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Financial Services to the Residents of the Region in the Field of Crafts

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ABSTRACT: Multifactorial empirical models were built on the example of the service sector which is provided to the population of Kashkadarya region, forecasts were given through them and suggestions and recommendations were given on the basis of obtained results.

KEYWORDS: optimization, multifactorial empirical models, regression equation, correlation coefficient, Darbin-Watson criterion, Fisher and student criteria.

I. Introduction

The development of digital (information) technologies at the present stage affects almost all spheres of economic activity. The article highlights the results of research and forecasting the quality of service to the population of the territory based on empirical models.

The aim of the study is to increase the efficiency of using the "digital information system in the service sector of the territory's population" and to develop an empirical forecasting model. The research was carried out using analysis and generalization tools to determine and classify the boundaries of the problem area. When forming an empirical forecasting model and describing its individual elements, a systematic approach and digital information technologies were used.

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].

II. Methods

According to the famous American researcher P. Strassman, investments in information technology are most closely related to such indicators of service enterprises as administrative and management costs[5]. Media and technology can reduce the cost of internal governance in the industry. In his works, P. David[6]. argues that information technologies are "General-purpose technologies". Harvard Business School professor G. Loveman[7] . also emphasizes a similar point of view. Information technology creates the potential for the development of other digital technologies, but technologies that do not exist without digital technologies will not bring immediate benefits by themselves. Information technology provides a platform for improving organizational processes and introducing fundamentally new tools into the existing service sector.

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[8; 10; 11; 12]:

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)

A similar operation was carried out by scientists E. Brinolfsson and L. Hitch, having studied the activities of 527 large American firms. In this approach, the authors note, an essential role is played by additional assets (assets that change

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under the influence of information technologies: experience and qualifications of employees, communication tools and technologies, quality of decision-making, changes in business processes, etc.). Over time, the results of the introduction of digital technologies appear gradually, in a general form. The complexity of public service systems (systems based on the use of information technologies) requires taking into account the specifics of digital technologies. It is responsible for intelligent processing of information about changes in the state (efficiency) of complex objects and provides the choice of management decisions[3; 4].

III. Results and Discussion

The real object is presented in the form of two systems: control and controllable (control object) in econometric modeling of the development of service sectors, in the description of management processes[13;14].

The general structure of control systems in econometric modeling of the multidisciplinary service sector is shown in Figure 1. It includes endogenous variables: $\vec{x}(t)$ - vector of input influences (task); $\vec{\upsilon}(t)$ - vector of external environment influences; $\vec{h}'(t)$ - vector of errors signal; $\vec{h}''(t)$ - vector of control influences; exogenous variables: $\vec{z}(t)$ - vector of S system state; $\vec{y}(t)$ - vector of the output variables, it is usually $\vec{y}(t)=\vec{z}(t)$.

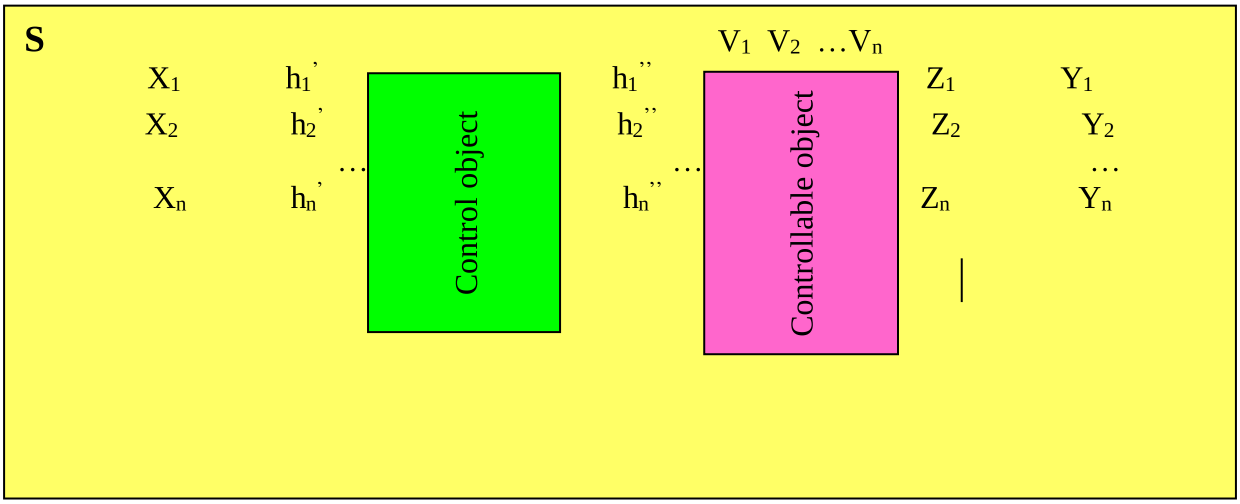

Figure 1. The structure of the management system in the econometric modeling of the development of service sectors

In the present case, the control system of econometric modeling is considered a set of software and hardware which provides a specific target control system. It is possible to make a decision on the *y(t)* state coordinate for a one-dimensional system depending on how far the control object reaches the target. The difference between the task value $y_{zad}(t)$ and the real value *y(t)* of the control quantity change law is considered $h'(t) = y_{zad}(t) — y(t)$ control error. If the given control quantity change law coincides with the input influences (task) change law, namely, if it is $x(t)=y_{zad}(t)$, then it will be $h'(t)=x(t)-y(t)$.

