

THE IMPORTANCE OF DIGITAL SKILLS AND TRUST FOR E-ADMINISTRATION & E-GOVERNMENT IMPLEMENTATION IN POLAND AND TÜRKİYE

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Abstract. This article examines the roles of digital skills and trust as factors facilitating e-administration and e-government development, and of citizens' empowerment in Poland and Türkiye. The study adopts a conceptual approach grounded in a structured literature review, complemented by a secondary case-study analysis. The proposed conceptual framework is based on the DigComp 3.0 model and integrates insights on the importance of trust in the process of implementing digital public services. The analysis identified key facilitators, including the rapid development of digital technologies in Poland and Türkiye, particularly in e-services, and their growing popularity among users. The article highlights barriers and challenges, including the digital divide and growing cybersecurity threats, which may hinder further progress in social innovations. Based on a comprehensive literature review, including secondary research and reports, as well as analyses involving public e-services provided by the two countries, the article formulates policy and educational recommendations to strengthen digital competencies and foster trust in e-government services.

Keywords: digital skills, digital competence, DigComp 3.0, e-government, e-administration

ПОЛЬША МЕН ТҮРКИЯДА ЭЛЕКТРОНДЫҚ ӘКІМШІЛІК ПЕН ЭЛЕКТРОНДЫҚ ҮКІМЕТТІ ЕНГІЗУДЕГІ ЦИФРЛЫҚ ДАҒДЫЛАР МЕН СЕНІМНІҢ МАҢЫЗДЫЛЫҒЫ

Аңдатпа. Бұл мақала Польша мен Түркияда электрондық әкімшілік пен электрондық үкіметті дамытуда және азаматтардың өкілеттілігін арттыруда цифрлық дағдылар мен сенімнің негізгі жеделдетушілері ретіндегі рөлдерін зерттейді. Зерттеу құрылымды әдеби шолуға негізделген тұжырымдамалық тәсілді қолданады және оны екінші деңгейлі кейс-зерттеу талдауымен толықтырады. Ұсынылған тұжырымдамалық шеңбер DigComp 3.0 моделіне негізделген және цифрлық қоғамдық қызметтерді енгізу процесінде сенімнің маңыздылығы жөніндегі түсініктерді біріктіреді. Талдау негізгі жеделдеткіштерді анықтады, соның ішінде Польша мен Түркияда, әсіресе электрондық қызметтер саласында цифрлық технологиялардың қарқынды дамуы және олардың пайдаланушылар арасындағы танымалдылығының артуы. Мақала цифрлық алшақтық пен өсіп келе жатқан киберқауіп-қатерлер сияқты әлеуметтік инновациялардың одан әрі дамуына кедергі келтіретін тосқауылдар мен қиындықтарды айқындайды. Екі ел ұсынған қоғамдық электрондық қызметтерді талдауды, екіншілік зерттеулер мен есептерді қоса алғанда, жан-жақты әдеби шолу негізінде мақала цифрлық құзыреттерді нығайту және электрондық үкімет қызметтеріне сенімділікті арттыру жөніндегі саяси және білім беру ұсыныстарын әзірлейді.

Түйін сөздер: сандық дағдылар, сандық құзыреттілік, DigComp 3.0, электрондық үкімет, электрондық әкімшілік

ЗНАЧЕНИЕ ЦИФРОВЫХ НАВЫКОВ И ДОВЕРИЯ ДЛЯ ВНЕДРЕНИЯ ЭЛЕКТРОННОЙ АДМИНИСТРАЦИИ И ЭЛЕКТРОННОГО ПРАВИТЕЛЬСТВА В ПОЛЬШЕ И ТУРЦИИ

Аннотация. В данной статье рассматриваются роли цифровых навыков и доверия как ключевых факторов, способствующих развитию электронного администрирования и электронного правительства, а также расширению прав и возможностей граждан в Польше и Турции. В исследовании используется концептуальный подход, основанный на структурированном обзоре литературы и дополненный вторичным анализом конкретных примеров. Предлагаемая концептуальная основа базируется на модели DigComp 3.0 и учитывает важность доверия в процессе внедрения цифровых государственных услуг. Анализ выявил ключевые факторы, в том числе быстрое развитие цифровых технологий в Польше и Турции, особенно в сфере электронных услуг, а также их растущую популярность среди пользователей. В статье освещаются барьеры и вызовы, в том числе цифровой разрыв и растущие угрозы кибербезопасности, которые могут препятствовать дальнейшему

