_2\hat{x}_n + \cdots + \hat{a}_n\sum\hat{x}_n^2 = \sum\hat{y}\hat{x}_n \end{cases} \quad (9)$$

If this system of normal equations (9) is solved analytically by several methods of mathematics, then the values of the unknown parameters $\hat{a}_0, \hat{a}_1, \ldots, \hat{a}_n$ are found.

In order to have multi-factorial empirical models of the processes, several options were calculated in the Eviews 9 program and appropriate results were obtained. For example, builds an empirical model for providing quality educational services to the population of the region is built in table 6 and it is shown their importance using criteria in the evaluation of this model and its parameters.

If there is not autocorrelation in the residuals of the outcome factor, then the value of the calculated DW criterion will be around 2.

Table 4 Elasticity coefficient

Variable	Model coefficients	Standardized coefficient	Elasticity coefficient
X1	-1.100206	-4.369932	-55.98207
X3	0.156436	4.862546	8.936691
X7	0.075311	1.069777	2.638688
X12	-0.858810	-0.777640	-1.818216
C	2561.479	NA	47.22490

It was determined that the value of the DW criterion which were calculated the empirical models which were constructed for each sector of the service sector was higher than the table value. This indicates that there is not autocorrelation in the residues of outcome factor. The Fisher and Student criteria were calculated and the calculated value was compared with the table values, the magnitude of it was determined that they were higher than the table values.

The parameters which were taken into account in the models which were built for each service sector (for linear regression equations) consist of different indicators. Therefore, it is necessary to calculate the coefficients of elasticity in the analysis.

IV. Conclusions

It is expedient to pay essential attention to the innovation factor for the sustainable development of the service sector for the population of the region in the future. It is necessary to encourage innovative ideas and newly opened service sectors, to encourage the factors which create conditions for the development of high-quality service sectors for developing and organizing service sectors on the basis of innovation in the region.

It is necessary to econometrically model the management plans for the elimination of imperfections in the way of achieving the social goals which are set for the economic growth and living standards of the population and the development of the living conditions of the population. During 2017-2021 years (also, in next periods), it is expedient to develop long-term forecasts (2020-2025) in order to plan policy and projects which will be accepted as the part of action strategy of regional development of the region, plan technologic modernization and service sectors, intensive development of infrastructure, orient them to the welfare of the population.

In the current situation, the service sector to the population offers a variety of additional services, the main content of these services composed of releasing the population from the anxieties in living conditions, improving the quality of services and achieving to live in meaningful daily life.

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