

DIGITAL COMPETENCE AS A KEY FACTOR IN THE MODERNIZATION OF PUBLIC ADMINISTRATION

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ABSTRACT

This study aims to investigate the integration and effectiveness of Information and Communication Technology (ICT) in public administration, focusing on understanding the relationship between professional skills and the application of ICT tools. By adopting an online survey-based methodology, data was collected from 18 civil servants with the aim of assessing their current ICT skills and identifying the main tools used in their daily activities. Key findings highlight a significant need to improve ICT training, highlighting a gap between existing skills and digital governance requirements. This research contributes to the ongoing discourse on digital transformation in the public sector by providing critical insights into the state of digital literacy among civil servants. However, the limited sample size of the study is a notable limitation, cautioning against overgeneralizing the findings. Given this constraint, further research with larger and more diverse samples is suggested to confirm these results and provide a more comprehensive understanding of the evolving digital landscape in public administration. Initial observations are promising but highlight the need for continued investment in ICT education and training. Such an approach is vital for equipping public administration with the necessary tools and developing the skills of employees to effectively navigate the digital age, thus increasing the overall efficiency and responsiveness of public services.

KEYWORDS: *Digital Competence, Public Administration, Governance Digitalization.*

INTRODUCTION

In the context of a world in continuous and rapid transformation, marked by profound changes and unprecedented global events, public administration faces complex challenges that demand adaptability and intense modernization. The global health crisis caused by the COVID-19 pandemic has acutely highlighted the imperative need to reconfigure and update government institutions, highlighting gaps in their ability to respond effectively to the emerging needs of society. At the same time, the geopolitical tensions manifested at the borders and the military conflicts in various regions of the world amplify the level of uncertainty and demand a strategic reaction from the public administration. Thus, the modernization of public administration is no longer just a development objective, but an essential strategic imperative for ensuring national stability and security (Calin et al., 2022).

In this complex and dynamic framework, digital competence emerges as a central and indispensable element in the process of modernization of public administration. This introduction aims to explore in depth the cumulative impact of the pandemic, border tensions and military conflicts on the functioning of public administration, while highlighting the crucial role that digital competence plays in adapting to this rapidly changing landscape.

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The global health crisis generated by the COVID-19 pandemic has subjected public administrations to an unprecedented test of resilience, forcing them to respond quickly and efficiently to a complex set of needs and expectations from citizens. The restrictive measures imposed, such as social isolation and movement restrictions, along with the management of limited medical resources, required intensive use of advanced digital tools and highlighted the importance of digital competence in crisis management. Processes such as mass testing, contact tracing and implementation of vaccination programs have become operations of unprecedented complexity, requiring robust digital infrastructure and staff skilled in the use of emerging technologies.

Moreover, the pandemic has accelerated the transition to remote working and online collaboration models, forcing civil servants to rapidly develop their digital skills to ensure continuity of governance and uninterrupted delivery of public services. This transformation revealed both the potential of digital technologies in making administrative processes more efficient, as well as the vulnerabilities generated by the lack of adequate skills among staff.

In parallel with the challenges generated by the pandemic, heightened geopolitical tensions and military conflicts in various areas of the globe bring to the fore new dimensions of governance and national security. Public administrations are called upon to address these multidimensional challenges, effectively managing available resources, protecting citizens and maintaining stability in a geopolitical environment characterized by uncertainty and volatility.

In this context, digital competence becomes essential for monitoring and promptly responding to threats, coordinating security efforts and communicating effectively with the population. The use of advanced technologies, such as artificial intelligence, big data and real-time information systems, is proving to be indispensable in effectively managing crisis situations and ensuring an adequate level of protection and safety for communities.

Looking to the future, the evolution of public administration will be deeply influenced by the level of digital competence of its staff. Digital competence emerges as a determining factor in ensuring the effectiveness, transparency and resilience of the governing act. Strategic investment in the training and development of digital skills of public sector employees is becoming a *sine qua non* condition to adequately respond to present and future challenges.

1. LITERATURE REVIEW

Currently, the level of preparation and digital competence of citizens is considered an essential competitive factor, meaning that users with a high level of digital competencies are associated with intensive users, while those with minimal knowledge are characterized as passive users of technology. Thus, even in public administration, it is crucial to monitor the level of competencies, as digitalization significantly contributes to increasing the quality of public services that have a direct impact on citizens (Budai et al., 2023; Burlacu, Părgaru, Iacob & Gomboș, 2022).

Globally, digitalization has expanded to include a multitude of areas such as banking services, social assistance, job applications, resulting in the use of technology no longer being optional but a necessary requirement for social, economic, and civic life. For example, in Great Britain, government services have been visibly digitalized through the government's "digital-by-default" agenda. Currently, people are compelled to use technologies to receive various services, whether governmental or commercial (Allmann & Blank, 2021).

Due to rapid evolution, citizens' expectations of public administration and the services they provide for the benefit of society are continually growing and represent a challenge for the state to adapt and change the public sector, thus embracing the era of digital technology (Burlacu et al., 2021).

In Romania, the digitalization of public administration and the perspectives of sustainable development have been highlighted by authors such as Burlacu et al. (2022a), who emphasize the importance of digital competencies in increasing efficiency and transparency in administrative action.

Studies also show that digitalization can contribute to organizational resilience and the improvement of public services offered to citizens (Burlacu et al., 2022b).

England has shown concern for implementing strategies regarding citizens' digital competencies. The recent political impetus for greater attention to digital skills comes from two interrelated sources: concern about the "digital skills crisis" and an ongoing commitment to promoting digital inclusion in the UK. A policy document on digital inclusion and skills produced by the Department for Culture, Media and Sport (DCMS) in England states that digital inclusion and digital skills are a way for citizens to achieve a range of positive outcomes, including gaining employment, saving money, expanding career opportunities, improving health, and reducing isolation (Eynon, 2021).

A civil servant, in their daily activity, collects, uses, and processes data, documents, and information. From this perspective, the official must correctly use the tools available to citizens (e.g., the Internet for information search) and tools specific to their field. The issuance of electronic documents is established by law, and specific rules are introduced for each administration for managing, storing, or transmitting the document. The employee must have the ability to apply these rules, but especially to use the electronic signature and archive management (Călin, Burlacu, Mocanu & Popescu, 2022).

Sidorchuk et al. (2021) states that the digital transformation of public administration does not cover only the individual functions of governmental organizations but the entire management cycle, which involves planning, management, control, and decision-making. The impact this transformation has on the performance of civil servants is identified in their activity as follows:

- Changes in the activity process of civil servants by expanding the use of big data for formulating public policies, producing official statistics, etc., automating routine procedures and interactions, increasing efficiency.
- Transformation of the management cycle, namely service delivery, making management decisions based on certain algorithms or data, even with the help of artificial intelligence, changing the way of evaluating the performance of the official, for example, using certain studies or analyses.
- Change in the culture of interaction is associated with the spread of "flexible management" culture, i.e., orientation towards activities followed by feedback.
- Digital development, civil servants learn how to work, constantly adapt to changes and IT systems at work.
- Continuous development of the professional field of civil servants.
- Introduction of a new motivation system for officials, offering the possibility of a flexible work schedule and emphasis on results rather than time spent at work.

Continuing the presentation of the impact of digital transformation, we present the digital competencies of civil servants that authors from Belarus have identified. The types of competencies are presented as follows: managerial competencies (the set of personal skills used for the effective performance of activities, such as intellectual, moral, leadership qualities, digital planning, and others); technical skills (those ICT competencies that allow working online or with various digital devices); communication skills (effective communication through various digital channels and in a team) (Sidorchuk et al., 2021; Negescu et al., 2021).