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прогрессу в области социальных инноваций. На основе всестороннего обзора литературы, включая вторичные исследования и отчеты, а также анализа государственных электронных услуг, предоставляемых этими двумя странами, в статье сформулированы рекомендации в области политики и образования, направленные на укрепление цифровых компетенций и укрепление доверия к услугам электронного правительства.

Ключевые слова: цифровые навыки, цифровая грамотность, DigComp 3.0, электронное правительство, электронное управление

Introduction

Digital transformation is now a central pillar of EU public administration reform. The EU Digital Decade 2030 policy program sets targets, including 100% key public services online and 80% of citizens using e-government. As a member state, Poland is bound by these commitments (Grodzka et al., 2008). Although Türkiye is an EU candidate country, the government is actively implementing solutions in social e-services, including e-administration and e-government. Both countries have been developing their e-government and e-administration infrastructure for many years. For many years, Poland has been expanding its e-government and e-administration infrastructure by creating integrated digital platforms and public registries that provide citizens with access to a wide range of online services, in line with the general framework of European digital policy (Piątkowski & Misztal, 2022). Türkiye has also successfully implemented many ICT-based solutions, such as government-deployed platforms, applications, and numerous online registries and public e-services, partly in response to European digital initiatives.

Poland has been developing its e-government and e-administration infrastructure for many years, implementing a wide range of digital public services such as the ePUAP electronic services platform, the gov.pl governmental portal, the Trusted Profile (Profil Zaufany) for secure identification, the ZUS Electronic Services Platform (PUE ZUS) and the mObywatel mobile application, which integrates digital documents and access to online public services. At the same time, Türkiye has expanded its e-government ecosystem using the central “e-Devlet” portal, which provides access to thousands of online public services, such as tax and insurance services, property registries, and various electronic certificates. Online platforms in Türkiye also offer solutions such as secure digital identification through banking systems and pilot projects utilizing blockchain technology in selected public services.

Citizens in Poland and Türkiye are increasingly using e-services, such as e-education, e-health, e-government, and e-administration. The implementation and expanding adoption of these services have also contributed to changes in individuals’ perceptions of their own agency, as well as to increased awareness, knowledge, experience, and competence in using various systems, platforms, and applications. Moreover, as research indicates, consumers of different services are demonstrating more proactive behaviors. This trend is also evident in the areas of e-administration and e-government. An increasing number of users are turning to online solutions to file tax returns and apply for social benefits through digital systems. In addition, these platforms can be used to register a business and track the progress of administrative procedures, such as obtaining identification documents.

However, the scale, pace, and effectiveness of e-administration and e-government implementation processes depend on a wide range of factors. Particularly important in this context are individuals’ sense of security and autonomy, as well as trust in government institutions and digital environments, including the internet, technologies as well as one’s own digital competencies.

The authors address a significant research problem related to citizens’ trust in government and technology, as well as their own digital competencies. In this area, a notable research gap can be identified: much of the e-government literature treats technological deployment as the independent variable and service efficiency as the dependent variable, while research on the human skills dimension, such as digital skills, competence, and literacy, remains relatively limited. In the context of the rapid pace of technological change, driven by advances in big data analytics, cloud computing, artificial intelligence, and machine learning, existing studies do not sufficiently capture emerging challenges. Without a deeper understanding of, and practical orientation toward, overcoming barriers to the implementation, adoption, and use of e-administration and e-governance solutions, there is a risk of widening the digital divide and increasing citizens’ exposure to threats within the digital environment, which remain insufficiently examined and

addressed. A gap has been identified in both the literature and research: e-administration and e-government systems may be designed and implemented without ensuring that citizens and public officials possess the skills necessary to use them effectively (Włodyka, 2021). In this context, digital skills and user trust are seen as essential elements that support investment and infrastructure development and increase the likelihood of achieving concrete results.

