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Article

Analysis of Factors Influencing The Effectiveness of Medical Service Enterprises

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Abstract: Uzbekistan is currently undergoing reforms to strengthen market mechanisms, digitalization, and private sector engagement that play a prominent role in efficient functioning of medical service enterprises, which is crucial for healthcare system development. Resource utilization is significant in health economy, as the health economy is directly related to the quality of service, profit and also the competition which depends on the optimum utilization of financial and human capital in the health economy. While several international studies have focused on efficiency, in Uzbekistan, this number is limited, and there are practically no studies that define economic performance as a multifactorial interaction parameter. In particular, the extent that internal and external factors drive performance and profitability versus service quality has received little quantitative attention. The study uses an economic analysis, its comparison, a system of indicators method, and integral and chain substitution methods. The research quantifies the impacts of main variables (like income, expenses, productivity, and profit) by modeling them based on statistical data of medical enterprises in order to assess their contribution to the integral efficiency. The analyses show that service volume, labor productivity, employee qualification, and efficient use of resources are the key factors. Reassurances like this confirm the reliability of the integral method for complex efficiency assessment over the much more varied chain substitution approach, providing more consistent results. According to the data at the end of October 2023, factor analysis reveals the interdependence of labor, financial, and material indicators, which suggests that successful improvement of productivity and effective allocation of resources can have a pronounced positive impact on enterprise performance and financial stability. This study offers a methodological basis for health managers and decision-makers to incorporate factor analysis into economic-related decision-making. Its implementation facilitates data-driven approaches for enhancing the effectiveness, sustainability, and competitiveness of the entire medical service sector in Uzbekistan.

Keywords: medical services, factor analysis, economic efficiency, profitability, labor productivity, financial stability, overall outcome, profit, human resources, factor influence.

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1. Introduction

In a market economy, the stable operation and economic efficiency of medical service enterprises are among the crucial factors determining the level of development of a country's healthcare system. The medical services sector, as a strategic direction for strengthening public health, increasing labor productivity, and developing human capital, remains at the forefront of state policy attention. Therefore, conducting a thorough economic analysis of medical service providers' activities, particularly identifying factors influencing their indicators such as income, expenses, profitability, labor productivity, and service quality, is a pressing issue today.

In the economic activities of medical service enterprises, numerous factors interact in a complex manner. Each of these factors directly influences the overall performance of the

enterprise - its profit, competitiveness, profitability, and service volume. Consequently, factor analysis of activities is regarded as a crucial scientific and methodological tool for assessing the economic condition of the enterprise, identifying ways to increase efficiency, and substantiating management decisions.

Today, large-scale reforms are being carried out in the healthcare system of Uzbekistan to deepen market principles, support private medical institutions, improve the quality of medical services, and expand digitalization processes. From this point of view, the analysis of the financial results of medical service providers in terms of factors is important not only theoretically, but also practically, which serves to ensure their economic stability and increase their competitiveness in the service market.

Thus, the issues of factor analysis of the activities of medical service enterprises occupy a central place in the modern healthcare economy. Through it, not only is the current economic situation assessed, but also the future development strategy of the enterprise, investment policy, and mechanisms for improving the quality of services are determined.

2. Materials and Methods

This study employs a method for systematic economic analysis to identify and assess the determinants of the performance of medical service enterprises. The study uses a quantitative analytical approach based on statistical data collected from various medical institutions, with an emphasis on the KPI indicators of income, expenses, profit, labor productivity, and service volume. The methods of System of Indicators Analysis, Integral Method, and Chain Substitution Method are among the most frequently adopted analytical techniques that together allow the comprehensive analysis of interconnected economic factors. The integral method serves to evaluate the aggregated effects of various indicators upon the comprehensive performance of enterprises, whilst the chain substitution method allows for an examination of the individual effects of one indicator on another in succession. The comparative and structural analysis detects what these differences in the performance of medical enterprises by reporting periods, observing the trends in economic efficiency and management practices. Also, it incorporates graphical and tabulated manifestations to show relationship strength among variables and hierarchy of factor impacts. The assumption underpinning this methodological framework is that objectivity can be achieved through integrated theoretical insights and empirical data providing an opportunity to validate results through statistical interpretation. This method helps to detect the key determinants of financial stability and profitability and serves as a rigorous basis for managerial choices and policymaking. In conclusion, the methodology utilized provides a stable and repeatable model for evaluating and enhancing the cost-efficiency of medical service entities in response to the changing and reformative healthcare sector of Uzbekistan.

