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CHALLENGES OF IMPLEMENTING DIGITAL TECHNOLOGIES INTO PUBLIC ADMINISTRATION AND FORMING A "SMART GOVERNMENT"

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Abstract. The article contributes to the research problems of introducing digital technologies in public administration in the conditions of digital transformation. Along with the advantages of using modern technologies there are new risks associated with the organization of the process and the possibility of losing control over it, the excess of costs for the introduction of digital technologies over the capabilities of the state or over the potential benefits of the new system, the risks of cyberattacks or the emergence of new conflicts in the law, creating an increased probability of committing a crime. The purpose of the article is to summarize the foreign experience of formation of Smart Government, the problems of introduction of digital technologies in public administration, formation of Smart Government and identification of possible ways to solve these problems. The research methodology is represented by an interpretative literature review, methods of analysis, systematization and classification in the selection of provisions related to the problems of implementation of digital technologies in public administration and formation of Smart Government from scientific sources. Based on a comprehensive analysis of scientific approaches to the application of digital technologies in public administration, the features of foreign practice of digital technology application in public administration and the formation of Smart Government are identified, problems and recommendations for their elimination are determined.

Keywords: digitalization, digital technologies, digital transformation, public administration, public sector, smart government, artificial intelligence, machine learning, meta-universe

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НАУЧНО-ТЕХНИЧЕСКИЙ ПРОГРЕСС И ЕГО ВЛИЯНИЕ НА ОТРАСЛИ ЭКОНОМИКИ, ЭКОНОМИЧЕСКИЙ РОСТ И ИННОВАЦИОННОЕ РАЗВИТИЕ

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ПРОБЛЕМЫ ВНЕДРЕНИЯ ЦИФРОВЫХ ТЕХНОЛОГИЙ В ГОСУДАРСТВЕННОЕ УПРАВЛЕНИЕ И ФОРМИРОВАНИЯ УМНОГО ПРАВИТЕЛЬСТВА

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Аннотация. Статья вносит вклад в исследования проблематики введения цифровых технологий в государственное управление в условиях цифровой трансформации. Вместе с преимуществами использования современных технологий возникают новые риски, связанные с организацией процесса и возможностью утраты контроля над ним, превышением затрат на внедрение цифровых технологий над возможностями государства или над потенциальными преимуществами новой системы, риски кибератак или появления новых коллизий в праве, создающих повышенную вероятность совершения коррупционных действий и так далее. Целью статьи является обобщение зарубежного опыта формирования Умного Правительства, проблем внедрения цифровых технологий в государственное управление, формирования Умного Правительства и определение возможных путей решения этих проблем. Методология исследования представлена интерпретативным обзором литературы, методами анализа, систематизации и классификации при выборке из научных источников положений, относящихся к проблематике внедрения цифровых технологий в государственное управление и формирования Умного Правительства. На основе комплексного анализа научных подходов к применению цифровых технологий в государственном управлении выявлены особенности зарубежной практики применения цифровых технологий в государственном управлении и формирования Умного Правительства, определены проблемы и рекомендации по их устранению.

Ключевые слова: цифровизация, цифровые технологии, цифровая трансформация, государственное управление, государственный сектор, Умное Правительство, искусственный интеллект, машинное обучение, метавселенная

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INTRODUCTION

In recent decades, large-scale digital transformations have occurred worldwide, constituting what scholars refer to as the fourth industrial revolution. Characterized by technological innovations and new platforms for an information society, this revolution fundamentally alters various aspects of contemporary life. Government authorities play a significant role in this process. They face regulatory challenges, various barriers, and biases arising from digital transformation and the need to interact with citizens in a high-technology environment.

The rapid development of information and communication technologies drives a swift transition toward digital transformation in public services globally. Governments worldwide consider leveraging information technologies to improve the quality of public service delivery fundamental to their mission.