This article aims (a) to review the current state of e-administration and e-government development in Poland and Türkiye, (b) to assess the dual technological environment, the pace of development and cybersecurity risks, (c) to apply the DigComp 3.0 framework with a view to indicating e-government and e-administration competence requirements and analyzing trust as a prerequisite for successful implementation of these solutions. The authors place particular emphasis on the development of digital services, including e-administration and e-government, in Poland and Türkiye as the primary research context, while also incorporating a broader European perspective at times.

Methodology

The article is conceptual and theoretical in nature. However, the authors seek to derive conclusions on best practices from an analysis of literature, reports, and selected case studies. The conceptual argument is enriched with empirical and institutional context drawn from secondary sources. Measurable indicators of e-government development, digital literacy, and governance quality allow us to contextualize theoretical propositions within real-life examples. The institutional characteristics of both administrative systems provide the necessary backdrop for interpreting how the DigComp 3.0 framework and the concept of trust function in two distinct cultural environments. Systematizing the barriers and factors conducive to the development of e-administration and e-government provides a structured reference point for discussing mechanisms identified in the literature. Together, these elements ensure that the conceptual reflection does not remain detached from the empirical and institutional realities of Poland and Türkiye.

These findings translate into insights on best practices and practical recommendations for creating an enabling environment for citizens to implement, adopt, and effectively use e-administration and e-government services. As mentioned, the study focuses on two key aspects: digital competences, defined in accordance with the DigComp 3.0 framework introduced in November 2025, and the issue of trust.

Theoretical Framework and Basic Concepts

It is important to focus on key definitional distinctions that are highly relevant to the arguments developed in this article. Although the concepts of e-administration and e-government are gaining increasing attention and a growing number of studies and analyses are emerging in this field, there is still no clear, universally accepted set of definitions that consistently capture the key concepts and terminology. Digital competence is a key consideration in this paper because it “involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society” (Kluzer et al., 2025).

It is essential to distinguish between key terms and concepts that form the basis for understanding the development of e-administration and e-government. It is worth paying particular attention to the explanation of concepts such as: digitization, i.e., the conversion of analog data into digital form, digitalization, i.e., the use of digital technologies to modify or automate processes and digital transformation, i.e., systemic changes at societal and organizational levels. Equally important is the distinction between e-government and e-administration. The first concept, e-government, refers primarily to the digital delivery of public services within the framework of interactions between the government and citizens (G2C) and between the government and businesses (G2B). E-administration, in turn, concerns the internal digital transformation of processes, workflows, and management within public institutions. It is important to note that in the case of e-government, the focus is on the outward-facing architecture of service relationships, whereas in the case of e-administration, a similar matrix of relationships is interpreted as an internal architecture of processes, systems and management that drives G2C and G2B services.

According to Bógdał-Brzezińska (2018, p. 21), „e-government is defined as using the Internet for delivering government information and services to citizens and business” In turn, “e-governance function is the public sector’s use of ICT with the aim of improving information and service delivery, enlarging citizen participation in the political process and evolving reliability, transparency and effectiveness of the institution of state on central, regional and local level” (Bógdał-Brzezińska, 2018, p. 21). Bógdał-Brzezińska (2018, p. 22-23) also indicates that „electronic administration (e-government) is a modern model of operating both government and local government institutions and which aim is to create a cheaper and more effective administration). Its essence is the use of IT tools not only in everyday office work, but also in communication with citizens”. As the author points out (Bógdał-Brzezińska, 2018, p. 23), “public electronic administration is composed of three categories: Government-to-Citizen (encouraging citizens to actively participate in the political life, for example at electronic discussion forums), Government-to-Business (the possibility of having influence on law regulations) and Government-to-Government (electronic communication between different governmental agendas)”. Kowal and Roztocki (2025, p. 1), in turn stress that „e-government may lead to better governance, because it implementation is frequently connected with innovation and reforms in public administration” (Ciborra and Navarra 2005 after: Kowal & Roztocki, 2025, p. 1). The authors also claim that “better governance is a prerogative for socioeconomic development” (Kowal & Roztocki, 2025, p. 1). Włodyka (2024, 120) provides a comprehensive definition of e-administration claiming that the term “encompasses all activities within public administration that utilize ICT, thereby allowing it to function electronically”. It is important to note that „the definition of e-administration varies among institutions such as the European Union, the United Nations, the Organization for Economic Co-operation and Development (OECD), Polish legislation, and academic literature” (Włodyka, 2024, p. 121). In the legal context, as the author claims, for example, in EU policy, “electronic administration is defined as the use of ICT in public administration coupled with organizational changes and new skills aimed at improving public services and democratic processes while bolstering support for public policy” (Communication COM/2003/0567 final, p. 7 after: Włodyka, 2024, p. 120).