Literature review.

Scientific research by foreign scientists serves as an important theoretical and practical basis for factor analysis of the activities of medical service providers. In particular, in the work «Efficiency Measurement in Health and Health Care,» written by Bruce Hollingsworth and Stuart J. Peacock, the methodological foundations for assessing the effectiveness of the healthcare system are deeply analyzed [1]. The authors reveal the interrelationship of such indicators as productivity, the level of resource utilization, service quality, and patient outcomes when measuring effectiveness at medical service enterprises [2]. In their opinion, performance analysis should be measured not only from a financial point of view, but also through social effectiveness. This approach creates the theoretical basis for factor analysis, combining economic and medical indicators in medical service enterprises [3].

A. Charlesworth's research «Measuring the Productivity of the Healthcare System» extensively covers the issues of measuring the effectiveness of the healthcare system. The author conducts a factor analysis of the healthcare sector in terms of labor productivity, the volume of services provided, and the dynamics of expenditures using the example of OECD countries. In the study, the implementation of digital technologies, management

efficiency, and service quality are assessed as the main factors in the analysis of the activities of medical service enterprises. Charlesworth also suggests using «output index» and «input index» indicators to assess the effectiveness of medical services [4].

In the article «A practical measure of health facility efficiency: an innovation» by M. Z. Hasan and co-authors, a new approach to determining the practical effectiveness of healthcare institutions is proposed. According to the research results, when assessing the effectiveness of healthcare institutions, it is necessary to conduct a comprehensive analysis of the level of resource use, the number of patients, the quality of service, and management processes. The authors emphasize the need to introduce information technologies, improve staff qualifications, and optimize resources to increase efficiency in medical service enterprises. This work is of particular importance as a practical methodological basis for factor analysis of the activities of medical services [5].

Local economist M.Q.Pardayev, in his textbook «Economic Analysis,» separately dwells on the traditional methods used in economic analysis, in particular, on the methods of integral and chain substitution, and provides information about their similarities and differences from other methods. Factor analysis details the significance and place of these traditional methods [6].

These sources strengthen the theoretical and empirical foundations of factor analysis of medical service enterprises and contribute to the formation of scientific and methodological approaches aimed at increasing efficiency in the healthcare system of Uzbekistan.

3. Results

Analysis and results.

The effective organization of financial management in enterprises largely depends on accurate and correct organization of analytical work, with the help of which ensuring the solvency, liquidity, and financial stability of enterprises, periodic monitoring of the occurrence of financial and economic processes and events, It is possible to assess the overall financial and economic situation [7]. With the help of analysis, which hinders the sustainable development of the enterprise shortcomings are identified and these shortcomings are eliminated, and the business entity's further development paths are determined or ensure effective operation is transferred to the route.

Factor analysis plays an invaluable role in managing the activities of medical service providers, as this approach allows for a deep study of the factors influencing the economic efficiency of the enterprise and their consideration in management decisions [8]. Factor analysis creates a system of comprehensive economic analysis by identifying internal and external factors in the production and service processes of medical enterprises, measuring the strength of their influence, and assessing the contribution to the results.

Firstly, factor analysis plays an important role in identifying the main factors influencing the financial results of medical service enterprises, in particular, indicators of income, profit, and profitability [9]. For example, such factors as the volume of services, the number of patients, the average cost of services, the level of resource utilization, staff qualifications, and the provision of medicines and equipment play a decisive role in the formation of the effectiveness of a medical enterprise.