The Russian Federation embarked on the path of digitalization in the early 2000s and continues this policy today. The Federal Target

Program "Electronic Russia (2002–2010)" was one of the earliest projects for the digitalization of public administration. Currently, the government is implementing the Information Society Development Strategy, adopted by Presidential Decree No. 203 on May 9, 2017, "On the Strategy for the Development of the Information Society in the Russian Federation for 2017–2030." Scholarly research confirms the relevance of applying digital technologies in public administration. For example, in 2019, the consulting firm BCG released a study on the level of digital government service usage worldwide, ranking Russia among the top ten countries and third in the growth rate of digital technology adoption. Consequently, ensuring the security, efficiency, and convenience of these technologies has become a primary task for government authorities.

This article aims to summarize global experience in Smart Government development, analyse the issues of implementing digital technologies in public administration, and identify possible solutions to these problems.

STATE OF THE ART

Scholarly literature actively examines the application of digital technologies in public administration, along with their advantages and disadvantages. Some researchers investigate practices in the most developed countries, while others focus on the digitalization process within the Russian Federation.

O.G. Kirillova has described the primary digital technologies in public administration, identified the most actively used ones, and examined "the advantages of their integration into the system of government authorities" (Kirillova, 2022).

O.N. Afanasyeva and A.M. Avdeeva (Afanasyeva, Avdeeva, 2022) have examined the features and prospects of applying the GosTech platform in Russia and the potential difficulties in its development. O.N. Afanasyeva, M.A. May, and K.A. Sklyarov (Afanasyeva, May, and Sklyarov, 2023) have investigated problems related to digital technologies in public administration and digital tools within the Smart Government framework.

Z.V. Gerasimchuk and I.S. Baranova (Gerasimchuk, Baranova, 2020) conducted a more detailed investigation into the application of digital technologies during the crisis caused by the COVID-19 epidemic. They identified the main directions of digital transformation, highlighted the sectors most vulnerable to crises, and suggested possible ways to mitigate such crises.

V.A. Yakovlev-Chernyshev examined "the organizational and legal aspects of digitalization of public administration in the Russian Federation" (Yakovlev-Chernyshev, 2021). The author identified the main risks that this process entails, grouped them, and provided recommendations for their mitigation.

The article by V.P. Kirilenko and A. Fotopoulou (Kirilenko, Fotopoulou, 2019) explores concepts such as the digital state and e-government, which emerge from the digital transformation of government authorities. The authors described the necessary stages for constructing a digital government and the most serious issues that may arise during the implementation of an action plan.

Foreign scholars developed the concept of "digital transformation" as a process of change driven by the potential of digital technologies (Moser-Plautz, Schmidthuber, 2023) and proposed a review of the organizational aspects of civil servants' work that digital transformation is likely to affect.

Foreign researchers also actively investigate digitalization in public administration: they have examined how legacy systems impact digital transformation in European public administrations, concluding that understanding the complexity of transforming such systems is decisive for addressing process-related challenges (Irani et al., 2023); they have explored opportunities for creating public or additional value through digital government services from a citizen perspective (Luna et al., 2024); they have employed the concept of public value as a measure

of digital government service success from the citizen's viewpoint (Buyannemekh et al., 2024); and they have applied a startup-based approach to digital transformation in the public sector (Venson, da Costa Figueiredo and Canedo, 2024).

Among foreign studies, one finds models for analysing how public sector digitalization processes influence the behaviour, performance, and values of public organizations (Vigoda-Gadot, Mizrahi, 2024), as well as work that identifies and confirms how civil servants' deliberate ignorance influences the digital transformation of the public sector (Crusoe, Magnusson and Eklund, 2024). Research has also focused on identifying the relationship between digital, communication, and intrapreneurial competencies and civil servants' readiness for future work (David et al., 2024). Scholars have examined how civil servants perceive and demonstrate readiness to use artificial intelligence in public administration (Ahn and Chen, 2022).

