



Research Article

Enhancing Digital Competencies and Digital Literacy of Civil Servants

**Eugenia Vladimirovna Andryushina¹, Ekaterina Aleksandrovna Panova^{1, 2, *},
Lilia Vladimirovna Bondareva³**

¹School of Management, Shenzhen MSU-BIT University (SMBU), Shenzhen, China

²School of Public Administration, Lomonosov Moscow State University, Moscow, Russia

³School of World Politics, Lomonosov Moscow State University, Moscow, Russia

Abstract

This article investigates structural transformations in public administration, emphasizing how digital technologies reshape governance processes from traditional e-government to data-driven decision-making, and generate critical demand for advanced IT competencies among civil servants. The paper analyzes the evolving framework of highly demanded capabilities and digital literacy required by officials, while identifying discrepancies between digital state requirements and current public sector capacities. To achieve this, the study utilizes a comparative conceptual and operational analysis of digital literacy and competency models, drawing on contemporary theoretical discourse and global empirical benchmarks, including international E-Government Surveys and national reports. The analysis indicates that digital literacy has expanded beyond basic computer literacy to encompass advanced data management, strategic foresight, cybersecurity, and ethical human-AI collaboration. To ensure robust digital state conversion, governments must transcend purely technical training. The article concludes that public organizations must implement holistic professional development systems that seamlessly integrate core technical skillsets with leadership, agile collaboration, and adaptive socioemotional capabilities to effectively overcome critical institutional skills shortages. Furthermore, the findings demonstrate that highly trained public administrators facilitate the creation of synergistic policies that are robust, adaptable, and strictly aligned with the multifaceted dimensions of digital state development. Ultimately, advanced digital capabilities, including artificial intelligence proficiency, are no longer optional but constitute foundational prerequisites indispensable for functioning within contemporary digital government frameworks.

Keywords

Digital State, E-government, Digital Competencies, Digital Literacy, Civil Servants, Officials

1. Introduction

In the digital era, governance is rapidly evolving. The development of the digital state and the digitalization of public administration are among the conditions for achieving the

Sustainable Development Goals adopted by the United Nations in 2013 (Grigalashvili, 2023), which is consistently re-

*Correspondence: Ekaterina Aleksandrovna Panova (ekaterina_panova@mail.ru)

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flected in the UN Reports on the development of e-government. The penultimate Report from 2022, for example, emphasizes the growing role of digital transformation and digital government in advancing the 2030 Agenda for Sustainable Development, ensuring inclusivity in the digital era. It also notes how digital technologies have enabled governments to effectively respond to challenges posed by the global health crisis and maintain the delivery of essential public services and escalating isolation, uncertainty and vulnerability [1].

In practical terms at the global level, namely in the UN reports on the development of e-government, the concepts of «electronic government» (E-government) and «digital state» are used interchangeably. At the same time, in scientific and theoretical discourse, these terms differ and reflect the evolution of the development of the public administration system from the simple introduction of telecommunications tools into the work of civil servants, the creation of electronic interaction between all participants in public administration (G-to-G, G-to-E) and citizens (G-to-C), business (G-to-B), until the complete transition to a completely different quality of existence of the state, the management apparatus [2].

E-government has been replaced by the digital state, with decision-making process now driven by digital data rather than paper-based records. Moreover, not only is the form of civil service provision changing, but the very essence of public administration and the nature of interaction between all parties to the process are radically transforming: from decision makers, politicians, officials, to citizens. Most countries have outlined digital transformation as one of their top public policy priorities. The digital state model is characterized by a number of features that are significantly different from the «pre-digital» version of the public administration. First, the role of citizens in the system of interaction with the state is transformed: from the role of consumer to the role of partner. Through information technologies, a dialogue between the citizens as public service users and the authorities as state representatives can be formed that adheres to the principles of openness, transparency, democracy, and even partial accountability of the general public in public administration. E-platforms, online communication channels, and new types of «digital officials» (such as chatbots) have brought about a revolution in public service delivery.

In an increasingly digitally driven public administration, traditional ecosystems, processes, and procedures are being radically reshaped, thereby transforming the competency framework of public servants and underscoring the need to develop advanced digital skills and high levels of digital literacy. For civil servants, the move to the digital state model sets a demand for the development of combinations of their advanced digital-technical skills with an understanding of the essence, possibilities and limitations of digital tools («digital literacy»). Digital skills should empower public administrators to generate tangible social outcomes. To achieve those outcomes, officials should be able to understand, contextualize, and adapt digital technologies offer to public needs.

