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THE IMPACT OF DEVELOPING TELEMEDICINE SERVICES ON THE ECONOMIC EFFICIENCY OF MEDICAL SERVICE ENTERPRISES



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Annotatsiya: Telemeditsina xizmatlarini rivojlantirishning tibbiy xizmat ko'rsatish korxonalari iqtisodiy samaradorligiga ta'siri tadqiq etilgan. Telemeditsina xizmatlarini tibbiy xizmat ko'rsatish jarayonlariga integratsiya qilish natijasida korxona xarajatlarini optimallashtirish, mavjud tibbiy infratuzilmadan foydalanish samaradorligini oshirish, tibbiyot xodimlari mehnat unumdorligini yuksaltirish hamda ko'rsatiladigan xizmatlar hajmini kengaytirish imkoniyatlari tahlil qilingan. Telemeditsinaning iqtisodiy samaradorligini baholash uchun xarajatlarni tejash, bir shifokorga to'g'ri keladigan xizmatlar soni, masofaviy konsultatsiyalar ulushi, bir xizmatga to'g'ri keladigan o'rtacha xarajat, daromad va rentabellik kabi ko'rsatkichlardan foydalanish taklif etilgan.

Kalit so'zlar: telemeditsina, tibbiy xizmatlar, iqtisodiy samaradorlik, tibbiy xizmat ko'rsatish korxonalari, raqamli sog'liqni saqlash, xarajatlarni optimallashtirish, mehnat unumdorligi, rentabellik, raqamlashtirish, masofaviy tibbiy xizmatlar.

Аннотация: Исследовано влияние развития телемедицинских услуг на экономическую эффективность предприятий, оказывающих медицинские услуги. Проанализированы возможности оптимизации затрат предприятий, повышения эффективности использования существующей медицинской инфраструктуры, роста производительности труда медицинских работников и расширения объёма предоставляемых услуг в результате интеграции телемедицинских технологий в процессы медицинского обслуживания. Для оценки экономической эффективности телемедицины предложено использовать такие показатели, как экономия затрат, количество услуг в расчёте на одного врача, доля дистанционных консультаций, средние затраты на одну услугу, доход и рентабельность.

Ключевые слова: телемедицина, медицинские услуги, экономическая эффективность, предприятия медицинских услуг, цифровое здравоохранение, оптимизация затрат, производительность труда, рентабельность, цифровизация, дистанционные медицинские услуги.

Abstract: The impact of telemedicine service development on the economic efficiency of medical service enterprises is examined. The potential for optimizing enterprise costs, improving the efficiency of existing medical infrastructure, increasing the labor productivity of healthcare professionals, and expanding the volume of services through the integration of telemedicine into healthcare delivery processes is analyzed. To assess the economic efficiency of telemedicine, indicators such as cost savings, the number of services provided per physician, the share of remote consultations, average cost per service, revenue, and profitability are proposed.

Keywords: telemedicine, medical services, economic efficiency, medical service enterprises, digital healthcare, cost optimization, labor productivity, profitability, digitalization, remote medical services.

INTRODUCTION

Today, the rapid development of the digital economy is shaping new forms of organization, provision, and management of medical services within the healthcare system. In particular, as a result of the widespread introduction of information and communication technologies into the medical field, the scale of telemedicine services is increasing, and new opportunities are emerging to improve the organizational and economic mechanisms of medical service enterprises. Telemedicine serves to increase the accessibility and speed of medical services by providing remote medical consultations, exchanging diagnostic data, monitoring patients' health status, and organizing information exchange between medical specialists.

The issue of ensuring economic efficiency in the activities of medical service enterprises requires the rational use of available financial, labor, material-technical, and information resources alongside increasing the volume of services. In the traditional medical service model, expenses related to a patient's physical visit

to a medical facility, reception rooms, administrative services, queue management, and other infrastructure constitute part of the enterprise's total costs. The development of telemedicine services increases the efficiency of time and resource use by transferring certain types of medical services to a remote format.

