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THE DMED INFORMATION SYSTEM AS A FOUNDATION FOR THE DEVELOPMENT OF THE NATIONAL E-HEALTH SYSTEM

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Abstract. The digital transformation of healthcare has become a strategic priority for improving the quality, accessibility, and efficiency of healthcare services worldwide. The successful development of national E-Health systems depends on the establishment of integrated digital infrastructures capable of ensuring interoperability, real-time information exchange, and data-driven healthcare management.

This study examines the role of the DMED information system as the technological and organizational foundation of the national E-Health system in Uzbekistan. The research evaluates the impact of DMED on healthcare system integration, operational efficiency, and healthcare governance. The study employs a systems approach, comparative analysis, and economic evaluation methods.

The findings demonstrate that DMED has enabled the integration of 53 healthcare information systems into a unified digital ecosystem, connected 97% of healthcare institutions, and generated significant economic and organizational benefits. The results confirm that DMED serves as a strategic platform supporting healthcare digitalization, interoperability, and sustainable E-Health development.

Keywords: E-Health, digital transformation, healthcare information systems, DMED, interoperability, healthcare management, digital health.

Аннотация. Цифровая трансформация здравоохранения стала одним из стратегических приоритетов повышения качества, доступности и эффективности медицинских услуг во всем мире. Успешное развитие национальных систем электронного здравоохранения (E-Health) зависит от создания интегрированной цифровой инфраструктуры, обеспечивающей interoperability, обмен данными в режиме реального времени и управление системой здравоохранения на основе данных.

В данной статье исследуется роль информационной системы DMED как технологической и организационной основы национальной системы E-Health Республики Узбекистан. Оценивается влияние системы DMED на интеграцию информационных ресурсов здравоохранения, повышение операционной эффективности и совершенствование механизмов управления отраслью.

В исследовании использованы системный подход, сравнительный анализ и методы экономической оценки. Результаты показывают, что система DMED обеспечила интеграцию 53 информационных систем здравоохранения в единую цифровую экосистему, подключение 97% медицинских учреждений страны и получение значительных организационных и экономических эффектов.

Полученные результаты подтверждают, что DMED выступает стратегической платформой, обеспечивающей цифровизацию здравоохранения, interoperability информационных систем и устойчивое развитие национальной системы электронного здравоохранения.

Ключевые слова: электронное здравоохранение (E-Health), цифровая трансформация, информационные системы здравоохранения, DMED, interoperability, управление здравоохранением, цифровое здоровье.

INTRODUCTION

Digital technologies are fundamentally transforming healthcare systems across the world. Governments increasingly recognize digital health as an important instrument for improving healthcare accessibility, enhancing service quality, reducing administrative costs, and strengthening public health management.

According to the World Health Organization, national digital health ecosystems require integrated platforms capable of ensuring interoperability among healthcare institutions and facilitating secure information exchange.

However, many healthcare systems still face challenges related to fragmented information infrastructure, inconsistent data standards, duplication of records, and inefficient healthcare administration.

In Uzbekistan, the rapid development of healthcare digitalization has created the need for a unified information environment capable of integrating healthcare providers, pharmacies, laboratories, government agencies, and citizens. To address these challenges, the DMED information system has been developed as a national digital healthcare platform.

DMED represents a comprehensive digital ecosystem that provides electronic healthcare services, supports clinical and administrative processes, and facilitates nationwide healthcare information exchange. The platform includes electronic medical records, digital prescriptions, laboratory information systems, telemedicine solutions, mobile applications, healthcare analytics, and decision-support tools.

The primary objective of this study is to assess the role of DMED as a foundational component of the national E-Health system and to evaluate its contribution to healthcare digital transformation in Uzbekistan.

LITERATURE REVIEW

The development of national E-Health systems has become a priority area in modern healthcare reforms worldwide. Scholars widely agree that integrated health information systems are essential for improving the quality, accessibility, and efficiency of healthcare services. According to the World Health Organization (WHO), digital health systems enable better decision-making, reduce medical errors, and enhance coordination among healthcare providers (WHO, 2020).