Secondly, factor analysis assesses the efficiency of the enterprise's use of labor and material resources. In this case, labor productivity, the volume of services provided by employees, the rational distribution of working time, and the continuity of the production process are taken as the main areas of analysis [10]. Thus, the management of the enterprise identifies discrepancies arising in the process of providing services and develops specific measures to eliminate them.

Thirdly, factor analysis plays an important role in improving the quality of medical services. The quality of service is assessed by such factors as patient satisfaction, treatment outcomes, service speed, and conditions. If these indicators are determined using factor analysis, the medical enterprise will be able to optimize its activities in accordance with the needs of patients.

Fourthly, factor analysis serves as a tool for scientific substantiation of management decisions. Because this analysis, along with an objective assessment of the enterprise's current state, helps to develop reasonable proposals on how to allocate resources, invest, or expand the range of services. Especially in the context of digitalization and automation processes, factor analysis is important as an integral part of economic modeling based on information technologies [11].

Thus, the role of factor analysis in the activities of medical service providers serves not only the identification and assessment of economic results, but also the sustainable development of the healthcare system by increasing efficiency, rational use of resources, and harmonization of the quality of services and the needs of patients. Therefore, the introduction of factor analysis mechanisms in the activities of each medical enterprise is the most important condition for increasing management efficiency and ensuring economic stability [12].

Economic efficiency represents the useful result obtained through the use of means of production and living labor, or the result obtained per unit of total resources. When evaluating a particular activity or determining its dimensions, it is necessary to know the criterion of economic efficiency. In a market economy, since each enterprise has full economic and legal independence, its main goal is to fully and effectively use the resources assigned to it, and the more income and profit it receives per unit of these resources, the greater its competitive advantage [13].

The concept of effectiveness in medical services occupies a central place in assessing the economic and social effectiveness of the healthcare system. It reflects how rationally and purposefully medical institutions use available resources - labor, material and technical base, medicines, financial resources, and time factors. In other words, the effectiveness of medical services is the ability to provide high-quality and comprehensive medical care with less resources [14].

As a result of the research, when assessing the effectiveness of medical service enterprises, the following indicator of overall effectiveness was developed, considering the number of appeals received by the enterprise and the proportion of patients served to them from these appeals, the volume of medical services per patient, and the money spent on advertising expenses of hospitals as important factors:

$$OEI = X_1 \cdot X_2 \cdot X_3 \quad (OEI - \text{overall efficiency indicator})$$

Here:

X_1 – *the retention rate of applicants* –

$$\frac{\textit{Number of people who used medical services}}{\textit{number of applicants}}$$

X_2 – *the extent of medical care provided to a single patient* –

$$\frac{\textit{net income}}{\textit{Number of people who used medical services}}$$

X_3 – *The number of inquiries resulting from every thousand soums spent on advertising* –

$$\frac{\textit{number of applicants}}{\textit{volume of advertising expenses}} * 1000$$

Based on this developed formula, based on the methods of integral and chain substitution, we obtain the following tables for the influence of all three factors on overall efficiency, see Tbale 1 and 2:

Table 1. Calculation of the overall efficiency indicator of medical service enterprises using the integrated method of factor analysis