From an industrial society to a digital society and digital state, the world today is undergoing unprecedented change. The «Internet of things», Big-data, cloud computing, artificial intelligence, blockchain, and other new-generation information technologies are deeply integrated into various fields of society. Overcoming these challenges is essential to ensure the sustainable implementation of AI in the public sector. «Scholars are now beginning to argue that public administrations can no longer rely solely on the capacities developed in recent years for the adoption of digital technologies: a new and different type of capability is needed, namely AI capability» [3].

The digital renovation of public administration involves changing the mechanisms for providing public services, moving the official websites of authorities and their subordinate structures to a unified online platform, implementing and developing electronic feedback formats, digital profiles of citizens and organizations, and so on. Governments are increasingly digitizing their services using technology to better understand and respond to the needs of the public. Digital technologies have the potential to transform government, by enabling the implementation of more accessible and effective services. To support a shift towards digital government, investment is needed in developing the digital competencies as well as digital literacy of civil servants. In the digital age, the development of human resources in the public sector should take the construction of digital governance competency as a top priority. Decision-making officials need to build effective strategies to foster digital competencies and digital literacy for digital government.

2. Research Findings

There are many definitions of the concept of «competencies». Many experts and specialists in human resource management offer their own interpretations, but two primary approaches to understanding competencies are widely recognized: the American and the European. According to the American approach, competencies are defined as a description of employee behavior where possessing appropriate competencies leads to the correct actions and desired work results. The European approach focuses on the ability of an employee to solve certain tasks and achieve results in accordance with the requirements and standards defined by the organisation. Thus, the American approach involves the use of behavioral indicators to assess employees and generally relies on the postulates of behaviorism, while the European approach is more functional, since it focuses on solving specific professional problems [4].

In the recent years, many meanings and new labels have evolved for the term «competence» and «competency». The term «competence» and «competent» refer to a state or quality of being able and fit. Usually the term «competency/competencies» has been used «to refer to the meaning expressed as behaviors that an individual needs to demonstrate, while the

term «competence» has been used to refer to the meaning expressed as standards of performance» [5].

Two main definitions of digital literacy exist: the conceptual understanding describes the connection between its constituent elements; the operational view identifies what relates to digital literacy in terms of specific tasks and skills. The first to introduce the term «digital literacy» into academic discourse was P. Gilster. He indicated that digital literacy is the ability to critically use information in various formats from different sources. In his understanding, the emphasis on critical thinking is particularly important. With regard to the applied (operational) aspects, Gilster pointed to four competencies: searching the Internet, navigating hypertext, collecting relevant information, and evaluating discovered content [6].

Gilster's definition of digital literacy dates back to the 1990s. In the contemporary discourse, several approaches to conceptualizing digital literacy have emerged [7]. Researchers discuss digital literacy purely in terms of its practical application as a set of competencies for people to use digital tools in a certain way to combine, analyze, and evaluate digital resources, create knowledge, generate content, and communicate with people. From the cognitive standpoint, digital literacy is interpreted as the ability to obtain and critically evaluate information, search for solutions to problems, and make decisions using digital tools. The social meaning in the conceptualization of digital literacy is strengthened by viewing it as the ability to creatively participate in social practices, adopt identities and form social relationships.

A pronounced trend has emerged in interpreting the concept of digital literacy towards a definition that combines both technical competencies and cognitive skills (including a critical and creative attitude towards digital technologies). There are views that digital literacy and digital competencies can be used as synonyms, but a substantial analysis of these concepts indicated that digital literacy is a broader phenomenon.

In the late 20th century – early 21st century, digital literacy was predominantly understood as the ability to use information and communication technologies effectively. The key qualification requirements for the digital literacy of civil servants included the ability to operate specialized software and use the Internet. As digital technologies and AI have advanced, digital literacy has become a more complicated phenomenon — critical thinking, a creative approach to interacting with AI, mastery of digital security norms, and ethical behavior in the digital space are all essential components of its modern form. This shift is due to the integration of digital tools within the internal architecture of the state authorities and in their interactions with citizens. Moreover, modern officials are expected to continuously improve their digital skills, keeping pace with the rapid proliferation of digital tools. This trend is fundamental for civil servants to effectively address the challenges of digital public governance.

The digital competencies as well as digital literacy of civil servants are necessary to ensure high management results in a

society with growing digital literacy and the technologies' introduction in all spheres of life [8]. The development of a single information space of the state civil service and the widespread introduction of e-government technologies impose increased requirements on public servants' competencies in the field of digital technologies. To speed up to digital state the public sector needs professionals with digital skills. However, a gap exists between the required skills and the current reality – the NAO report revealed that only 4% of civil servants of the UK are classified as digital professionals [9].