According to one approach, digital competence is an evolving concept related to the development of digital technology and the political goals and expectations of citizenship. Spanish researchers, such as Fraile et al. (2018), cited by Budai et al. (2023), identified that digital competence stands out among the eight competencies developed by the European Commission that help continuous learning and, therefore, is a necessary condition for personal development, active citizenship, social inclusion, and employment in a knowledge-based society (Budai et al., 2023). Digital competence is one of the important competencies of modern society; thus, digital technology is constantly evolving and offers us more opportunities and freedom than ever before. Ferrari's research (2012) identified the following definition: digital competencies are the set of knowledge, skills, attitudes needed to use ICT and digital media to perform tasks, solve problems, communicate, manage information, collaborate; to

create and share content and to build knowledge effectively, efficiently, appropriately, autonomously, flexibly, ethically, and reflectively for work, leisure, study, and social interaction.

The study conducted by Parsons et al. (2023) on digital skills provides an assessment of decision-makers and adopts a selective approach to public policy adjustments in six OECD member states—the UK, Germany, Iceland, Greece, Switzerland, and New Zealand. To some extent, anticipated competencies are relatively predictable. Online marketing and communication skills, social media, and Microsoft Office scored high (Parsons et al., 2023).

Competencies require both knowledge and skills (Edelmann et al. 2023). An Austrian case study by Edelmann et al. (2023), regarding the competencies that aid the digital transformation of public administration, concludes that the administration requires all those competencies such as business skills, IT skills, legal competencies, organizational skills, leadership skills. Competencies considered to be most relevant are soft skills (specifically for staff holding a management position), functional knowledge of computers and IT systems, as well as business skills.

For the Nordic countries, the concept of digital competencies has become very complex and a key element for education. Norway starts with the reform of the national curriculum in which we find the ability to use digital tools as a basic competence. Norway ranks among the first countries in the world where digital skills are an essential element of a curriculum. One of the school subjects emphasizing digital competencies relates to social sciences, which stresses digital interaction and digital citizenship, students' critical judgment towards information sources, and becoming communicative and creative using digital resources. One of the ideas implemented in Finland to support the digitization of the curriculum is a "transversal competence" to be developed in most subjects. These competencies include learning skills, interaction and expression skills, multiple literacies (including digital literacy), i.e., the ability to produce and interpret a wide range of different texts, as well as cultural competencies, interaction and self-expression, digital technology skills, professional life skills and entrepreneurship, participation, engagement, and building a sustainable future, among other perspectives (Erstad et al., 2021). In Sweden, according to the Swedish Government, digitization means changing society and life. The national curriculum highlights children's ability to use and understand digital systems and services and to engage with information and media in a critical and responsible way. There is also an emphasis on the creative aspects of digitization, children's problem-solving skills, and their ability to turn ideas into reality with the help of technology (Erstad et al., 2021).

Regarding digital competence, Carretero et al. (2017, p.11), cited by Klochan et al. (2021), illustrate the following essential digital competencies: information and data literacy, which helps to locate and retrieve digital data; communication and collaboration, which aids in interacting and collaborating through digital technologies, actively participating in society by providing services to citizens in digital format, as well as managing digital identity and reputation; digital content creation, necessary for editing digital content, improving and integrating information while respecting and enforcing copyright; safety, essential for protecting devices, content, and personal data in digital format and their privacy; problem-solving, a competency that requires the use of digital tools and an understanding of digital evolution.

Lindroth and Bergquist (2010) extract from the Official Journal of the European Union the concept of digital competence that requires a careful approach, knowledge, and a solid understanding of the role and opportunities of information society technology in everyday life, whether in personal life or at the workplace. Thus, digital competencies are essential to acquire other competencies necessary for carrying out activities at the workplace and beyond (Spante et al., 2018).

Research by some experts identifies twelve digital skills, and some of them are presented below. A person must have general knowledge and functional skills, i.e., know the basic elements needed to use digital devices; in daily use, they implement digital technologies for daily activities; possess advanced and specialized skills in different activities, so the digitally competent person improves professional performance by using ICT to express creativity; use technology-mediated collaboration and communication by connecting to share and communicate with other active individuals in digital

environments; process and manage information, using digital skills to collect and analyze data; consider data confidentiality and security by taking appropriate security measures; have a balanced attitude towards technology, enjoying opportunities and developments while being close to the digital society; are aware and understand the role that technology has in society; continuously use digital technologies to increase professional and personal effectiveness and efficiency (Janssen et al., 2013). Over time, governments worldwide have tried to adapt and leverage ICT technology to facilitate communication with citizens and improve the services provided (Liu & Yuan, 2015). This method of transmitting data and information in electronic format can lead to an increase in the level of trust in authorities, creating a connection between these involved actors (Popescu, Gomboș, Burlacu & Mair, 2021).

The emergence of digital tools represents a mechanism for implementing processes, making it possible to significantly improve their quality characteristics (execution time, optimization, effectiveness of the services provided, and efficiency), as well as the emergence of new qualities and characteristics of these processes (e.g., automatic decisions) (Klochan, 2021, p. 43)

According to Klochan (2021), the foundations used in digital transformation are: Big Data—referring to the increased possibility of storing and processing information in all types of systems, as the basis of artificial intelligence; Mobility—availability of information from anywhere, using different devices (e.g., mobile phone, laptop); Cloud technologies—used as a way to store data, with the possibility of access from different places; Socialization and personalization—the need to collect as many users as possible with their personal data (Klochan, 2021).

Using digital platforms in conducting the consultation process helps achieve maximum productivity—by utilizing unified consultation activities and the parallel execution of many such activities. Parallel consultation processes are divided into processes like SIMD (Single Instruction Multiple Data) and MIMD (Multiple Instruction Multiple Data). Consultation processes like SIMD are a vector tool for implementing consultation processes (Klochan, 2021, p. 48). Digital platforms are used as tools to improve public administration (Burlacu et al., 2022a).

In an article on "Digital Skills and Education" written in 2019, it is mentioned that the 21st century is represented by digitalization. This accelerated pace of technology brings to the forefront the need for adaptation and continuous development of digital skills. These digital skills, in the view of authors Iordache, Mariën, and Baelden, cited by Levano et al. (2019), are characterized as measurable outcomes of digital literacy processes. Gilster introduced the concept of digital literacy in 1990, seeing it as a useful element in understanding and using information from a multitude of sources available on the computer (Spante et al., 2018).

To use the Internet, users need some digital competencies mentioned in the "Partnership for 21st Century Skills," such as: learning skills, including creativity, critical thinking, and problem-solving; literacy skills, such as ICT and information literacy; life skills, encompassing flexibility, initiative, adaptation, responsibility, leadership (van Laar et al., 2020).

To achieve digital literacy in Singapore, the "Unified Framework for Digital Literacy" (UFDL) aims to support this process through a digital literacy plan. UFDL strengthens policy coherence across different frameworks, programs, and campaigns so that efforts to improve Singaporeans' field skills and digital skills are collectively harmonized (Levano et al., 2019).

To achieve digital literacy in Singapore (UFDL) The Unifact Framework for Literacy wants to support this process through a digital literacy plan. UFDL strengthens policy coherence across different frameworks, programs, and campaigns so that efforts to improve Singaporeans' field skills and digital skills are collectively harmonized. This aspect is presented in table 1.