According to the Turkish Science Council (2002, p. 10 and Ali (2018, p. 131)), electronic government, digital government or e-government refer to “a state model that aims to increase performance and productivity by using information technologies in the exchange of information, services and goods between public institutions/organizations, citizens and commercial institutions. Another advantage of e-government is that “the state becomes transparent, and on the other hand, citizens are more actively involved in the state’s decision mechanisms” (Yüçetürk, 2002, p. 146).

A comparison of the terminology employed across national contexts yields observations worth noting. In Turkish academic discourse, as well as in English-language literature on the Turkish public sector, the distinction between the concepts of e-government and e-administration seems less clear than in the literature on Polish public services, where both terms are sometimes treated as analytically distinguishable categories (Włodyka, 2024, p. 121). This may be related to the concept of e-Devlet as an umbrella term, which in Turkish academic discourse encompasses both the governmental and administrative dimensions without a clear distinction between the concepts. A distinct term operates at the level of local self-government: e- Belediye (e-Municipality), defined in the relevant literature as “the provision of goods and services provided by municipalities to the service of the people of that region in an electronic environment” (Ali, 2018, p. 132).

It is also important to note that in this article, trust is considered a multidimensional construct encompassing trust in authorities, technology, and one’s own digital competence. Trust is a multidimensional concept. However, the authors of this article focus on only a few key dimensions. As Mayer et al. (1995, p. 712) indicate, “trust is the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party”. This definition of trust may be applied to the first dimension, referring to the relationship between a citizen and the government, being represented by authorities, public administration employees, civil servants, etc. Another dimension is related to “trust in a specific technology [that] refers to

one's beliefs that the technology has the attributes of ability, benevolence, and integrity and that using it will lead to favorable outcomes" (McKnight et al, 2001). Another perspective which is important to the authors' research is related to the perception of "digital trust", "trust in IT" or "trust in IT artifacts", which represent a concept that "has become increasingly recognized for its essential role in encouraging consumers to adopt online modes of commerce" (Vance et al., 2008, p. 75). They also consider "user experience and the level of support received - how satisfied the trustor is with the service, their prior experiences, and the convenience of using the product or service" (Saveljeva & Volkova, 2025, p.10). Thus, "digital competence is crucial for ensuring acceptance of and access to innovative services" (Fandrejewska-Nowakowska, 2025, p. 44).

Development, conditions, and trajectory of e-administration and e-government in Poland and in Türkiye

Poland and Türkiye are both unitary states. However, they differ in terms of how power is distributed within that framework. In Poland, we see a decentralized model comprising three levels of local government, whereas Türkiye has maintained a centralized territorial administration in which provincial governors are appointed by the president. This asymmetry impacts the implementation of e-government. It fosters local initiatives in Poland, whereas in Türkiye, it creates conditions for the implementation of uniform, top-down digital solutions. The systems of government reinforce this divergence. Poland's parliamentary-cabinet model distributes the executive function and coordinates digital policy jointly through the Ministry of Digital Affairs and the Chancellery of the Prime Minister, whereas Türkiye, following the 2017 constitutional reform, concentrates executive power in the Presidency, with the Digital Transformation Office operating directly under it. The Turkish model is simpler from an institutional standpoint but is characterized by a greater concentration of political power. Their differing statuses in relation to the European Union shape both regulatory environments. Poland is implementing EU regulations on digitalization, including the eIDAS Regulation and the NIS2 Directive. Turkey, whose accession negotiations have been on hold since June 2018, operates outside this framework. Turkey's digital infrastructure, while internally coherent, is not yet fully aligned with the European interoperability framework. Furthermore, the cybersecurity architecture reflects the broader administrative logic of each of these countries. Poland divides responsibility among three national CSIRT teams (CSIRT NASK, CSIRT GOV, CSIRT MON), in accordance with the multi-stakeholder governance model adopted by the EU. Turkey consolidates this function within a single body, USOM, reflecting the principle of centralized state authority that runs throughout its system.