INTEGRAL METHOD					
№	**Indicators**	**Reporting period**	**Past period**	**Difference**	**Impact of factors ΔOEIx**
1	X_1	X_1^1	X_1^0	$\Delta X_1 = X_1^1 - X_1^0$	$\Delta OEI(X_1) = \frac{1}{2} \times \Delta X_1 \times (X_2^1 \times X_3^0 + X_2^0 \times X_3^1) + \frac{1}{3} \times \Delta X_1 \times \Delta X_2 \times \Delta X_3$
2	X_2	X_2^1	X_2^0	$\Delta X_2 = X_2^1 - X_2^0$	$\Delta OEI(X_2) = \frac{1}{2} \times \Delta X_2 \times (X_1^1 \times X_3^0 + X_1^0 \times X_3^1) + \frac{1}{3} \times \Delta X_1 \times \Delta X_2 \times \Delta X_3$
3	X_3	X_3^1	X_3^0	$\Delta X_3 = X_3^1 - X_3^0$	$\Delta OEI(X_3) = \frac{1}{2} \times \Delta X_3 \times (X_1^1 \times X_2^0 + X_1^0 \times X_2^1) + \frac{1}{3} \times \Delta X_1 \times \Delta X_2 \times \Delta X_3$
4	OEI	$X_1^1 \times X_2^1 \times X_3^1$	$X_1^0 \times X_2^0 \times X_3^0$	$\Delta OEI = OEI_1 - OEI_0$	$\Delta OEI = \Delta OEI(X_1) \pm \Delta OEI(X_2) \pm \Delta OEI(X_3)$

Although the calculation of the integral method is somewhat more complex than the chain substitution method, the influence on the overall result remains unchanged even if the factors influencing the overall result are rearranged.

Table 2. Calculation of the overall efficiency indicator of medical service enterprises using the chain substitution method of factor analysis

METHOD OF CHAIN SUBSTITUTION					
№	**Indicators**	**Reporting period**	**Past period**	**Difference**	**Impact of factors ΔOEIx**
1	X_1	X_1^1	X_1^0	$\Delta X_1 = X_1^1 - X_1^0$	$\Delta OEI(X_1) = (X_1^1 \times X_2^0 \times X_3^0) - (X_1^0 \times X_2^0 \times X_3^0)$
2	X_2	X_2^1	X_2^0	$\Delta X_2 = X_2^1 - X_2^0$	$\Delta OEI(X_2) = (X_1^1 \times X_2^1 \times X_3^0) - (X_1^1 \times X_2^0 \times X_3^0)$
3	X_3	X_3^1	X_3^0	$\Delta X_3 = X_3^1 - X_3^0$	$\Delta OEI(X_3) = (X_1^1 \times X_2^1 \times X_3^1) - (X_1^1 \times X_2^1 \times X_3^0)$

4	OEI	$X_1^1 \times X_2^1 \times X_3^1$	$X_1^0 \times X_2^0 \times X_3^0$	$\Delta OEI = OEI_1 - OEI_0$	$\Delta OEI = \Delta OEI(X_1) \pm \Delta OEI(X_2) \pm \Delta OEI(X_3)$

Analysis shows that both methods are used in factor analysis to calculate the influence of factors influencing the result. However, although the chain substitution method is easier to calculate than the integral method, it has one drawback. That is, if the order of factors influencing the overall result changes in this method, the value of their impact on the overall result also changes [15]. Therefore, we recommend using the integral method in our research.

4. Conclusion

Factor analysis of the activities of medical service providers plays an important role in increasing their economic efficiency, scientifically substantiating management decisions, and ensuring the sustainable development of the healthcare system. The research results show that the financial results of medical enterprises, the quality of services, and the level of resource utilization are formed as a result of the interaction of many factors. Therefore, factor analysis allows for a separate and comprehensive study of each of these factors, which serves to identify the strengths and weaknesses of the enterprise's activities.

The results obtained on the basis of factor analysis make it possible to improve the mechanisms of economic management at medical service enterprises, optimize costs, improve the quality of services and stabilize profitability. Especially in the context of the digital economy, this analysis is necessary for assessing the activities of medical institutions in real time through information systems and establishing strategic planning.

Factor analysis also helps to assess the overall effectiveness of the healthcare system by identifying the relationship between labor, material, and financial resources that affect the effectiveness of medical services. This is of great practical importance in the development of new approaches to the development of the medical sphere, support for the private sector, and improving the quality of services in state policy.

In general, factor analysis of the activities of medical service providers is a scientifically based management tool that ensures sustainable development, competitiveness, and efficiency in the healthcare economy. Therefore, every medical enterprise must implement the principles of factor analysis in its activities, increase effectiveness, and strengthen its position as a system serving public health.

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