Recently, research directions such as artificial intelligence, machine learning, and the metaverse have become more prevalent in public administration studies. For instance, van Noordt and Tangi (2023) demonstrated that various components of artificial intelligence capabilities – tangible, intangible, and human-related – are necessary for the successful development and application of AI technologies in public administration. Hong, Kim, and Kwon (2022) studied the factors that determine digital innovation in the public sector. Lnenicka et al. (2024) noted that the metaverse provides a virtual reality environment in which one can perform actions without physically visiting locations of interest, including public administration bodies.

THE CONCEPT AND MAIN TYPES OF DIGITAL TECHNOLOGIES

Society widely calls for digital technologies, and both business and public administration actively adopt them due to their high efficiency and speed in solving assigned tasks. Authors define the concept of digital technologies differently depending on the sphere of application.

For example, N.A. Stebikhova and O.V. Gudkova provide the following definition: "Digital technologies are a discrete system based on methods of information coding and transmission that allows performing multiple diverse tasks in the shortest time intervals" (Stebikhova, Gudkova, 2018).

E.M. Kanishcheva and E.S. Belyaeva offer another interpretation: "Digital technologies are technologies that are products created with the aid of computing equipment and corresponding software and are inseparable from them" (Kanishcheva, Belyaeva, 2021).

Both definitions contain information about the specificity of the information technology development process; however, the first emphasizes the advantages of information technologies, while the latter focuses on the features of their functioning.

There are many types of digital technologies, all of which can be useful for digital government in some sense. E.M. Kanishcheva and E.S. Belyaeva identifiy seven types of digital technologies *(Figure 1)*.

Public administration currently employs the following digital technologies most actively:

- Big Data – data arrays that analysts classify according to specific criteria and use for making managerial decisions. For instance, "the accounting of tax revenues exemplifies Big Data use at the federal level of public administration, for which the state requires high speed of information receipt and processing" (Kirillova, 2022).
- Distributed ledger systems (blockchain) – databases that a large number of users within a given network create and modify. Each participant has an individual key ensuring the security of information the network stores and contributes data about their own assets.
- Artificial intelligence – intelligent machines or computer programs capable

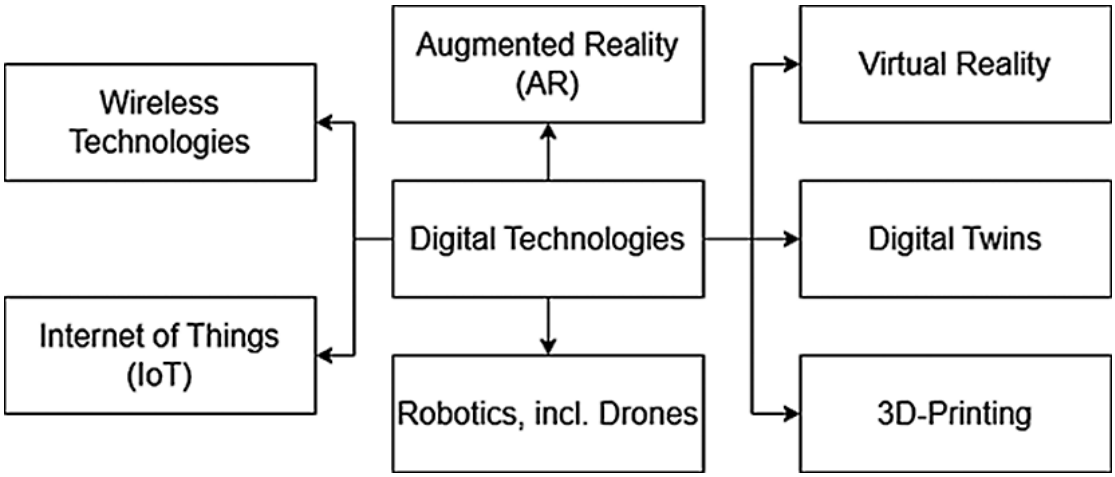

Figure 1. Types of digital technologies
Рисунок 1. Виды цифровых технологий

Source: Kanishcheva, Belyaeva, 2021

of imitating human intelligence and performing human functions.
– Internet of Things (IoT); digital traceability; quantum communications – technologies that enable the construction of computational systems.