The detailed information supporting these observations is summarized in Table 2.

Table 1. Institutional characteristics of the public administration system in Poland and Türkiye

Dimension	Poland	Türkiye
Form of state	Unitary, decentralized state (Constitution of the Republic of Poland of 1997, Chapter VII)	Unitary, centralized state (Constitution of Türkiye of 1982)
System of government	Parliamentary-cabinet system and Council of Ministers headed by the Prime Minister	Presidential system (since the constitutional reform of 2017). The President combines the functions of head of state and head of the executive
Legislative body	Bicameral parliament: Sejm (460 deputies) and Senate (100 senators)	Unicameral parliament: Grand National Assembly of Türkiye (TBMM, 600 deputies)
Territorial administrative structure	Three tiers of self-government: 16 voivodeships, 380 counties (including 66 cities with county status), 2,479 municipalities (as of 1 January 2025)	Centralized territorial administration: 81 provinces (il) with governors appointed by the President, 973 districts (ilçe), approx. 1,389 municipalities (belediye) with elected mayors, and approx. 18,200 villages (köy)
EU status	EU Member State (since 1 May 2004)	Candidate country (status granted in December 1999 at the European Council summit in Helsinki, following the accession application of 1987).

Dimension	Poland	Türkiye
		Accession negotiations launched in 2005 have been at a standstill since June 2018
Central e-government platform	gov.pl + mObywatel + ePUAP (Trusted Profile)	e-Devlet Kapısı (turkiye.gov.tr) and e-İmza
Coordination of digital policy	Ministry of Digital Affairs and Chancellery of the Prime Minister (KPRM)	Cumhurbaşkanlığı Dijital Dönüşüm Ofisi (Presidential Digital Transformation Office)
National CSIRT team	Three national-level CSIRTs: CSIRT NASK (including CERT Polska), CSIRT GOV (ABW), CSIRT MON (Ministry of National Defence). Act on the National Cybersecurity System of 2018	USOM – Ulusal Siber Olaylara Müdahale Merkezi (National Cyber Incident Response Centre)

Source: own elaboration based on: Constitution of the Republic of Poland of 2 April 1997 (Art. 96, 97, 153, Chapter VII), Mazur, Możdżeń, and Oramus (2018), Statistics Poland (2025) — Administrative division of Poland, Act of 5 July 2018 on the National Cybersecurity System, Constitution of Türkiye of 1982 (as amended by the referendum of April 2017, effective from June 2018), Government of Türkiye, Digital Transformation Office, European Council, conclusions of the Helsinki summit (December 1999) and Council conclusions of June 2018.

The foundation of Poland's e-administration is the gov.pl portal, which serves as the central gateway to digital public services, integrating the websites of ministries, central government agencies, and provincial offices. The key authentication tool is the Profil Zaufany (PZ, Trusted Profile), which enables citizens to confirm their identity and sign electronic documents when dealing with public administration, and can be set up online via internet banking without visiting an office.

Another key element is ePUAP (Electronic Public Administration Services Platform). This platform enables citizens to submit applications and requests remotely and to communicate with various public institutions. Many administrative services are also available directly through online banking systems, which increases security and simultaneously reduces barriers to using digital services.

The mObywatel app provides mobile access to public administration services. The app also stores digital documents, including ID cards and driver's licenses, serving as a mobile equivalent of traditional physical documents. In the area of e-health, the IKP (Internetowe Konto Pacjenta) allows citizens to access their medical records, providing access to e-prescriptions, e-referrals, medical history, and test results, which are also available in the mojIKP mobile app. The introduction of e-prescriptions and e-referrals has led to greater convenience and new opportunities for communication between patients, doctors, and pharmacists.