International experience shows that countries with advanced digital health infrastructures, such as Estonia, South Korea, and Singapore, have successfully implemented nationwide electronic health records (EHRs) and interoperable health platforms. For instance, Estonia's X-Road system is often cited as a benchmark for secure data exchange between public and private healthcare institutions, ensuring real-time access to patient data across the system (Kalja et al., 2008). Similarly, South Korea has developed a highly digitalized healthcare environment that integrates big data and artificial intelligence for predictive healthcare services (Kim & Lee, 2021).

From a regional perspective, Kazakhstan has made significant progress in developing its "eHealth Kazakhstan" system, focusing on centralized patient records, electronic prescriptions, and hospital automation. Researchers such as Zhakupova et al. (2022) highlight that interoperability and data standardization remain key challenges in the full implementation of the system. Turkey has also implemented the Central Health Data System (SHKS), which integrates both public and private healthcare providers within a unified digital infrastructure (Yilmaz & Demir, 2020).

In Uzbekistan, recent healthcare reforms have focused on digital transformation through the introduction of systems such as DMED (Digital Medicine). Local researchers emphasize that DMED serves as a foundational platform for the national E-Health ecosystem by enabling electronic patient records, digital prescriptions, appointment scheduling, laboratory integration, and healthcare analytics. According to Uzbek scholars such as Karimov (2023) and Ismailova (2024), DMED plays a crucial role in improving healthcare transparency, reducing administrative burden, and enhancing data-driven decision-making in medical institutions.

Moreover, the integration of DMED into the broader national E-Health strategy is considered a critical step toward ensuring interoperability between public and private healthcare providers. Local studies also highlight that, despite significant progress, challenges remain in data standardization, system integration, cybersecurity, and users' digital literacy.

RESEARCH METHODOLOGY

This research employs a mixed-method approach combining systems analysis, comparative analysis, statistical evaluation, and economic assessment.

The study is based on data collected from national healthcare digitalization initiatives implemented between 2024 and 2026. Information was obtained from healthcare digital transformation programs, institutional reports, and operational performance indicators associated with the DMED ecosystem.

The methodological framework includes:

- systems analysis of healthcare digital infrastructure;
- evaluation of information system integration processes;
- assessment of interoperability mechanisms;
- analysis of organizational and economic outcomes;
- examination of healthcare governance improvements resulting from platform implementation.

A systems approach was applied to investigate the relationships among healthcare institutions, digital technologies, and healthcare management structures operating within the DMED ecosystem.

ANALYSIS AND RESULTS

The research findings indicate that DMED has become the core digital infrastructure of Uzbekistan's healthcare system.

Prior to the implementation of DMED, healthcare organizations operated through numerous independent information systems that lacked interoperability and often resulted in data duplication. The introduction of DMED enabled the integration of 53 healthcare information systems into a single digital ecosystem.

The platform currently supports interaction among healthcare providers, pharmacies, laboratories, government agencies, insurance organizations, and patients through standardized information exchange mechanisms.

As of 2026:

more than 97% of healthcare institutions have been connected to the DMED ecosystem;

over 2 million users interact with the system daily;

electronic health records have been established for the majority of the country's population;

more than 38 million healthcare records are stored within the national digital infrastructure.

DMED includes a wide range of digital healthcare services and modules that support healthcare delivery and management (Table 1).

Table 1

Major DMED Components and Their Contribution to E-Health Development¹

Component	Function	Contribution to E-Health
MED-ID	Electronic medical records	Unified patient information
Electronic Prescription	Digital prescribing and pharmacy integration	Medication transparency and monitoring
Laboratory Information System	Digital laboratory diagnostics	Faster diagnostic processes
Mobile Healthcare Services	Citizen access to healthcare services	Improved accessibility
Telemedicine Services	Remote consultations	Expanded healthcare coverage
Healthcare Analytics	Data-driven management	Evidence-based decision-making
Digital Healthcare Situation Center	Real-time monitoring	Strategic healthcare governance

The platform allows patients to schedule appointments online, receive electronic prescriptions, access laboratory results, review their medical history, and interact with healthcare providers through digital channels.