The development of the research field pertaining to the digital competencies of civil servants has been consistently and intensively pursued by scholars in recent years. However, publications tend to focus on justifying the need to enforce requirements for "digital" knowledge rather than detailing specific content or discussing specific models that meet modern demands [10].

The digital competence of civil servants is commonly interpreted as their professional readiness to perform work-related tasks using information and communication technologies, including the Internet, social networks, specific software installed in the public sector offices as well as a range of state information systems and resources.

The UNESCO report «Artificial Intelligence and Competencies in Digital Transformation for Civil Servants» notes that the development of digital literacy and digital competencies of civil servants are among the top priorities for governments in many countries worldwide. The potential of artificial intelligence and digital data must be understood and utilized by public servants while designing and implementing policies. Understanding how to handle these data, nuances, risks, and problems when implementing public policies based on the possibilities of new technologies is required [15].

There are critical digital competency gaps in the public sector. A lot of officials do not possess sufficient digital skills to insure the desired digital government transformation. Digital skill shortages restrict the public sector's capacity to effectively deliver services. To overcome these barriers and seize the opportunities of digital transformation, civil servants need to develop new competencies that equip them with skills to address the complex challenges of digital era governance. These competencies include understanding of the most common technologies that underpin digital services, including Application Programming Interfaces (APIs), cloud computing and AI.

The overall level of digital competence and digital literacy among state and municipal employees is assessed by experts as average, only partially ensuring the intensity and effectiveness of the undergoing digital transformation of public administration. According to the NAFI research center, in 2021 48% of civil servants possessed an advanced level of digital literacy, 49% had a basic level, and 3% had a beginner level [11]. A number of important digital competencies among civil servants are underdeveloped, including software configuration, and the protection of digital devices and personal data, which

leads to the risks of information loss and limitations in ensuring state cybersecurity.

This situation is a bottleneck not only for Russian practices, but also for other countries. Such concerns are reflected in the UN Report on the Development of E-government in 2024, where experts noted the role of AI as both a driver and an obstacle to the development of the digital state. The report also noted that the rapid development of artificial intelligence technologies, in particular the development of Large Language Models (LLM), has outpaced the adoption of an appropriate regulatory framework, and there is an urgent need for effective management to reduce associated risks such as data distortion [12].

Research shows that in many cases, failures of digital transformation projects are due not only to a lack of IT infrastructure and appropriate policy framework, but also to a lack of appropriate digital competencies within government and the difficulty of applying those competencies effectively. As a result, governments worldwide are paying attention to the knowledge, skills and attitudes that civil servants need to effectively use digital tools, develop and implement digital transformation projects, and address complex governance challenges. Given the contextual factors driving the transition of public administration toward a digital model, it is essential to adopt a digitally oriented approach to personnel training. Consequently, there is an urgent need to enhance civil servants' expertise within the framework of management system digitalization.

Artificial intelligence and digital technologies are becoming indispensable in model of governance XXI century, enhancing administrative efficiency. AI technologies in public administration are gaining increasing attention due to the potential benefits they can provide in improving governmental operations. The advent of AI is seen as a new and novel game changer in the public sector. The promises of AI are about using intelligent machines to take over human tasks and perform them more efficiently and effectively with tangible results and create public value. However, one of the factors hindering this progress is the lack of digital skills and digital literacy of officials.

The rise of AI technologies provides new momentum for transforming governance models and has become a pivotal lever for enhancing digital governance capabilities. One of the crucial factors hindering the progress in incorporating AI technologies within public administration is the lack of AI-skill of civil servants. Whilst AI is often discussed in replacing or automating human activities, human resources and skillsets are invaluable in AI capability. AI does not get developed without the involvement of human experts and workers. This requires public bodies to employ and retain staff with expertise in the development of AI as well as staff with skillsets in managing the existing IT infrastructure. Every civil servant needs some form of AI-related competencies [13].

Civil servants with AI expertise are crucial for developing AI capability and critical to ensuring ethical and responsible

use of AI. Civil servants and managers play a crucial role in the AI capability. They require understanding and knowing the features of AI technology, the ability to apply the possibilities and potential of AI to solve current and strategic issues. Digital competences and digital literacy are essential for successfully implementing AI in public administration. Digital expertise is necessary to work with AI, and public employees need to understand and know the features of AI. The transformation toward digital government requires that governments not only «use» technology but also «master» it and continuously «iterate» their services – tasks that cannot be achieved without a team equipped with digital thinking and digital skills [14].