In the World Health Organization's strategic approaches to digital healthcare, digital technologies are recognized as one of the key tools for improving the quality, accessibility, efficiency, and sustainability of healthcare services. In particular, telemedicine services allow for expanding the geographically limited capabilities of medical professionals, improving patients' access to medical services, and, in some cases, optimizing the costs associated with the use of healthcare resources.

The economic efficiency of telemedicine is primarily reflected in indicators such as the level of utilization of the service capacity of medical enterprises, cost per service, labor productivity of medical workers, volume of services, additional income, and profitability. At the same time, the implementation of a telemedicine system at the initial stage requires additional investments related to software, technical infrastructure, information security, personnel training, and technical support for the system. Therefore, when evaluating the economic efficiency of telemedicine, it is necessary to consider initial investments and their payback period alongside current costs.

The acceleration of the digitalization of the healthcare system in Uzbekistan also creates important conditions for the development of telemedicine services. The use of electronic medical data in medical institutions, the integration of information systems, and the expansion of remote service capabilities are important directions for the digital transformation of medical service enterprises. In this process, evaluating telemedicine services not only from a medical perspective but also from the perspective of economic efficiency is becoming an important scientific and practical task. From this perspective, it is important to determine the impact of the development of telemedicine services on the economic efficiency of medical service enterprises, improve efficiency assessment criteria and indicators, and identify opportunities for telemedicine services to reduce costs and increase revenues.

LITERATURE REVIEW

The development of telemedicine services and their impact on the economic efficiency of medical service providers constitute one of the important scientific areas of digital healthcare. Foreign studies have extensively examined the potential of telemedicine to reduce costs, expand access to medical services, increase the productivity of medical workers, and optimize service processes.

In a systematic review of the cost-effectiveness of telemedicine interventions, Whitten and Love argued that, in the economic evaluation of telemedicine projects, it is necessary to consider, in addition to the costs of implementing the technology, the costs associated with patients' time and transportation, the efficiency of healthcare workers, and the cost of alternative services [1].

A study by the WHO summarized the available scientific evidence on the cost-effectiveness of telemedicine and telehealth services. The study found that the effectiveness of telemedicine depends on the type of service, the distance between the patient and the healthcare facility, the duration of the consultation, the cost of the service, and the intensity of technology use [2].

De Guzman and co-authors systematically studied the cost-effectiveness of videoconferencing and telephone consultations in primary care. The researchers showed that the cost-effectiveness of teleconsultations is related to the service delivery format, the level of service utilization, and the available medical infrastructure [3].

Bell-Aldeghi et al. conducted a systematic review of the factors that determine the cost-effectiveness of telemedicine. The study found that the cost-effectiveness of telemedicine is influenced by the organizational model of the service, technological infrastructure, intensity of service use, and the costs of organizing medical services [4].

A telemedicine market study conducted by the European Commission found that the majority of the scientific literature on telemedicine provides a positive assessment of cost-effectiveness. The study found that the economic outcomes of telemedicine are influenced by the distance between the patient and the doctor, the duration of the consultation, the cost of the doctor's visit, transportation costs, and the level of service utilization [5].

In Uzbekistan, scientific and practical research on the digitalization of the healthcare system and the development of telemedicine services is also progressing. Khalmukhamedov and Nurillayeva studied the issues of teaching telemedicine and electronic clinic skills to medical university students. The authors demonstrated the importance of developing appropriate digital competencies among medical workers for the effective use of telemedicine technologies [6].

In Khalmukhamedov's study on the introduction of digital medicine into the system of higher medical education, the use of telemedicine technologies was assessed as a promising direction for improving the

quality of medical care, expanding patient service opportunities, and reducing healthcare costs [7].

Koylanov, Tillayeva, and Muhammadaliyeva analyzed the possibilities and limitations of telemedicine and digital healthcare, demonstrating the importance of digital technologies in effectively organizing remote consultations, patient monitoring, diagnosis, and treatment processes [8].