Table 1. Frameworks, campaigns, and programs for digitization in Singapore

Organizations involved in digital literacy and the processes used	
Local organizations	Digital literacy frameworks, programs or campaigns
Singapore Ministry of Communications and Information	Digital media, literacy and the information framework
Singapore Ministry of Education	National Digital Literacy Program
Cyber Security Agency of Singapore	Stay Safe Online — Cyber Awareness
National Library Board, Singapore	The SURE program
International organizations	Digital literacy frameworks/programmes or campaigns
The European Commission	Digital competences
UNESCO	Global Framework of Reference for Digital Literacy Skills
Microsoft	Microsoft Digital Literacy
ECDL Foundation	ICDL/ECDL certifications
Pearson Education Inc	Internet Core Competency certification

Source: Authors

Klochan et al., (2021) referring to the study of Law et al., (2018) offers the following definition: Digital literacy is the ability to define, manage, communicate, evaluate, and create information safely with the help of digital technologies.

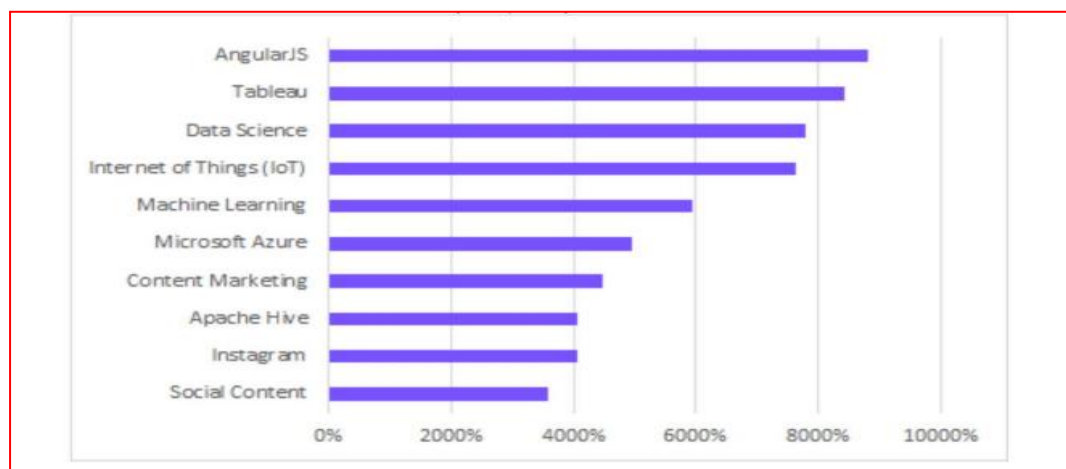


Figure 1. Basic digital skills in Singapore, 2019

Source: Adapted from APEC, 2020, p. 38

Digital literacy means that we can understand media, seek, and critically evaluate information, and communicate with others through a variety of media (Ferrari, 2012).

As key skills, Singapore ranks Microsoft Excel, PowerPoint, and Word digital skills in the top positions, which can be seen in figure 1. Also, over time the digital skills AngularJS (specific to web applications), Tableau (to observe data) and Data Science have emerged, according to Figure 2.

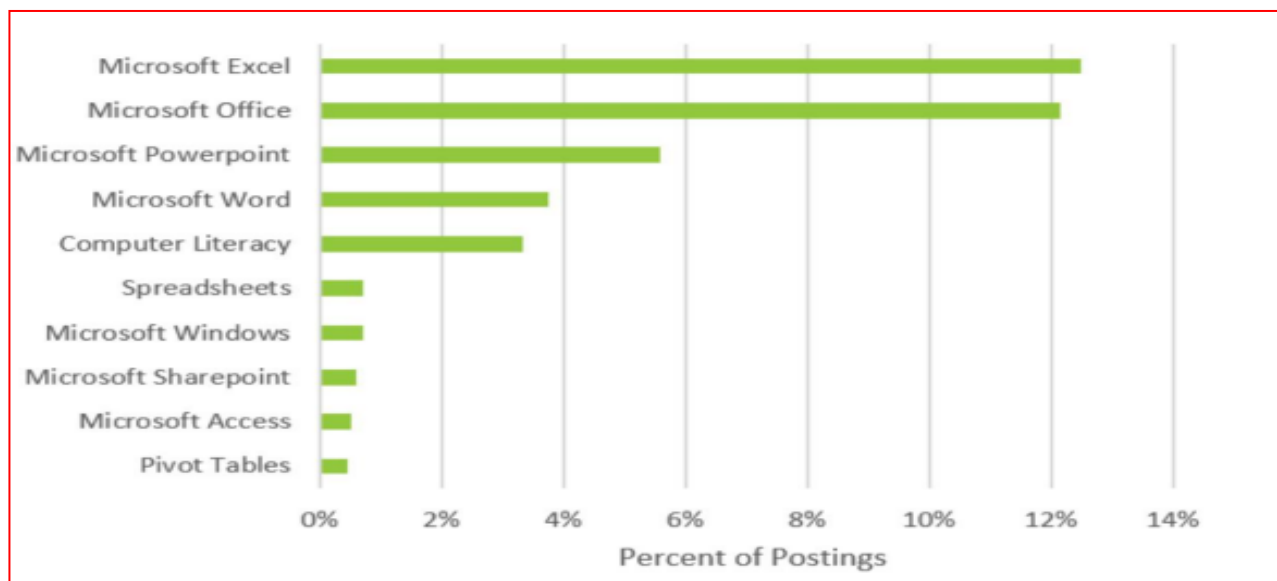


Figure 2. Growing digital skills in Singapore, 2020

Source: APEC Report Closing the Digital Skills Gap (APEC, 2020, p.39)

The present reports, which address the issue of digitalization, represent a significant stage in the process of building a professional career in which the employee has a set of essential digital skills. The tools shown in the two figures, being in common use and well known to most citizens, readers and other users, considerably facilitate the transmission of information, the collection and sorting of data, as well as the preparation of documents, presentations or other similar activities. The benefits arising from the use of these tools consist of reducing the time required for various operations (for example, waiting time or the time allocated to the preparation of documents), reducing expenses, simplifying the procedures related to the performance of tasks, maintaining connections and being able to receive immediate feedback, among others.

To illustrate the variety of digital literacy programs available, here are some examples, such as:

Microsoft - Digital Literacy Standard Curriculum

ICDL - International Computer Operator's License

Certiport - Basic Internet and Computer Certification (IC3)

Among the reference tools best known and used in the development of e-government is the Digital Economy and Society Index (DESI), which evaluates the member states of the European Union based on criteria such as connectivity, the skills of internet users and human capital, the use of technology digital in various activities such as business or e-commerce, and e-government for public services; also, another important tool is the E-Government Development Index (Wodecka-Hyjek, Kafel, & Kusa, R., 2021).

