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THE ROLE OF GEOINFORMATION TECHNOLOGIES IN IMPROVING THE DESIGN OF MEDICAL INSTITUTIONS' ACTIVITIES WITHIN THE ELECTRONIC GOVERNMENT MANAGEMENT SYSTEM

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Annotation: The article highlights the necessity of using a geoinformation system in the design of organizing the activities of medical institutions within the electronic government management system, as well as its capabilities and effectiveness.

Keywords: E-government, healthcare, system, project, management, planning, automation, geoinformation system, activity, service delivery, region, capability, efficiency.

Аннотация: В статье освящена вопросы необходимости применения геоинформационной системы при проектирования организации деятельности медицинских учреждений, их возможности и эффективности в системе управления электронного правительство.

Ключевые слова: Электронное правительства, медицина, система, проект, управления, планирования, автоматизация, геоинформационная система, деятельность, услуга, территория, возможность, эффективность.

Introduction

In the era of digital technologies, increasing the efficiency of state management systems and delivering quick and quality services to the population, including medical services, through the electronic government system has become a priority. Geoinformation systems (GIS) play a significant role in this process. They enable visual analysis of territorial and spatial data, improve accuracy, and accelerate decision-making. GIS is widely applied across all sectors during the digitization process. Digitization positively influences the development of the most promising methods for organizing medical care worldwide. GIS is particularly important for effectively building information technology infrastructure in healthcare. For this reason, developed countries actively utilize innovations in medicine. Based on this, the application of geoinformation systems in designing medical institutions within the electronic government management system is becoming a contemporary requirement in our country. This research aims to highlight the relevance, significance, and necessity of applying

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geoinformation systems in designing the activities of medical institutions within Uzbekistan's electronic government management system.

Review of Literature Related to the Topic

In the 21st century, the era of informatization, almost all countries around the world are paying great attention to digitization in nearly all fields, the development of digital technologies, and their implementation in everyday life.

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In this direction, educational literature has been published, and numerous scientific research works are being conducted. In particular, the works of scholars conducting research on digitization in the field of medicine are commendable and serve as the foundation for our study.

In the work of foreign expert Justine Blanford titled *"Geographic Information, Geospatial Technologies and Spatial Data Science for Health,"* the application of geoinformation technologies in healthcare, their integration with epidemiology and disease ecology, as well as methods for analyzing health and disease risks are discussed. The book *"Geospatial Information System Use in Public Organizations: How and Why GIS Should be Used in the Public Sector,"* edited by Nicolas A. Valcik and published in 2023, provides information on the use of geographic information systems in government organizations, including the role of GIS technologies in the management and planning of healthcare institutions. The 2024 publication *"Advances in Geoinformatics Technologies: Facilities and Utilities Optimization and Management for Smart City Applications,"* edited by Muhammad Uznir Ujang and Ram Narayan Yadav, discusses the development of geoinformation technologies in the context of smart cities, management of institutions and services, and the application of GIS technologies in healthcare systems. The 2020 book *Health Information Management: Empowering Public Health,* authored by J. Mantas and A. Hasman, is dedicated to managing health information, integrating with electronic government systems, and highlighting the role of geoinformation technologies in improving the efficiency of healthcare services.

In 2008, Hsinchun Chen, Lawrence Brandt, Valerie Gregg, Roland Traunmueller, Sharon Dawes, Eduard Hovy, Ann Macintosh, and Catherine A. Larson published the book *"Digital Government: E-Government Research, Case Studies, and Implementation,"* which includes examples of e-government research, practices, and the application of GIS technologies in the healthcare sector.

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Many works, educational materials, and scientific research results by local scholars have been published in the field under study. In the educational literature *"Geographic Information Systems and Technologies,"* published by Safarov E.Yu. (2011), Gulyamova L.X. (2018), and co-authors Abdurahmonov S.N., Muxtorov O.B., Abdusamatov O.S., Jo'rayev A.Yu., Inamov A.N. (2020), the main concepts and theoretical foundations of geographic information systems, their types, and their applications in various fields, including medicine, are presented, highlighting their potential in the medical sector. The educational book *"Information Technologies in Medicine"* (Part I), published in 2018 by co-authors Bazarbayev M.I., Tulaboyev A.K., Ermetov E.Ya., and others, provides

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information on the application, efficiency, and practical aspects of information technologies, including geographic information systems, in the medical field. The scientific article *"The Role and Importance of Information Technologies in Modern Medicine"* by I.M. Boynazarov and M.O. Rahmonov discusses the role and significance of information and communication technologies, including geographic information systems, in modern medicine.

Research Methodology

The research methodology is primarily based on systematic analysis, management, and information processing methods. It analyzes from a scientific and practical perspective the measures being implemented for informatization of medical institutions within the electronic government management system in the Republic of Uzbekistan, as well as the application of geoinformation technologies in the design and management of medical institutions. The study is based on the measures taken for development and improvement in these areas. Additionally, the research is conducted based on the concepts and principles of "Electronic Government" and "Geographic Information Systems" (GIS).

Electronic Government (e-Government) is a management system aimed at delivering government services effectively, transparently, and conveniently to citizens, businesses, and government agencies through the use of information and communication technologies.

GIS (Geographic Information System) is a system that provides the capability to collect, manage, analyze, and visualize geographic data. It consists of the integration of maps, databases, and software.