Mirsidikova and Rasulova studied the use of telemedicine in healthcare during the COVID-19 pandemic. The study showed that telemedicine served as an important tool for organizing medical services remotely, maintaining communication between patients and doctors, and expanding access to medical services during the pandemic [9].

The regulatory framework for the digitalization of the healthcare system in Uzbekistan is also being consistently improved. In 2026, the Ministry of Health approved the procedure for using the “Electronic Polyclinic”, “Electronic Hospital”, “Electronic Medical Card”, and “Electronic Prescription” modules within the “Electronic Healthcare” information system [10].

The literature analysis shows that, in foreign studies, the economic efficiency of telemedicine has mainly been assessed through cost-effectiveness, reductions in time and transportation costs, the volume of services, and the efficiency of medical resource utilization. In Uzbek studies, telemedicine has mainly been examined in terms of the quality of medical services, digital competencies, remote consultations, and the formation of a digital healthcare system. In this regard, there are opportunities for further systematization of the comprehensive assessment of the direct impact of telemedicine services on the economic efficiency of medical service providers within existing scientific studies. In particular, assessing the impact of telemedicine development on the cost of one service, the labor productivity of medical workers, the volume of services, income, profit, and enterprise profitability based on a unified system of indicators remains an important scientific and practical issue.

RESEARCH METHODOLOGY

The methodological basis of this study is a systematic and comprehensive approach aimed at determining the impact of the development of telemedicine services on the economic efficiency of medical service providers. In the course of the research, **systematic analysis, induction and deduction, comparative analysis, economic-statistical analysis, grouping, and dynamic analysis methods were used.**

ANALYSIS AND RESULTS

The rapid introduction of digital technologies into the healthcare system is changing traditional approaches to organizing the activities of medical service enterprises. In this process, telemedicine services are emerging as an important tool that enables the remote provision of medical services, the efficient allocation of medical staff time, effective patient flow management, and increased efficiency in the use of available resources. In foreign studies, the economic efficiency of telemedicine has been assessed in relation to the cost of services, patient transportation costs, time spent by medical staff, and the accessibility of services.

The economic importance of telemedicine for healthcare providers is primarily reflected in the increased efficiency of resource utilization through the digitalization of certain stages of the service delivery process. As a result of organizing remote consultations, the workload on reception areas, administrative services, and other infrastructure can be optimized in cases where a patient does not need to physically visit a medical facility. Consequently, the level of utilization of the enterprise's existing capacities is optimized.

In this context, the economic effectiveness of implementing telemedicine services is formed in the following main areas (Figure 1):

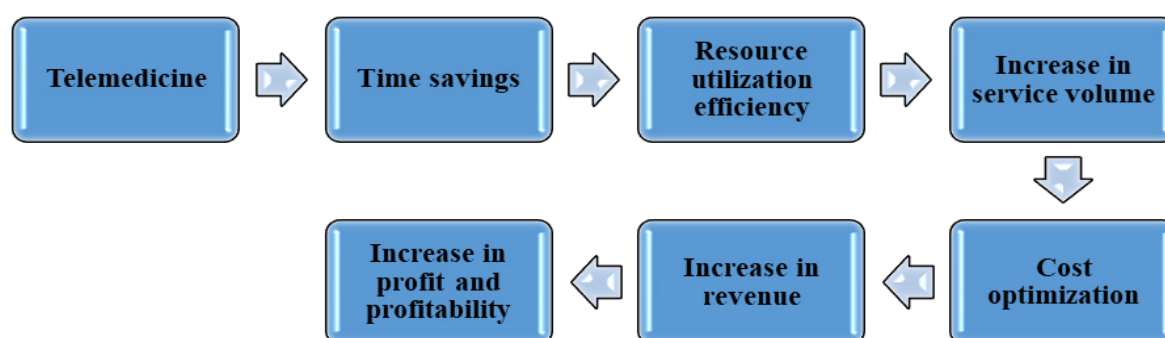


Figure 1. Mechanism of Influence of the Development of Telemedicine Services on the Economic Efficiency of

Medical Service Providers¹

This mechanism makes it possible to link the economic efficiency of telemedicine with the overall financial results of the enterprise.