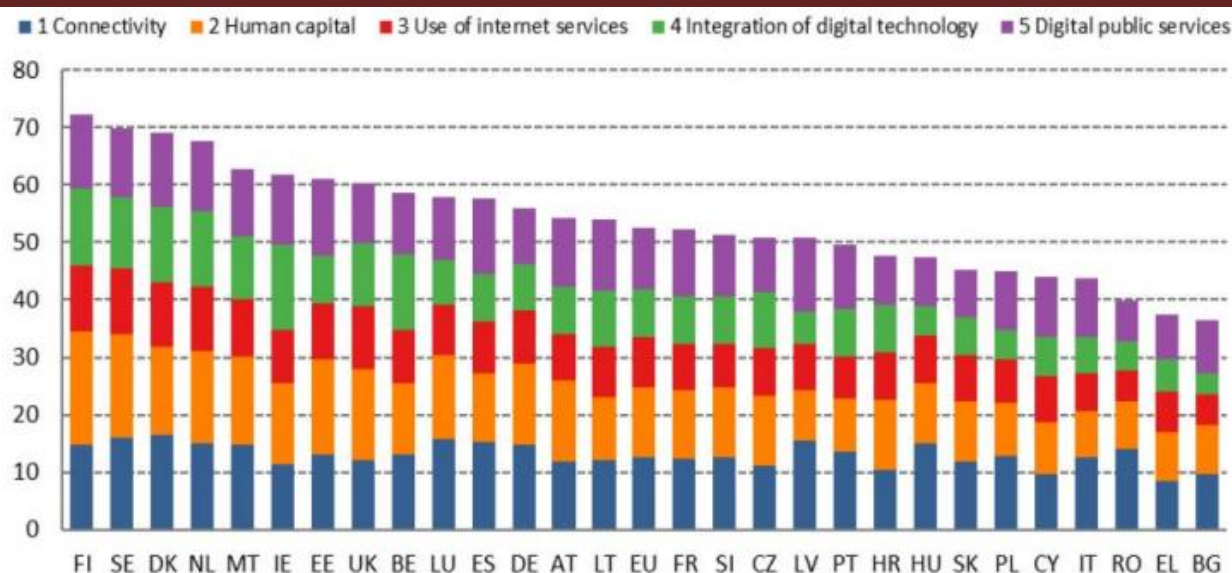


Figure 3. Digital Economy and Society Index, 2020.

Source: Adapted from the Digital Economy and Society Index (2020, p.14)

In a report carried out in Poland, which according to the graph above is at the bottom of the ranking in terms of digital performance (DESI), it is mentioned that a project has been started, finalizing a strategy through the Digital Skills Development Program to contribute to the development of digital skills necessary for citizens, other actors involved and especially the public administration. However, it is mentioned that another program is planned for the period 2021-2027, called the Digital Poland Operational Program (Wodecka-Hyjek, Kafel, & Kusa, R., 2021).

The Microsoft Digital Literacy Program offers digital literacy courses like:

- The first course is about *computer work* - interacting with the computer, using it, using applications and using connected devices.
- Another course is about *accessing information online* - logging in, browsing the internet and searching.
- *Online communication* - with the help of e-mail and online chat
- *Surfing safely and responsibly in the online environment* - respect for privacy and security
- *Creating digital content* - accessing Microsoft Office tools, using word documents, creating and editing word text, as well as creating documents in PDF format
- *Online content collaboration and management* - device storage in the Cloud, document sharing, time management through a digital calendar and work through tasks and contacts.

Also, the ICDL Digital Citizen Program presents a set of useful skills to use the computer and the Internet offered by the ECDL foundation. This foundation offers certificates for acquired knowledge and skills. As an example, ICDL program offers the following skill sets, according to the adjacent table. Digital Citizen is created for beginners and is open to everyone, regardless of their education, age or ability. ICDL is a global leader in digital literacy learning and certification. (ICDL Europe, 2023) To understand the essence of this program we will present the important elements that are learned within it, as well as the necessary skills that an individual must master:

- *Computer basics* - its component parts, types, using the keyboard and mouse and shutting down the computer.
- *Introduction to desktop* - icons, taskbar and start button, data storage, applications and file types.
- *Introduction to documents* - creating a document, naming, and saving it, setting the font type, cutting, copying and pasting, saving and printing.

- *Introduction to the web* - online security, connecting to the internet, using search engines and downloading data, and using online forms.
- *Communication-connecting with an email* account or creating one, replying and forwarding emails, online communication.

ICDL modules have been designed with the aim of developing the digital skills required for a modern workplace, with employees to use technology effectively. According to ICDL EUROPE, (2023) people who complete the Digital Citizen program will acquire the necessary skills to progress on Digital Citizen Plus, ICDL Workforce modules and more. They will thus be able to understand the essential activities involved in using a computer, i.e. turning it on and off, navigating the desktop, storing files, creating, saving, and editing a document, using electronic data sources and how to use online services as well as communication by e-mail and instant messaging.

The third program offered as an example is the IC3 Digital Literacy Program. The Internet Core Competency Certification is a global benchmark for essential computer knowledge such as operating systems, hardware, software, and networking offered by Pearson Education Inc. The IC3 Digital Literacy program covers the following modules (Certiport, 2019):

- *Technology basics* - explaining essential software concepts, identifying and solving technical problems.
- *Digital citizenship*- Managing and protecting digital identity.
- *Information management* - which refers to the management, storage and processing of data available in the online environment and the evaluation of information sources.
- *Content creation* - the responsible use of digital sources, as well as the presentation or editing of original content for a certain type of audience.
- *Communication* - expressing and interacting with others using digital means and personalizing the content of the message according to the target audience.
- *Safety and security* - identifying threats and finding online security measures to avoid cyber threats and managing security through passwords and virus removal.

Certiport has worked with some of the world's most renowned organizations, transforming IC3 digital knowledge into a truly global standard. Examples of organizations that give credit to this program: ISTE- The International Society for Technology in Education is the creator and administrator of the definitive educational technology standards in the United States; ACE- The American Council on Education is the unifying voice of the US for higher education; GDLC- Global Council for Digital Literacy; DigComp; The Government of Romania; UNESCO etc. Digital literacy IC3 is mapped to the European Commission's Digital Competence Framework for Citizens (DigComp) (Vuorikari, Kluzer, and Punie (2022)).

In Spain, in 2017, the European Framework of Digital Competences for Teachers was published, which has the following areas of competence: Professional involvement, the digital competence of teachers is manifested not only by their ability to use digital technologies to improve their teaching, but also through their ability to interact professionally with colleagues, students and various actors in the educational community; Digital resources, regarding obtaining, creating and distributing digital resources, taking into account copyright and protecting personal data. One of the key skills that all teachers need to develop is the identification of teaching resources. Teachers must also be able to modify, create and share them to adapt to their goals, audiences and teaching styles; Teaching and learning; Evaluation; Empowering learners and Facilitating students' digital skills. This proposal is found in the "DigComp Initiatives" and contributes to the "Skills Agenda for Europe" (Cabero-Almenara, 2020).

Digital means for cooperation

To have an open relationship between the state and society, it is necessary to adopt effective tools that create efficient and productive communication processes to support bilateral interaction.

According to Popovych et al. (2020), some of the conceptual principles that determine the essence of the social and communicative paradigm of public administration include: the transformation of the state from a monopolistic subject of social development into one of the elements of the general system of administration; the establishment of a triangle of power including the government, citizens and other participants of the public administration, thus allowing more effective decisions to be made; citizens act as a controlling authority and form the basis for the legitimacy of state power. Social networks represent one of the key tools for organizing mutual connections between these two parties, i.e. state and citizens. At the stage of development of technological progress and information technology, the term "social network" is used to refer to web resources that allow expression and communication with others, that is, developing one's own page and communicating with other users, thus forming networks of "colleagues", "friends" or "followers". (Popovych et al. 2020) Social networks are a tool that creates many forms of communication. For example, the following outlines three shapes:

- asynchronous one-to-one communication (private messages);
- asynchronous many-to-many communication (communication in groups);
- "one-to-one", "one-and-several", "one-to-several" synchronous communications (commenting on the posts of some people or pages).