Analysis and Results

Improving the living standards of the population and strengthening the country's economic stability are among the priority tasks of the Uzbekistan government's policy, with a focus on the development of communication, informatization, and telecommunication technologies. The essence, goals, and future development of this task are reflected in a number of presidential decrees related to the sector. In line with these decrees, programs for the development of telecommunication technologies, networks, and communication infrastructure in Uzbekistan have been approved for the near future.

Based on the approved program, the development of telecommunication technologies, networks, and communication infrastructure in Uzbekistan can be conditionally divided into two programs. The first program concerns the development of telecommunication technologies, networks, and communication infrastructure of the Republic of Uzbekistan, while the second program involves creating the information systems and database complex of the "Electronic Government" system. Within the framework of these programs, a plan of activities has been adopted by the government for the creation of the "National Geoinformation System" as part of the "Electronic Government" system development program.

The National Geographic Information System of Uzbekistan has been established as a part of the Electronic Government system, with the aim of creating a unified computerized system across multiple sectors. In recent years, particular attention has also been given to the digitization of the healthcare sector, with the development and implementation of systems such as "Electronic Polyclinic" and "Electronic Doctor."

The effectiveness of digitization efforts across sectors, including healthcare, largely depends on the utilization level of the National Information and Communication Systems and the National Geographic Information Systems. Within the framework of the planned project for the establishment of the "National Geographic Information System," it is necessary to create a multi-purpose information system that will take into account and assess the natural and economic potential of the

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country and its regions. Additionally, the system should provide necessary information for the operation and management of medical institutions, as well as for the population.

Based on the above, improving the design of geographic information systems (GIS) for medical institutions within the framework of Electronic Government management—based on Information and Communication Technologies (ICT) and the National Geographic Information System—is considered a pressing issue of both scientific and practical importance in today's context.

In the conditions of Uzbekistan, the development of GIS for medical institutions at the regional level requires, first and foremost, the formation of the geoinformation model structure of medical institutions, including its topological elements and geodata database. In this regard, when planning the activities of medical institutions, it is necessary to first address the question: *What do the Electronic Government system, Geographic Information Systems (GIS), and Information and Communication Technologies (ICT) offer?*—based on the analysis of existing published data.

Geoaxborot tizimlari va texnologiyalari – Gulyamova L.X. (2018) PDF

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E-Government and Geographic Information Systems

E-Government systems are aimed at simplifying and optimizing service delivery processes for citizens. Geographic Information Systems (GIS), on the other hand, help collect, store, and analyze location-based data. The integration of these two systems is used in planning the location of medical institutions and managing healthcare resources more efficiently.

The Role of GIS in Medical Institutions

GIS assists medical institutions in tracking the spread of diseases, analyzing demographic data, and optimizing the allocation of resources. Medical professionals can visualize disease-related information based on location, which facilitates more informed and effective decision-making.

Monitoring and Forecasting

Through GIS, it is possible to monitor the location and spread of diseases. This plays a crucial role in epidemiological research and shaping public health policies, as well as in disease control and prevention efforts.

Optimal Resource Allocation

GIS helps in the efficient distribution of resources for medical institutions, including healthcare personnel and medical equipment. This, in turn, enables faster and higher-quality healthcare services for patients.

Citizen Engagement and Information Transparency

E-Government systems can provide citizens with critical information through GIS, such as data on disease outbreaks, vaccination sites, and available medical services.

Application of Innovations and Technologies

Innovative technologies such as artificial intelligence and machine learning enhance the effectiveness of GIS. These technologies allow for the analysis of large datasets and enable predictive modeling for better planning and response.

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The implementation of the above-mentioned measures will provide numerous conveniences for both the general public and healthcare professionals.

Creation of Integrated Platforms

Establishing integrated platforms will enable effective data exchange, allowing for the unification of databases between e-government systems and medical institutions. This, in turn, will

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provide both citizens and healthcare professionals with convenient access to geographic information systems (GIS).

Monitoring and Analytics

By implementing a disease surveillance system, it becomes possible to monitor and analyze the spread of diseases in real time through GIS. Geographic information systems can also be used to collect and analyze statistical data within medical institutions, enhancing the quality of healthcare analytics and decision-making.

Resource Management and Allocation

Utilizing GIS in resource management allows for the optimization and effective allocation of healthcare resources. It supports location-based planning of medical services and increases overall system efficiency in healthcare institutions.

Enhancing Communication with the Population

GIS can be used to transparently provide the public with vital information such as disease outbreaks, vaccination sites, and available healthcare services. This strengthens the connection between healthcare institutions and the population by improving access to timely and location-based information.

Application of Innovative Technologies

The integration of artificial intelligence (AI) and big data analytics expands the capabilities of GIS in healthcare. These technologies allow for more accurate data analysis and predictive modeling, facilitating better planning and service delivery in medical institutions.

Education, Training, and Capacity Building

It becomes possible to organize training programs and educational courses for healthcare professionals and the public on the effective use of GIS. This contributes to the development of necessary skills and competencies for using GIS technologies efficiently.

CONCLUSION AND RECOMMENDATIONS

Geographic Information Systems (GIS) play a crucial role in the design and enhancement of the efficiency of medical institutions within the framework of e-government in Uzbekistan. However, to further improve these systems, the following are necessary in their development:

* Development of a unified geographic information platform and creation of an integrated system for all medical institutions;
* Strengthening the focus on training qualified specialists in the field of GIS;
* Provision of modern technical infrastructure;
* Improvement of legal frameworks and facilitation of data exchange.

By following this path, it will be possible to create a more competitive healthcare system within the framework of e-government management in Uzbekistan.

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