As part of the KPO (Krajowy Plan Odbudowy i Zwiększania Odporności, National Recovery and Resilience Plan), Poland is investing in the modernization and expansion of judicial registers, including the eKRS (elektroniczny Krajowy Rejestr Sądowy, Electronic National Court Register) and EKW (Elektroniczne Księgi Wieczyste, Electronic Land and Mortgage Registers), with services to be made available through the mObywatel application. Additionally, the E-Dyplomy project aims to create technical infrastructure for issuing and verifying academic diplomas in digital form. Digital transport services are also being developed, including an e-service for obtaining a driving license and the KKK (Kwalifikacyjna Karta Kierowcy, Driver Qualification Card).

Türkiye's e-government system is centered on the e-Devlet Kapısı (Electronic Government Gateway), available at turkiye.gov.tr, managed by the Digital Transformation Office under the Presidency of the Republic of Türkiye and operated in cooperation with Türksat. The platform allows citizens to handle many official matters remotely, from applying for jobs to court proceedings. The most popular services include: access to data stored by the SGK (Sosyal Güvenlik Kurumu, Social Security Institution), tax records, vehicle registration data, traffic tickets, real estate ownership, as well as services related to education and healthcare.

Authentication can be performed through multiple channels, including a password, e-İmza (electronic signature), mobil imza (mobile signature), national ID card, and online banking, with the option to enable two-factor authentication (2FA).

A key component of Türkiye's digital healthcare infrastructure is the e-Nabız (Electronic Pulse) platform, launched by the Ministry of Health as a nationwide PHR (Personal Health Record) system. The platform integrates data from hospitals, medical centers, family medicine centers, and pharmacies through numerous health information management systems, consolidating data from across the country into a single platform. The system enables access to a broad range of services related to treatment, prevention, health promotion, and related areas. One of the key recent developments is the implementation of a digital communication infrastructure within healthcare organizations and among healthcare personnel. Thanks to these solutions, primary care physicians can directly share patient data with second- and third-level specialists via the e-Nabız platform. This ensures continuity of care and improves the efficiency of the process of referring patients to specialists.

Türkiye is also implementing artificial intelligence (AI) and big data analytics solutions in public administration as part of the National Action Plan for the Artificial Intelligence Strategy. This initiative is supervised by the Office for Digital Transformation. These initiatives aim to enable the use of predictive management functions, such as demand forecasting and resource optimization, across all areas of public services.

Barriers and facilitators of e-administration and e-government

The successful implementation of e-administration and e-government depends on a range of factors, including institutional capacity, digital literacy, trust in public institutions, resources, and cybersecurity measures, not just technological infrastructure (Mazur et al., 2018). A comparison of Poland and Turkey provides a valuable analytical perspective. Both countries have created central digital platforms that consolidate access to public services. However, their approaches to digitization differ in significant ways. The analysis adopts several categories: authentication and digital identity, e-health, tax and fiscal services, justice and registration services, digital skills, cybersecurity, digital inclusion, and institutional coordination. The configuration of these factors is summarized in Table 3.

Table 2. Barriers and facilitators of e-administration and e-government in Poland and Türkiye

Category	Poland: barriers	Poland: facilitators	Türkiye: barriers	Türkiye: facilitators
Authentication and digital identity	Low trust in eID and concerns about data security	Trusted Profile accessible via online banking, unified gateway	Multiple parallel authentication channels create complexity	Integration of all channels within a single gateway
E-health	Uneven uptake in social assistance and primary care	Centralized access to records, e-prescriptions, e-referrals	Integration challenges across health institutions	Nationwide PHR enabling data sharing across care levels
Tax and fiscal services	Historical complexity of the tax system	Pre-filled tax declaration as the default channel	Reliance on paper processes in selected sub-domains	Tax, vehicle, and social security records in one gateway
Justice and registry services	Fragmentation and interoperability gaps between registers	EU-funded modernization of judicial and land registers	Limited integration between local and central registries	Wide range of court and registry services in single gateway
Digital skills	Basic digital skills below the EU average	EU-funded competence programs, partnerships with NGOs	Regional, generational, and language-based disparities	Growing ICT workforce and engineering graduate pipeline