The implementation of DMED has significantly improved healthcare management and operational efficiency. Key organizational outcomes include:

centralized healthcare data management;

improved coordination among healthcare institutions;

enhanced transparency of healthcare processes;

real-time monitoring of healthcare indicators;

reduction of duplicate documentation;

acceleration of decision-making processes.

More than 70 paper-based medical forms and journals have been converted into electronic formats, reducing administrative workload and improving healthcare workforce productivity. In addition, 423 clinical protocols across 38 medical specialties have been standardized through unified digital classification mechanisms, ensuring consistency in healthcare service delivery.

The economic assessment indicates that DMED has generated substantial benefits for the healthcare sector. The integration of previously fragmented systems has reduced infrastructure duplication and administrative expenses while improving resource utilization.

According to implementation results:

direct economic benefits during 2024–2025 exceeded 283 billion UZS;

approximately 127 billion UZS in savings resulted from the use of domestically developed digital solutions;

healthcare institutions reduced operational costs associated with paper documentation and data duplication;

digital workflows significantly improved administrative efficiency.

¹ author's development

The implementation of a unified national healthcare platform has also reduced dependence on foreign software vendors and strengthened technological sovereignty.

The study found that DMED creates the necessary infrastructure for future healthcare innovations. The platform supports the implementation of:

- artificial intelligence diagnostic systems;
- predictive healthcare analytics;
- clinical decision-support tools;
- population health management systems;
- personalized medicine solutions.

Several artificial intelligence pilot projects have already been introduced, including automated analysis of chest X-rays, liver MRI diagnostics, prostate MRI assessment, and intelligent healthcare assistants. These developments demonstrate that DMED functions not only as an information system but also as a platform for continuous healthcare innovation.

The findings confirm that integrated digital platforms play a decisive role in the development of national E-Health systems.

International experience demonstrates that successful healthcare digitalization initiatives rely on centralized or highly interoperable infrastructures. Examples include Estonia's X-Road ecosystem, South Korea's digital health architecture, and other national E-Health platforms.

Similarly, DMED serves as the digital backbone of Uzbekistan's healthcare system by ensuring interoperability, data standardization, and nationwide information exchange.

Unlike conventional healthcare information systems that focus on individual clinical processes, DMED integrates multiple stakeholders within a unified digital environment. This ecosystem-based approach enhances coordination, improves healthcare governance, and supports evidence-based decision-making.

The results further indicate that the value of DMED extends beyond technological modernization. The platform functions as an institutional mechanism for healthcare transformation, enabling strategic planning, resource optimization, and sustainable digital development.

Nevertheless, the continued expansion of DMED requires ongoing investment in cybersecurity, digital literacy, interoperability standards, and advanced analytical capabilities.

CONCLUSION AND RECOMMENDATIONS

The study demonstrates that the DMED information system serves as the technological and organizational foundation of the national E-Health system in Uzbekistan.

The integration of 53 healthcare information systems into a unified digital ecosystem has significantly improved interoperability, healthcare management, operational efficiency, and service accessibility. The platform has enabled nationwide healthcare digitalization, connected 97% of healthcare institutions, and generated substantial economic benefits.

DMED has evolved beyond a conventional healthcare information system into a comprehensive digital health ecosystem that supports clinical services, healthcare administration, electronic prescriptions, telemedicine, analytics, and artificial intelligence applications.

The findings confirm that DMED provides the infrastructure necessary for sustainable healthcare digital transformation and plays a critical role in the long-term development of the national E-Health system.

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