Currently, a manager can communicate with the public in the following ways (Popovych et al. 2020):

- *Informing the population* by providing ideas regarding various events or phenomena through its own communication channels.
- *Digital advice*. Social networks allow streaming and video conferencing with users. Live communication allows immediate tracking of users' reactions to the information provided.
- *Digital decision making*. Citizens can participate in the decision-making process, for example through petitions.

According to Popovych's statistics, in Ukraine, the tools used for e-democracy by government officials in service delivery are as follows: Websites, Google, social media, electronic registers, electronic surveys, electronic resources, electronic forums, appeals and electronic inquiries and E-petitions. In the case of internal communication, the tools used are e-mail, social media, electronic forums, Feedback on official websites and electronic surveys. Social and communication processes are essential in ensuring democratic values. That is why they are actively used by the government to establish bilateral and effective communication with the population (Popovych et al. 2020).

Reviewing the possibility of using artificial intelligence even in public administration, to contribute to the activity of officials, the following programs can be used to analyze e-mails, according to Todorov who mentions the following software that automates the workflow and extracts the main data, organized and economical (Todorov, 2023).

- ❖ **100Hires - Features:** This software quickly and securely extracts data from emails and other documents using natural language processing (NLP) algorithms and artificial intelligence; smart-efficient recruitment automation; Looking for candidates based on experience, education, and various requirements
- ❖ **Mailparser - Features:** Automated business process - companies extract data from emails and move them to the desired location; Email to Excel - data extracted from email is sent to Excel spreadsheets.
- ❖ **Parserr - Features:** Analyze emails - filter, transform and validate data; Automation rules - certain rules can be configured to extract data from email and how it is desired to transform it.

In another online publication written by Neagu Lidia, 2021 and published on Economica.net it is mentioned that AI applications were used in EU member states in 2020, as follows: Ireland (23%), Finland (12%)) Malta (19%), and Denmark (11%), and the lowest percentage was in Latvia (2%), Cyprus, Hungary, Slovenia (each with 3%), Poland (4%), Bulgaria and Austria (both with 5%), the

Netherlands, Croatia, Luxembourg, France, the Czech Republic, Estonia and Romania (6%). (Neagu, 2021)

In the guide to the jobs of the future, written in 2022 by coordinator Paul Andreea, it is mentioned that the best-known robotic advisors are Google Assistant and Alexa (Amazon), as well as chatbots integrated into social media sites, such as WeChat, Facebook. Types of chatbots found in the author's work are: Chatbot with voice recognition function, Hybrid Chatbot, Chatbot for messaging, Chatbot for skills, Chatbot based on keywords. Chatbot technology that is based on artificial intelligence uses the requested keywords, so platforms and chatbots are used such as (Paul, 2022, p. 87-93):

- *The Netomi platform* is used in companies to help customers' needs, using email, chat messaging or voice. This platform has the highest accuracy of all. Assists 70% with customer requests.
- *WP- Chatbot* is the most famous chatbot and offers a multitude of websites, live chat.
- *Replika* is a chatbot known as a "friend", an application that uses AI.
- *Tidio Support Bot* - companies use this bot to provide real-time answers to their customers.
- *Kuki AI Companion* - represents a virtual friend that addresses certain topics.
- *Meena* (Google) - conversational chatbot.
- *BlenderBot* (Facebook) - AI-based chatbot.
- *Insomnobot 3000* (Casper) - chatbot created to socialize with people suffering from insomnia.
- *Mondly: Learning Bot* - language learning platform.

As virtual assistants we mention *Siri* - available on Apple devices, *Cortana* - available on Microsoft and Google - on Android devices. (Paul, 2022, p. 90).

Finally, to adapt to new job requirements, digital skills are not enough, therefore it is necessary to strengthen human skills that cannot be replaced by machines, robots, or computers. The flexibility required by the current demands of the workforce is based on critical thinking, creativity, more precisely the strengthening of skills complementary to digital ones.

The organizational digital competencies that a civil servant must possess are the ability to design or plan roadmaps either for various projects or programs, to have the ability to organize programs and projects, and the technological digital competencies that relate to acquiring knowledge in the field of IT systems development, building a software monitoring system as well as managing IT systems (Sidorchuk et al. 2021).

2. FINDINGS

The intersection of digital competence and public administration has garnered significant scholarly attention in recent years. This literature review provides an overview of key studies and research findings, offering insights into the critical role of digital competence in the modernization of public administration.

Digital Competence in Public Administration: A Conceptual Framework

Building a conceptual framework for understanding digital competence in public administration, Johnson (2020) outlines the multifaceted nature of this competence. The study emphasizes the importance of digital literacy, technical skills, and adaptability in the context of e-governance. (Johnson, 2020)

Digital Competence and Citizen Engagement

Examining the relationship between digital competence and citizen engagement, Brown (2021) explores how proficient public administrators can utilize digital tools to foster better communication and engagement with citizens. This research underscores the potential for improved transparency and responsiveness. (Brown, 2021)

This research has yielded several significant findings regarding the impact of digital competence on the modernization of public administration in the context of health crises and geopolitical conflicts:

Digital Competence is Vital During Health Crises

The COVID-19 pandemic has underscored the crucial role of digital competence in crisis management. Public servants with advanced digital skills were able to efficiently manage medical resources, coordinate testing and vaccination efforts, and communicate with citizens in a more transparent manner.

Administrative Efficiency Depends on Digital Competence

The research has shown that the digital competence of public servants is positively correlated with the efficiency of administrative processes. Competent use of digital tools leads to reduced bureaucratic bottlenecks and faster delivery of public services.

Citizen Engagement is Enhanced through Digital Competence

Public servants with digital skills can use technology to communicate more effectively with citizens. This results in higher levels of transparency and citizen engagement in government processes.

Digital Competence Development Programs are Necessary

Studies have emphasized the need for the implementation of digital competence development programs in the public sector. Such programs should aim to prepare public servants to address technological challenges and leverage digital opportunities.

Challenges in Integrating Digital Competence

Integrating digital competence into public administration faces challenges such as resistance to change, budget constraints, and the need for infrastructure updates. These obstacles must be addressed to ensure the success of digital transformation.

Digital Competence in Crisis Management

In the context of geopolitical conflicts, digital competence becomes essential in threat management and response. Effective use of technologies can facilitate rapid decision-making and real-time coordination of actions.

These findings highlight the critical importance of digital competence in the modernization of public administration and its preparedness to navigate a rapidly changing global environment marked by complex challenges. Investment in the development of public servants' digital competence is a crucial step toward ensuring more efficient, transparent, and resilient governance in the face of contemporary crises.

As part of the research, a questionnaire was distributed based on which the data about the respondents were collected, with details such as age, gender, educational level, professional status, seniority within the National Agency of Public Servants in Romania (Agenția Națională a Funcționarilor Publici. (2022), and various questions related to technology, innovation and digital skills development.

Based on the data, we formulated and tested the following hypotheses:

Age and Technology Adoption Hypothesis

H1. Younger respondents may be more open to adopting new technologies compared to older respondents.

Gender and Innovation Perception Hypothesis

H2. There may be a difference between men's and women's perceptions of the importance and feasibility of technological innovations.

Hypothesis regarding educational level and the need for continuing education

H3. Respondents with a higher educational level might consider continuing education in the field of technology more important.