One of the main indicators of the economic efficiency of medical service enterprises is the cost of service. Reducing the cost of service, other conditions being equal, makes it possible to increase the profitability of the enterprise.

In traditional healthcare, certain costs are associated with a patient's physical visit to a medical facility. These may include the costs of arranging appointments, providing administrative services, managing queues, and using rooms and other infrastructure. While telemedicine can optimize some of these costs, it also requires expenditures related to software platforms, communication systems, information security, and maintenance.

The economic efficiency of a medical service provider is directly related to the growth in the volume of services. Telemedicine enables the enterprise to expand the geographical coverage of its services. In this case, patients can use certain consultation services without physically visiting a medical institution.

The share of telemedicine services in total services is determined as follows:

$$T_{med} = \frac{QT}{JQ} \times 100 \quad (1)$$

where:

T_{med} – share of telemedicine services;

QT – services provided via telemedicine;

JQ – total medical services.

A gradual increase in this indicator demonstrates the expansion of the enterprise's digital service portfolio.

At the same time, a high share of telemedicine services can generate greater economic efficiency when supported by optimal platform costs and sufficient demand for services. Therefore, in addition to the share of telemedicine services, it is appropriate to evaluate the economic outcome generated by each service.

Telemedicine enables the creation of additional sources of income for healthcare providers. Remote consultations, follow-up examinations, interpretation of laboratory results, remote monitoring, and specialist consultations can be organized as separate services.

Additional income from telemedicine:

$$QD = \frac{QT}{N} \quad (2)$$

where:

QD – additional income;

QT – number of telemedicine services;

N – average cost of one service.

In this case, technological costs, medical staff labor costs, platform usage costs, information security expenditures, and other related costs should be taken into account when determining the price of the service.

Increasing demand for telemedicine services contributes to the diversification of the enterprise's service portfolio, creating opportunities to generate revenue from digital services in addition to traditional services.

One of the final economic outcomes of implementing telemedicine services is a change in the profitability of the enterprise. Profitability is an important economic indicator that reflects the amount of profit an enterprise generates relative to the costs it incurs.

The profitability of telemedicine services can be calculated as follows:

$$R_{tm} = \frac{F_{tm}}{X_{tm}} \times 100 \quad (3)$$

where:

R_{tm} – profitability of telemedicine services;

F_{tm} – profit from telemedicine services;

X_{tm} – costs of providing telemedicine services.

If the growth rate of revenues from telemedicine services exceeds the growth rate of the costs associated

¹ Author's development

with providing them, the profitability of the enterprise will increase.

Based on the above analysis, it is appropriate to assess the economic efficiency of telemedicine services not through a single indicator but through a system of interrelated indicators (Table 1).

Table 1. Indicators for Assessing the Economic Efficiency of Telemedicine Services for Medical Service Providers²

Indicator	Content of calculation	Economic significance
Share of telemedicine	Telemedicine services / total services	Level of development of digital services
Cost per service	Total cost / number of services	Cost-effectiveness
Labor productivity	Number of services / number of employees	Use of labor resources
Additional income	Telemedicine services × plan	New source of income
Cost savings	Traditional cost – telemedicine cost	Resource saving
Return on investment	Investment / annual return	Investment efficiency
Profitability	Profit / cost × 100	Final economic result

Based on this system of indicators, it is possible to comprehensively assess the impact of telemedicine services on the economic efficiency of the enterprise. The main focus is not only on the increase in the number of telemedicine services but also on how this growth affects the financial results of the enterprise.

In general, the economic effectiveness of the development of telemedicine services is manifested not merely in the digitalization of service processes themselves but in the use of digital technologies to **increase the intensity of the utilization of existing resources, optimize the cost per unit of service, increase the productivity of medical workers, expand the geographical coverage of services, and generate additional income**. Therefore, it is advisable to formulate the development of telemedicine as a comprehensive organizational and economic mechanism for increasing the economic efficiency of enterprises providing medical services.