Thus, practitioners most frequently apply digital technologies for processing large arrays of personal data belonging to citizens and organizations.

FOREIGN EXPERIENCE

Digital technologies have been used in public administration for a considerable time. While Russia possesses considerable experience and high rates of digitalization, it initially relied on foreign models, as in many other domains, primarily from Western European countries, the United States, and some of the most technologically advanced Asian nations.

In the United States, information technologies have enhanced the efficiency of government authorities for more than two decades. The Clinton administration made the first attempts to incorporate digital systems into public administration as early as 1999. To ensure the effectiveness of digital technologies, the government undertook large-scale efforts to connect citizens to the internet and provide broad access to the public services portal. In 2001, the administration launched the presidential "Expanding Digital State" program (Kirilenko, Fotopoulou, 2019).

The E-Government Act of 2002 provided the legislative framework for equipping the government with digital technologies. Within the government, authorities established the Office for Electronic Government, headed by the Federal Chief Information Officer (Kirilenko, Fotopoulou, 2019). However, despite significant successes, the U.S. government still faces certain issues related to the application of digital technologies. The primary concern is the lack of equal access to electronic portals for all citizens. Another problem involves the duplication of operations when legislation requires paper-based completion and signing of applications and documents, which diminishes the value of using electronic resources.

France has a substantial administrative apparatus, and the problem of bureaucratization across all spheres and levels of public administration remains unresolved. Consequently, digital technologies hold significant importance for optimizing the work of government authorities. According to Law No. 2016–1321

of October 7, 2016, "For a Digital Republic," France embarked on a path of information openness, facilitated by electronic portals, websites, and other digital technologies (for example, the Order of the Minister of Economy of April 14, 2017, "On the Publication of Information on Public Procurement in Open Data Format") (Talapina, 2019). In France, citizens can also apply for public services through the portal mon.service-public.fr. At the same time, France faces two major obstacles slowing the digitalization of public administration: the absence of universal citizen access to the Internet and a generally low level of public trust in innovations, stemming from insufficient education in digital technologies.

Singapore surpasses many countries in the efficiency of information technology use. In particular, the public services portal ecitizen.gov.sg functions successfully, providing transactional services, identification services, and more. The portal grants access through a digital identity card.

In Japan, the digitalization process began at the end of the 20th century with the creation of the WAN Kasumigaseki platform in 1997. Regulatory support was provided by Law No. 144 of December 6, 2000, "On the Formation of an Advanced Information and Telecommunications Network Society," and the e-Japan program for building a digital state. Currently, Japan applies digital technologies in the provision of public services, taxation, trade, and other areas. Japan also operates an online voting system that employs blockchain technology.

In the Russian Federation, public administration continues to develop continuously with the aid of digital technologies. For example, the government portal undergoes constant updates within the framework of the Federal Project "Digital Public Administration" and the national program "Digital Economy of the Russian Federation." On January 18, 2022, authorities announced the introduction of a new user authentication tool for the portal – a biometric system. These measures aim to enhance the security of citizens' personal data.

The implementation of digital technologies in public administration has produced observable changes in the work of government bodies. However, experience has shown that continuous corrective measures are necessary to optimize and improve the functioning of these technological innovations.

MAIN ISSUES OF DIGITAL TECHNOLOGY INTEGRATION

The digital revolution is forging new societal foundations that government authorities must consider. While it promotes democratic values and rules, it also compels stronger government regulation and intervention to protect public goods and interests. This has given rise to the concept of "smart governance" or "Smart Government" (Schedler, Guenduez and Frischknecht, 2019), which implies a new direction in state-citizen relations that activates innovative digital instruments and technologies to enhance public sector efficiency. Studies have emerged (Palmisano, Sacchi, 2024) confirming that digital interaction between citizens and public administration acts as a mitigating factor, helping to reduce the adverse impact of inequality on institutional trust, which represents a significant positive development for public administration. Research has also examined the formation of public trust through the digital transformation of government (Virnandes, Shen and Vlahu-Gjorgievska, 2024).