A system with a control error $h'(t)=0$ for all time moments is called an ideal system. In practice, it is not possible to develop ideal systems. Therefore, the error in automatic control should be reduced on the basis of the principle of reserve connection (giving as information about the deviation between them with using the output variable *y(t)* and its task values).

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

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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.

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.

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.

Table 1. Service sectors for the population of Kashkadarya region and the factors which influence them

M_x – providing financial services to the population of region (in billion soums)	Y_2
A_s – total number of the population of region (thousand people)	X_1
I_{ba} – employed part of the population of the region (thousand people)	X_2
A_d – total income of the population of region (in billion soums)	X_3
U_i – total consumption of the population of the region (in billion soums)	X_4
SH_i – personal consumption of the population of the region (in billion soums)	X_5
I_i –social consumption of the population of the region (in billion soums)	X_6
K_m – capital investments of the population of the region (in billion soums)	X_7
Qx_m –volume of regional agricultural production (in billion soums)	X_8
T_a – volume of regional trade turnover (in billion soums)	X_9
C_m – volume of regional industrial production (in billion soums)	X_{10}
Y_t – carriage of passengers in the region (thousand people)	X_{11}
TFO_{bx} – total expenditures related to improving the welfare of the population of the region (in billion	X_{12}

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soums)	
Uyk_{xx} – housing expenditures for the population of the region (in billion soums)	X_{13}
O'_s – the number of teachers per thousand students in the region	X_{14}
S_{sx} – regional health care expenditures (in billion soums)	X_{15}
$K_{o's}$ – the number of hospital beds per 10,000 population in the region	X_{16}
V_s – the number of doctors per 10,000 population of the region	X_{17}
H_s – the number of nurses per 10,000 population of the region	X_{18}
Xtx – expenditures for public education in the region (in billion soums)	X_{19}

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 $i=1,\dots,n$, 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:

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

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

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

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

$$Cov(x,x)=Var(x),\ Cov(y,y)=Var(y). \qquad (3)$$

The correlation matrix among the factors which influence the development of each sector of the service sector in Kashkadarya region, was calculated in the program Eviews 9.

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:

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

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):

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

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

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

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

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

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

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

$$y' = a_0' + a_1 x_1' + a_2 x_2' + ... + a_n x_n'. \qquad (8)$$

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

$$\begin{cases} n\grave{a}_0 + \grave{a}_1 \sum x'_1 + \grave{a}_2 \sum x'_2 + \cdots \grave{a}_n \sum x'_n = \sum y' \\ \grave{a}_0 \sum x'_1 + \grave{a}_1 \sum x'^2_1 + \grave{a}_2 \sum x'_1 x'_2 + \cdots \grave{a}_n \sum x'_1 x'_n = \sum x'_1 y' \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \\ \grave{a}_0 \sum x'_n + \grave{a}_1 \sum x'_n x'_1 + \grave{a}_2 \sum x'_n x'_2 + \cdots \grave{a}_n \sum x'^2_n = \sum x'_n y' \end{cases} \qquad (9)$$

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

Table 2. Forecast of service sectors for the population of Kashkadarya region (billion soums / thousand soums)

Indicators	2019 (real)	Forecast years					
		2020	2021	2022	2023	2024	2025
M_x – providing financial services to the population of the region Y_2 /per capita	*147,27*	*162,84*	*178,90*	*195,42*	*212,37*	229,7	247,5
	873,85	1060,11	1271,19	1508,83	1774,67	2484,0	3902,2
	269,06	*320,40*	*377,24*	*439,81*	*508,26*	699,2	1079,9

Providing financial services (*Mx*) to the population of the region is expected to increase by 1,21 times in 2020 compared to 2019, and by 4,47 times by 2025. Liberalization of monetary policy, expansion of crediting scale for investment projects, as well as reforms which are carried out by providing innovative services by financial institutions have contributed to the growth of financial services. Except services in insurance and pension, financial services have a significant share in the total volume of financial services. Mediation services in monetary sector consists of the largest share of financial services except insurance and pension services;

IV. Conclusions

It is expedient to separate econometric modeling of each service sector. Because development of each sector of the service sector has a positive impact on development of another sector. Therefore, the use of econometric models in the form of interconnected equations system has particular importance in development of service sectors. Together with this, the organizational-economic mechanism of development of service sectors represents a hierarchical system of interconnected elements and groups (subjects, objects, principles, forms, methods and tools) at different levels, as well as their interrelationships, innovative infrastructure form relationships with market participants.

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.

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

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services and achieving to live in meaningful daily life.

As a result of the research, recommendations are made on forming the methodology and development goals of the service sector, choosing options for decision-making methods and evaluation criteria variants, developing optimal options.

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