There are the following requirements for digital qualification of civil servants: digital leadership, digital literacy, open data and data-driven approaches, AI etc. Some of the emerging competencies that are also fundamental for the digital era of public administration include systems thinking (the ability to understand the properties and dynamics of complex systems) and strategic foresight (the ability to anticipate future developments, problems and unexpected events).

Three domains in which civil servants need to acquire skills for digital governance initiatives [15]:

Digital planning. Digital Planning and Design enable civil servants to understand the complexity of today's problems, anticipate unexpected events and recognize strategic opportunities to use digital solutions and develop strategies and vision.

Data use. Data use and Governance represent a combination of competencies that enable civil servants to understand the fundamental role and value of data and its inherent risks, and the ability to use, analyze and share it, taking into consideration ethical, privacy and security concerns.

Digital management. Digital Management and Execution concern the need for civil servants to incorporate management practices that enhance the success of digital transformation initiatives. This includes managing and implementing projects and policies in an agile and collaborative way.

Dealing with public expectations and modern challenges is a struggle for governments in both developed and developing countries. A significant risk of discrediting the entire public administration system exists due to civil servants' lack of digital literacy. Civil servants around the world can fill knowledge gaps and optimize public administration processes through the establishment of systems for professional development [16].

The digital governance competences of civil servants are the cornerstone of digital government in many countries. Digital academies have been created in the UK, Canada, Singapore etc. They train civil servants in both digital and non-digital backgrounds. Digital skills training should go beyond the technical skills. Training needs to go beyond technical skills and develop leadership and soft skills that are crucial for supporting the cultural change that drives digital transformation. In order to establish a culture of effective digital interaction

between the state and citizens and successfully implement digital transformations, it's important to employ a leadership approach when working with digital technologies and AI. This encompasses the development of skills such as interpersonal communication, teamwork, creativity, critical thinking, and problem-solving. Tackling the digital skills gaps is crucial to boost the delivery of public services in a modern digital world.

In the digital era, the values that civil servants should pursue include digital learning capability, digital administrative capability, digital service capability, digital collaboration capability. Digital learning capability refers to the ability of civil servants to use digital learning tools and resources to increase their knowledge and enhance their talents in the digital environment. Digital administrative ability refers to the comprehensive quality of civil servants to use digital technology to promote digital identity reconstruction, internal operation process re-engineering, and governance optimization to adapt to the development of new technologies and new governance scenarios. Digital service capability refers to the ability of civil servants to serve the public with technologies such as the Internet, the Internet of Things, cloud computing, and Big Data. Digital collaboration ability refers to the ability of civil servants to use digital concepts, technologies, tools and other means to promote friendly cooperation between different subjects [17]. Digital skills should be considered as basic skills that civil servants need in order to work for the electronic government. One might even suggest these skills as a minimum norm, which is also desired for citizens that want to function in contemporary information-based society.

Socioemotional skills also become increasingly important when government functions are supported by digital technology, as digitalization may lead to a decline in routine work and the creation of more flexible team-based settings that require agile management, collaboration and problem solving [18].

3. Conclusion

The interaction between government and society through digital technologies can yield many advantages. Negative effects and risks can be incurred by using digital dialogue formats unprofessionally. Civil servants' digital knowledge, skills, and abilities play a significant role in minimizing these risks.

Traditional processes are giving way to tech-driven solutions designed to enhance efficiency and transparency. For future civil servants, digital literacy is no longer optional – it is critical. Digital state and e-governance as well as data-driven

decision-making become central to public administration, aspiring officers must equip themselves with digital skills to navigate this landscape effectively. Digital skills (including AI skills) should be considered as basic skills that civil servants need in order to work for the digital government. One might even suggest these skills as a minimum norm, which is also desired for officials that want to function in the digital state.

Training civil servants as digital, data and cybersecurity professionals will ensure the safe and responsible functioning of state institutions. The ability of civil servants to effectively utilize digital tools can accelerate progress in the public sector. Further in-depth research is needed to explore the relationship between the digital competencies and digital literacy of public administrators and civil servants.

Abbreviations

AI	Artificial Intelligence
APIs	Application Programming Interfaces
E-government	Electronic Government
G-to-C	Government-to-Business
G-to-C	Government-to-Citizens
G-to-G	Government-to-Government
IT	Information Technology
LLM	Large Language Models
NAFI	National Agency for Financial Research
NAO	National Audit Office
UN	United Nations

Author Contributions

Eugenia Vladimirovna Andryushina: Conceptualization, Methodology

Ekaterina Aleksandrovna Panova: Data curation, Investigation

Lilia Vladimirovna Bondareva: Writing – review & editing

Data Availability Statement

The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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