According to foreign scholars (Schedler, Guenduez and Frischknecht, 2019), Smart Government face operational challenges such as lack of legitimacy, legal foundations, policy coherence, technical infrastructure, understanding of costs and benefits, and innovation potential. Authors distinguish organizational and institutional barriers. Foreign authors define limiting factors for long-term application of artificial intelligence by public administration bodies: absence of internal technical knowledge for maintaining and updating AI systems, legal problems in applying developed AI systems, and limitation of capabilities for making changes to

maintain system operability (van Noordt, Tangi, 2023).

According to foreign scholars (Schedler, Guenduez and Frischknecht, 2019), "smart governance" faces operational challenges such as a lack of legitimacy, legal foundations, policy coherence, technical infrastructure, understanding of costs and benefits, and innovation potential. The authors distinguish between organizational and institutional barriers. Other limiting factors for the long-term application of artificial intelligence by public administration bodies include: a lack of internal technical knowledge to maintain and update AI systems, legal problems in applying developed AI systems, and limited capacity to make changes to maintain system operability (van Noordt, Tangi, 2023).

Several primary types of state digitalization problems can be identified:

- The uneven distribution of digitalization across areas and levels of governance,
- Technological issues,
- Information security issues.

The unevenness of digitalization across governance levels becomes apparent upon examining national projects for digital technology integration – most projects and government programs operate at the national level and are implemented federally. The execution of these plans in the regions faces difficulties due to uneven regional development and insufficient information provision. Success is primarily achieved in the most developed regions. To solve this problem, experts recommend providing all regions with necessary information and methodological materials when delegating new projects and tasks and conducting joint organizational measures with federal authorities to establish a unified understanding of digitalization goals and strategy.

Technological issues result in low efficiency of digital technology integration and low levels of citizen trust in innovation. These problems require a comprehensive solution: on the one hand, optimizing website operations, consolidating related information systems, and unifying federal and regional systems; on the other hand, providing digital training for both civil servants and the public regarding technology, personal data, and formulating requests for public services. Authorities must also ensure equal citizen access to digital services, including for those below the poverty line and people with disabilities.

The problem of digital security is among the most acute and requires increased attention. To minimize the negative effects of cyberattacks, it is essential to organize rapid response to breaches and limit attacker capabilities. This requires multi-layered protection with reinforced defenses for locations housing particularly important data.

Integrating digital transformation into public administration also alters social relations between parties involved in the production and consumption of public goods and services, leading to new challenges at human, organizational, and political levels. These may include growing inequality, decreased social mobility, corruption, differentiation in service provision coverage, and impact on government employment.

CONCLUSION

Thus, one can assert that applying digital technologies in public administration enhances the efficiency of government authorities at various levels and improves interaction between the state and citizens. Creating digital platforms and transferring G2G, G2C, and G2B processes to a digital environment has become highly relevant in the present context, including during the pandemic period with its forced self-isolation. The research results include an interpretative review of existing scholarly approaches to implementing digital technologies in public administration and an identification of features from foreign experiences in development of Smart Government. The article also identifies such problems of state digitalization and Smart Government development as the uneven distribution of digitalization across areas and levels of governance, technological difficulties, and information security issues.

These problems require prompt solutions at the management level to achieve genuinely high results in public administration. The study proposes recommendations for eliminating these problems; for example, providing all regions with necessary information, supplying methodological materials when delegating new projects and tasks to regional government authorities, and implementing organizational measures jointly with federal authorities to form a unified understanding of goals, digitalization strategy, and other aspects.

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