2.1 Basic statistical analyzes to test hypotheses.

H1. Age and Technology Adoption Hypothesis

Variables: Age (continuous), Technology adoption (categorical: low, medium, high)

Analysis Method: Logistic regression or Pearson correlation

Hypothesis: Age is inversely related to technology adoption (younger adopt more than older)

Correlation between Age and Technology Adoption: -0.014, p-value: 0.841

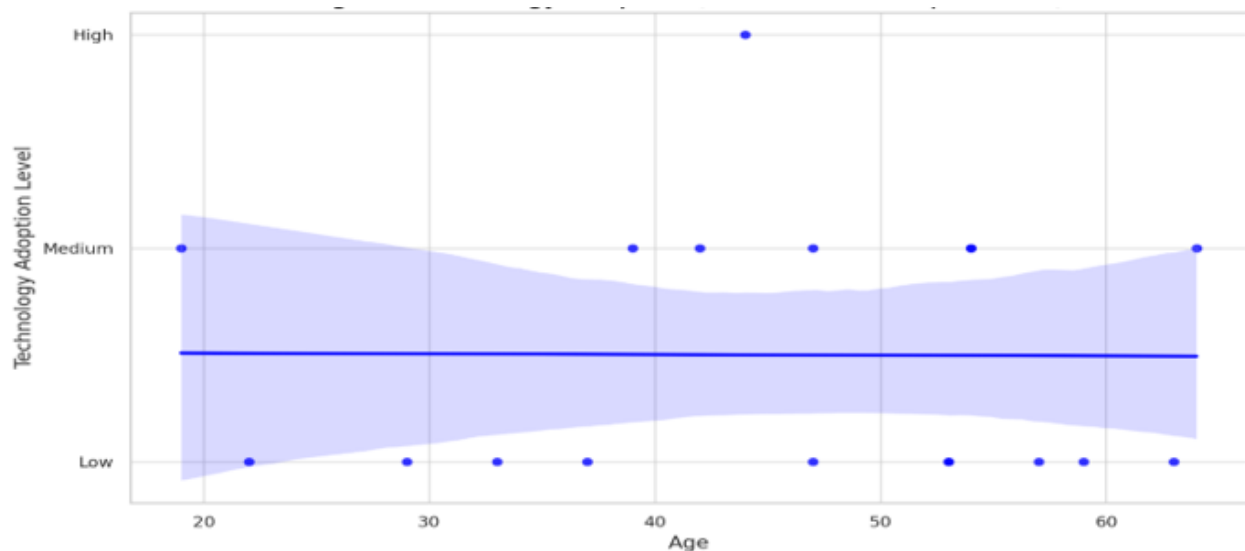


Figure 4. Age vs Technology Adoption

Source: own elaboration

Interpretation: There is no significant correlation between age and technology adoption in our data. This suggests that in this fictitious data set, age does not significantly influence technology adoption. Figure 4 shows a scatterplot of points indicating the relationship between respondents' age and their level of technology adoption. There is no clear trend or strong correlation between age and technology adoption. This suggests that, in this small subset of the data, age does not appear to be a major determinant of technology adoption. It is important to note that this is a small subset and not necessarily representative of the general population.

H2. Gender and Innovation Perception Hypothesis

Variables: Gender (categorical: male, female), Perception of innovation (categorical: low, medium, high)

Analysis Method: Chi-square test

Hypothesis: There is a significant difference between men and women in the perception of technological innovations

Chi-square: 6.045, p-value: 0.049

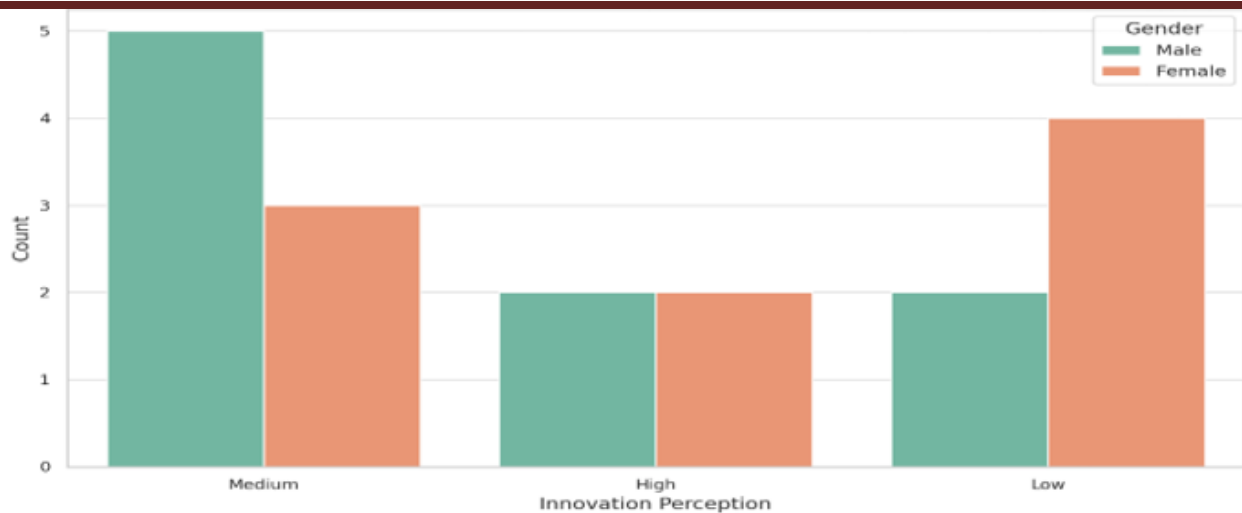


Figure 5. Gender and Innovation Perception

Source: own elaboration

Interpretation: There is a statistically significant difference between men and women in the perception of technological innovations. This suggests that gender can influence how technological innovations are perceived. Figure 5 shows the distribution of the perception of innovations between men and women. We observe that there is a relatively balanced distribution between men and women for the different levels of innovation perception. There is no obvious difference or clear trend to suggest that one gender perceives technological innovations significantly differently than the other, at least in this small group of respondents.

H3. Educational Level and Continuing Education Hypothesis

Variables: Level of education (categorical: low, medium, high), Need for continuing education (categorical: low, medium, high)

Analysis Method: Chi-square test

Hypothesis: People with a higher level of education consider continuing education in the field of technology more important