CONCLUSIONS AND SUGGESTIONS

The results of the study showed that the development of telemedicine services is one of the promising directions for increasing the economic efficiency of medical service enterprises. By organizing medical services remotely, telemedicine enables the expansion of service geography, the reduction of patient service time, the efficient utilization of medical personnel's labor, and the optimization of certain operating costs. The World Health Organization (WHO) has also noted the potential of telemedicine to reduce waiting times, improve access to services, and optimize costs.

The study substantiated that the economic efficiency of telemedicine should be assessed not only in terms of the costs of implementing the technology but also in terms of its impact on the overall performance of the enterprise. In particular, increasing the share of telemedicine services, reducing costs per service, increasing the labor productivity of medical workers, expanding the volume of services, and generating additional income are the main factors contributing to the economic efficiency of the enterprise. Although the introduction of telemedicine services initially requires a certain amount of investment, the economic efficiency of digital infrastructure increases as the volume of service utilization reaches a sufficient level. Therefore, when evaluating telemedicine projects, it is necessary to comprehensively consider initial investments, current costs, service volumes, additional income, and the payback period. The WHO has identified cost calculations and the development of an investment plan as particularly important stages in the implementation of telemedicine.

According to the research results, it is advisable to evaluate the economic efficiency of telemedicine at medical service enterprises based on the following sequence of indicators: **“costs – labor productivity – volume of services – income – profit – profitability.”** This approach allows for a comprehensive determination of the direct and indirect impacts of telemedicine on the enterprise's activities. Furthermore, the economic efficiency of telemedicine services depends not only on the availability of technological infrastructure but also on the digital competence of medical personnel, patients' readiness to use services, information security, financing mechanisms, and legal and organizational conditions. WHO studies also identify infrastructure, funding, and human resources as important factors in expanding telemedicine.

Based on the research results, the following proposals were developed to increase the economic efficiency of telemedicine services at medical service enterprises:

Integration of telemedicine services into the overall business model of the enterprise. Telemedicine should be developed not as a separate technological service but as an integral part of the enterprise's service portfolio

and economic management system.

Implementation of a KPI system for the economic efficiency of telemedicine services. It is advisable to use indicators such as the number of teleconsultations, the cost of one service, the number of services per doctor, additional income, cost savings, and profitability.

Development of economically justified tariffs for telemedicine services. When setting tariffs, the labor costs of medical workers, platform usage, communication, maintenance, information security, and other costs must be taken into account.

Implementation of a system for the economic assessment of investment projects for telemedicine services. For each project, the volume of investment, expected additional income, cost savings, net economic effect, and payback period must be calculated in advance.

Enhancing the digital competence of medical workers. It is necessary to establish a system of regular professional development in the use of telemedicine platforms, remote patient monitoring, working with electronic medical data, and information security.

Regular monitoring of the effectiveness of telemedicine services. In accordance with WHO recommendations, it is necessary to regularly evaluate the results of telemedicine programs, identify the most effective services, determine opportunities for further improvement, and enhance the business model based on the results.

Transforming telemedicine into a strategic direction for the digital transformation of medical service enterprises. At the same time, it is possible to maximize the impact of telemedicine on the economic efficiency of the enterprise by managing technological, economic, organizational, and human resource factors within a single system.

Overall, the development of telemedicine services should be viewed as a modern organizational and economic mechanism that enables medical service enterprises to optimize costs, efficiently utilize available resources, expand service volumes, generate additional income, and increase profitability. Its long-term effectiveness depends on a combination of digital infrastructure, an economically sound business model, qualified personnel, an appropriate legal environment, and regular monitoring.

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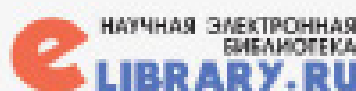
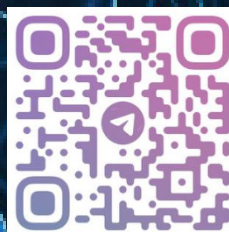
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