Category	Poland: barriers	Poland: facilitators	Türkiye: barriers	Türkiye: facilitators
Cybersecurity	Rising number of incidents, AI-augmented threats	National CSIRTs under the 2018 Act, and regional centers	As a non-EU country, Türkiye is not bound by the EU NIS2 directive and its national framework is not formally harmonized with NIS2 requirements	National CSIRT (USOM) and Cybersecurity Cluster
Digital inclusion and digital divide	Lower uptake in rural areas and among older citizens	Multi-channel design, broad broadband coverage	Pronounced west-east divide, exclusion of older citizens	High overall internet penetration, literacy programs
Institutional coordination	Fragmentation across ministries, limited reform continuity	Central coordination by the Ministry of Digital Affairs (in cooperation with the Chancellery of the Prime Minister and other ministries)	Slow local decision-making, centralized dependence	Strong coordination by the Digital Transformation Office

Source: own elaboration based on: Akan and Çil (2025), European Commission (2024), Eurostat (2023), Global Information Society Watch (2019), Invest in Türkiye (2024), Mazur, Mozdzeń, and Oramus (2018), Polat (2012) and Yıldırım and Bostancı (2022).

E-administration and e-government are crucial domains of public e-services, but for them to truly address pressing social challenges, crises, population aging, staff shortages, and limited public resources and funds, we need to consider how they can, on the one hand, be continuously improved and, on the other, become more accessible and inclusive. It is necessary to reflect on what must be done to overcome barriers related to the accessibility and usability of various technological solutions in the area of public e-services, including e-administration and e-government. It is also worth examining the main facilitators of the implementation, adoption, and effective use of these services. Key barriers certainly include low levels of digital competence (across its various dimensions), perceived threats related to cyber risks, and, in addition, a lack of trust in government, in technology, and in one's own abilities. Digital literacy, digital competence, knowledge and awareness on the one hand, and a sense of agency and openness to change on the other, can serve as important enablers of the development and implementation of public services. As van Deursen et al. (2011, p. 893) stress, "Internet skills go beyond technical and operational skills and also include formal, information, and strategic Internet skills. The most important differences are observed for formal and strategic Internet skills".

The approach to digital transformation, unfortunately, frequently focuses mainly on technological or implementation aspects from the perspective of experts, such as IT specialists or large public-sector organizations. Effective transformation requires not only the implementation of technology, but also organizational changes, such as simplifying procedures, redesigning, streamlining, and often automating processes, developing the digital skills of public sector employees, and ensuring clear leadership in the field of digitalization (see, e.g., Kusiak-Winter, 2022). It is essential to engage citizens in the design of e-services through consultation and co-creation. Individuals who are likely to face particular challenges related to a lack of trust in ICT solutions and in their own abilities, and who may experience anxiety or concerns about using e-administration and e-government solutions, can participate in pilot projects (for example, involving users aged 50+ or people with disabilities), which makes it possible to take specific needs into account and, at the same time, can foster a sense of agency and ensure that solutions are aligned with real-life problems and tasks.

It is also important to highlight issues of trust in institutions, technology, and in oneself (one's own digital competences). Research on the development of e-administration shows that a lack of trust is just as much of a barrier as a lack of skills. This distrust may concern both confidence in public administration and confidence in the security of technology. This is quite understandable given that the number and scale of cyberthreats are steadily increasing. Previously, attacks were

directed mainly at large commercial organizations or entities and units that are critical for the region's or state's critical infrastructure. It is worth noting, however, that although large entities were attacked, it was often customers' or users' data that was disclosed, exploited, or otherwise compromised. Such malware attacks frequently took the form of spyware, ransomware, or DDoS. Unfortunately, in recent years, more and more individual users have been the victims of cyberattacks (CERT, 2024), as it is easier to manipulate people's minds using social engineering techniques such as phishing. Today, phishing can be even more effective thanks to the use of modern technologies: big data analytics makes it possible to build very detailed psychographic and behavioral profiles of users, while AI enables the creation of synthetic media in the form of images, audio, or video that are highly convincing and tailored to the situation and circumstances of individual users. Therefore, it is essential to develop citizens' digital skills, knowledge, and awareness. In addition, appropriate measures to increase transparency, ensure clear data protection rules, promote best practices in cybersecurity, and raise awareness of the benefits of electronic services help strengthen users' willingness and readiness to use them.