Chi-square: 2,700, p-value: 0.609

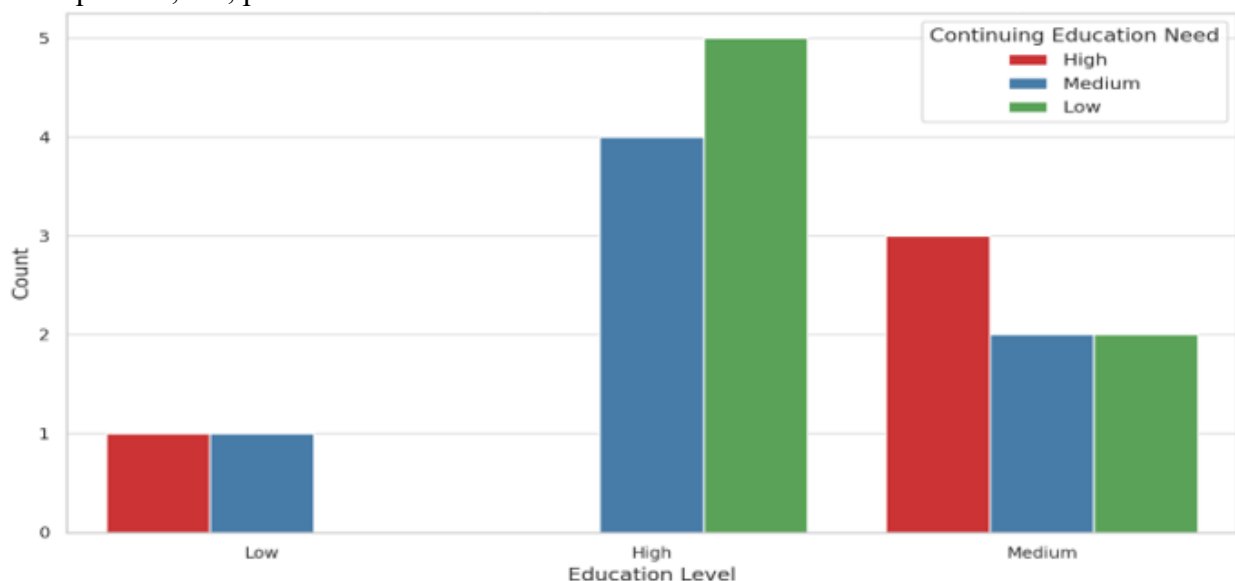


Figure 6. Education Level vs Continuing Education Need

Source: own elaboration

Interpretation: There is no statistically significant difference between education levels and perceived need for continuing education in technology. This indicates that, in our fictitious data set, education level is not a significant factor in the perceived need for continuing technology education. This graph in Figure 6 compares education level with perceived need for continuing education in technology. The results show a variety of responses at different levels of education. There does not appear to be a clear trend indicating that people with a higher level of education feel a greater need for continuing education in technology.

3. LIMITATIONS OF THE RESEARCH

Sample Size and Representativeness

Although the sample was carefully selected, it may not reflect the full diversity of public administrations worldwide. The sample size may not capture the full range of challenges and experiences faced by civil servants in different contexts.

Self-Reporting Bias

The data collected is subject to self-reporting bias, as respondents and interviewees may over- or under-estimate their level of digital competence or the importance of digital skills in their roles.

Contextual Specificity

Qualitative findings are context specific and may not be directly transferable to all settings. The impact of digital competence may vary depending on the socio-political and economic context specific to each region.

Temporal Factors

The study represents a static snapshot in time, and the rapidly evolving nature of technology and geopolitics implies that findings may evolve as well.

Methodological Limitation

The methodology applied in this study, combining questionnaires and interviews, has its own limitations. For example, questionnaires may not be detailed enough to capture the complex nuances of digital literacy, while interviews, while providing deep detail, may be subjective and limited by the researcher's interpretations.

Reliance on Secondary Sources

The study relies significantly on secondary literature and previous research, which may be outdated or may not fully reflect the current realities of public administration in the digital context.

Diversity of Technological Tools

The study did not address in detail the diversity of technological tools available and how they are implemented in different administrative contexts. This is an important limitation, as the specific use of technologies can significantly influence the required digital competence.

Resistance to Change

The study did not explore in depth how cultural or institutional resistance to change can affect the adoption of digital skills in public administration, which is a crucial component in understanding the modernization process.

By acknowledging these limitations, the study can be seen as a starting point for future research to address these gaps and provide a more complete perspective on the role of digital competence in modernizing public administration.

CONCLUSIONS

In a world characterized by dynamic challenges and opportunities, digital competence stands out as an essential element in the process of modernizing public administration. The COVID-19 pandemic

has undeniably highlighted the crucial importance of digital skills in managing crisis situations and ensuring continuity of governance. Moreover, the complex and ever-changing geopolitical landscape dictates the need for robust digital expertise to facilitate effective decision-making and effective threat management.

Administrative efficiency, citizen involvement and transparency are aspects intrinsically linked to the level of digital competence within public administration. Competent use of digital tools can simplify and optimize bureaucratic processes, encourage meaningful and productive interactions with citizens, and ensure responsible and transparent use of public resources.

However, as we conclude this study, it becomes apparent that the road to full integration of digital literacy is strewn with significant challenges. Resistance to change, budget constraints and the need to upgrade infrastructure are formidable barriers that require strategic planning and a firm commitment to overcome.

Based on the findings and acknowledging the limitations of this study, the following recommendations are offered:

- Governments should prioritize investing in programs to develop digital competence for civil servants. These programs should be tailored to the specific needs of different roles within the administration, thus ensuring a personalized and effective approach to vocational training.
- Strong leadership and effective management strategies are crucial to overcoming resistance to digital transformation. Leaders in public administration should actively promote digital initiatives, inspire employees and create an organizational culture oriented towards continuous learning and innovation.
- Given the global nature of digital challenges, international collaboration and knowledge sharing between governments and organizations can encourage the adoption of best practices and accelerate the growth of digital literacy globally.
- Governments should assess and prioritize upgrading technology infrastructure to effectively support digital initiatives. This includes not only updating equipment and systems but also ensuring robust cyber security measures are in place to protect sensitive data and maintain public trust.
- Maintaining continuity in research on digital competence and its impact on public administration is essential. Longitudinal studies that track the evolution of digital skills and their influence on governance effectiveness can provide valuable insights and guide policymakers' future strategies.

In conclusion, digital competence asserts itself as the cornerstone of a modernized, efficient and resilient public administration in an era marked by global crises and uncertainties. It is imperative that policymakers recognize not only the immediate benefits of digital literacy, but also its long-term impact on the sustainability and competitiveness of nations on the international stage. The integration of digital skills in public administration is not only an adaptation to new technologies, but also a profound transformation of the way public services are designed, implemented and evaluated.

The development of digital competence must be accompanied by appropriate policies and legislative frameworks that facilitate innovation and at the same time protect the rights and security of citizens. Continuing education and training plays a key role in this process, ensuring that public sector employees are prepared to meet the emerging challenges and capitalize on the opportunities offered by digital transformation.

In light of these considerations, it is essential that governments take a proactive and strategic approach to promoting digital literacy, invest in infrastructure and human resources, and collaborate internationally to share knowledge and best practices. Only through a concerted and sustained effort can it be ensured that the public administration evolves in step with the digital society, responding to the needs and expectations of citizens and contributing to sustainable economic and social development.

Embracing this digital transformation is not only a technological necessity, but also a commitment to fundamental democratic values such as transparency, accountability and citizen participation, which underpin effective and fair governance. While the road to fully mainstreaming digital literacy is complex and demanding, it is an inevitable path that governments must take to ensure the well-being and prosperity of their citizens in the digital age and to build resilient societies in the face of future challenges

REFERENCES

- Allmann, K., Blank, G. (2021). Rethinking digital skills in the era of compulsory computing: methods, measurement, policy and theory. *Information, Communication & Society*, 24(5), 633-648.
- Agencia Națională a Funcționarilor Publici. (2022). *Analiză privind nevoia de instruire a resurselor umane din administrația publică din România în domeniul competențelor digitale* [Anexa nr. 1 – Analiza competențe digitale]. ANFP. <https://www.anfp.gov.ro/R/Doc/2023/PNRR/Anexa%20nr.%201%20-%20Analiza%20competente%20digitale.pdf>
- Brown, C. (2021). Digital Competence and Citizen Engagement: Exploring the Nexus in Public Administration. *Public Engagement Quarterly*, 28(4), 301-318.
- Budai, B. B., Csuhai, S., Tózsai, I. (2023). Digital Competence Development in Public Administration Higher Education. *Sustainability*, 15(16), 12462.
- Burlacu, S., Diaconu, A., Mocanu, V., Gombos, S. P. (2022a) The Effects of Digital Globalization on Economics and Society. In R. Pamfilie, V. Dinu, C. Vasiliu, D. Pleșea, L. Tăchiciu (eds.), *8th BASIQ International Conference on New Trends in Sustainable Business and Consumption*, Graz, Austria, 25-27 May 2022. Bucharest: ASE, 95-100. https://conference.ase.ro/wp-content/uploads/2022/06/22011_Final.pdf
- Burlacu, S., Mocanu, V., Gomboș, S. P., Dobre, F. (2022b). Organizational Resiliency Through Digitalization. *Proceedings of the INTERNATIONAL MANAGEMENT CONFERENCE* (Vol. 16, No. 1, pp. 643-650). Faculty of Management, Academy of Economic Studies, Bucharest, Romania.
- Burlacu, S., Negescu, M. D. O., Patarlageanu, S. R., Vasilescu, R. A. (2021). Digital globalization and its impact on economic and social life. *SHS Web of Conferences* (Vol. 129, p. 06003). EDP Sciences.
- Burlacu, S., Pargaru, I., Iacob, O. C., Gombos, S. P. (2022). Digital Public Administration and the Perspectives of Sustainable Development in Romania. *European Journal of Sustainable Development*, 11(4), 230-230.
- Burlacu, S., Popescu, M. L., Diaconu, A., Sârbu, A. (2021). Digital Public Administration for Sustainable Development. *European Journal of Sustainable Development* (2021), 10, 4, 33-40. Doi: 10.14207/ejsd.2021.v10n4p33
- Cabero-Almenara, J., Gutiérrez-Castillo, J. J., Palacios-Rodríguez, A., Barroso-Osuna, J. (2020). Development of the teacher digital competence validation of DigCompEdu check-in questionnaire in the university context of Andalusia (Spain). *Sustainability*, 12(15), 6094.
- Calin, A.M., Burlacu, S., Mocanu, V., Popescu, M.L., (2022). Digital Public Management Governance. In R.Pamfilie, V. Dinu, C. Vasiliu, D. Pleșea, L. Tăchiciu eds. 2022, *8th BASIQ International Conference on New Trends in Sustainable Business and Consumption*. Graz, Austria, 25-27 May 2022. Bucharest: ASE, pp.101-108. DOI: 10.24818/BASIQ/2022/08/012
- Certiport. (2019). *Microsoft Office Specialist program: MOS Word*. Certiport (Pearson VUE). <https://certiport.pearsonvue.com/Certifications/Microsoft/MOS/Certify/MOS-Word>
- Ciarli, T., Kenney, M., Massini, S., Piscitello, L. (2021). Digital technologies, innovation, and skills: Emerging trajectories and challenges. *Research Policy*, 50(7), 104289.

- Edelmann, N., Mergel, I., & Lampoltshammer, T. J. (2023). Competences that foster digital transformation of public administrations: An Austrian case study. *Administrative Sciences*, 13(2), 68.
- Erstad, O., Kjällander, S., Järvelä, S. (2021). Facing the challenges of ‘digital competence’ a Nordic agenda for curriculum development for the 21st century. *Nordic Journal of Digital Literacy*, 16(2), 77-87.
- Eynon, R. (2021). Becoming digitally literate: Reinstating an educational lens to digital skills policies for adults. *British educational research journal*, 47(1), 146-162.
- Ferrari, A. (2012). *Digital competence in practice: An analysis of frameworks* (p. 82116). Luxembourg: Publications Office of the European Union.
- Janssen, J., Stoyanov, S., Ferrari, A., Punie, Y., Pannekeet, K., & Sloep, P. (2013). Experts’ views on digital competence: Commonalities and differences. *Computers & Education*, 68, 473–481. <https://doi.org/10.1016/j.compedu.2013.06.008>
- Johnson, A. (2020). Digital Competence in Public Administration: A Conceptual Framework. *Public Administration Journal*, 45(3), 210-225.
- Klochan, V., Piliaiev, I., Sydorenko, T., & Petrenko, L. (2021). Digital platforms as a tool for the transformation of strategic consulting in public administration. *Journal of Information Technology Management*, 13(3), 63–77.
- Levano, F. L., Sanchez, S., Guillén-Aparicio, P., Tello-Cabello, S., Herrera-Paico, N., & Collantes-Inga, Z. (2019). Digital competences and education. *Propósitos y Representaciones*, 7(2), 569–588. <https://doi.org/10.20511/pyr2019.v7n2.329>
- Lindroth, T., & Bergquist, M. (2010). Laptops in an educational practice: Promoting the personal learning situation. *Computers & Education*, 54(2), 311–320. <https://doi.org/10.1016/j.compedu.2009.07.014>
- Liu, S. M., & Yuan, Q. (2015). The evolution of information and communication technology in public administration. *Public Administration and Development*, 35(2), 140–151. <https://doi.org/10.1002/pad.1717>
- Neagu, L. (2021, November 22). Only 6% of Romanian companies use artificial intelligence applications. *Economica.net*. https://www.economica.net/doar-6-dintre-companiile-din-romania-folosesc-aplicatii-cu-inteligenta-artificiala_540632.html
- Negescu, M. D. O., Burlacu, S., Biner, M., Gombos, S. P., Kant, A., & Troacă, A. V. (2021). Paradigms of public administration digitalization in the context of the Covid-19 pandemic. In *Proceedings of Administration and Public Management International Conference* (Vol. 17, No. 1, pp. 109-115). Research Centre in Public Administration and Public Services, Bucharest, Romania.
- Parsons, D., Choi, M., Thomas, R., Glyptou, K., & Walsh, K. (2023). The policy responses of tourism agencies to emerging digital skills constraints: A critical assessment of six countries. *International Journal of Tourism Research*, 25(1), 97-108.
- Paul, A. (2022). *The guide to the jobs of the future* (5th ed.) [PowerPoint presentation]. INACO. <https://inaco.ro/wp-content/uploads/2022/09/GMV-5.pdf>
- Popescu, M. L., Gombos, S. P., Burlacu, S., & Mair, A. (2021). The impact of the COVID-19 pandemic on digital globalization. In *SHS Web of Conferences* (Vol. 129, p. 06008). EDP Sciences.
- Popovych, V., Ragimov, F., Kornienko, V., Ivanova, I. B., & Zoriana, B. (2020). Development of social and communicative paradigm of public administration in the field of social networks. *International Journal of Data and Network Science*, 4(3), 319-328.
- Sidorchuk, I. P., Akhrymenka, A. A., & Tuleyko, E. V. (2021). Model of digital competencies of civil servants in the Republic of Belarus. *Digital Technologies and Innovations. Regional Innovations Journal*, (1, Special Issue), 16–19. <https://libeldoc.bsuir.by/handle/123456789/44691>

- Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent Education*, 5(1), 1519143. <https://doi.org/10.1080/2331186X.2018.1519143>
- Todorov, G. (2023, January 5). Top 3 and other recommended email parsing software for 2023. *Thrivemyway*. <https://thrivemyway.com/email-parsing-software/>
- van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2020). Determinants of 21st-Century Skills and 21st-Century Digital Skills for Workers: A Systematic Literature Review. *SAGE Open*, 10(1). <https://doi.org/10.1177/2158244019900176>
- Vuorikari, R., Kluzer, S., & Punie, Y. (2022). *DigComp 2.2: The digital competence framework for citizens – With new examples of knowledge, skills and attitudes* (EUR 31006 EN). Publications Office of the European Union. <https://doi.org/10.2760/115376>
- Wodecka-Hyjek, A., Kafel, T., & Kusa, R. (2021). Managing digital competences in public administration. In *People in organization: Selected challenges for management* (pp. 45–60). AGH University of Science and Technology Press. <https://acortar.link/RsH9bk>