The Technological Dual Environment: Fast Pace of ICT Development and Cybersecurity Risks

One of the key factors supporting the development and implementation of social e-services, including e-administration and e-government, is the acceleration of ICT innovation. Thanks to the dynamic growth of cloud computing, mobile technologies, IoT, AI and data-driven services, new technologies not only emerge more quickly but are also adopted by users at a faster pace. It is important to note that, given the current speed and ubiquity of various solutions, opting out is often not realistically possible. For example, AI frequently supports big data analytics, and many platforms or call centers routinely use chatbots. Even common services and basic software now come equipped with new functionalities. Knowledge, awareness and competences are essential to maintain vigilance, critical thinking and a proactive approach in the face of AI's algorithmic impact, not to say outright manipulation. It is impossible to avoid participating in this trend, but it is crucial that these solutions are designed and developed with society as a whole in mind. Inclusion is therefore vital, as it helps reduce the digital divide, which may otherwise widen due to the acceleration of ICT innovation. We are observing shorter technology life cycles and pressure to deploy rapidly. Very often, we deal with minimum viable products (MVPs) because providers seek to test solutions in live environments while expecting users to learn continuously and remain flexible, as technology is constantly evolving.

The rapidly expanding digital ecosystem also contributes to an increase in threats, as this flexibility and speed of deployment mean that MVPs are not tested for all possible circumstances. As a result, given the widespread use of new solutions and the growing number of their users, the overall attack surface increases. If we also take into account the complexity of mobile applications, platforms, devices and networks, we are faced with a vast number of potential entry points. It becomes very easy to exploit vulnerabilities in new solutions that are still being tested. Growing dependence on interconnected digital infrastructure in public services, business, and everyday life means more potential risks and, in practice, as already mentioned, more entry points for attackers, including cloud platforms, APIs, mobile apps, smart devices, and critical infrastructures.

It is also important to highlight the dual nature of emerging technologies, i.e., the opportunities and risks that they bring. On the one hand, we have better protection because AI, big data, digital twins, and automation can serve as tools for enhanced security, enabling faster threat detection and more advanced anomaly analysis. On the other hand, the same technologies can be used to carry out more sophisticated attacks, for instance, more effective and credible AI-driven phishing that relies on synthetic media such as deepfakes, or on automated exploit generation that autonomously searches the web for vulnerabilities. Therefore, a dual-use dilemma arises: the very technologies that strengthen resilience can also be weaponized by malicious actors.

This article draws attention to a very important aspect of creating suitable conditions for the development of social e-services, in particular e-administration and e-government, namely the human factor and digital literacy. Many studies highlight the persistent role of human behavior as

a critical vulnerability, citing examples such as falling victim to social engineering, poor password practices, and low awareness of threats. For this reason, it must be consistently emphasized that users themselves have a direct impact on their consumer safety and security.

Another key issue is building cyber resilience. This requires a shift in mindset, that is, a transition from technical protection to building organizational resilience. Resilience should encompass incident response, business continuity planning, and supply chain security. Cooperation among stakeholders, such as the government, business, civil society, and academia, is also essential for monitoring threats, exchanging information, and developing a common framework for action. Top-down and bottom-up initiatives should be integrated to enhance the effectiveness of defensive or preventive measures, informed by lessons learned from past incidents. In this context, a well-functioning feedback loop and sustained cooperation toward common goals, such as cybersecurity, are needed.

DigComp 3.0 Framework: the context of e-administration and e-government Implementation and Use

The European Digital Competence Framework for Citizens (DigComp), first published in 2013 as a reference tool describing the knowledge, skills and attitudes required for digital engagement in learning, work and civic participation (Ferrari, 2013), has undergone four successive revisions in 2016 (Vuorikari et al., 2016), 2017 (Carretero et al., 2017), 2022 (Vuorikari et al., 2022), and most recently in 2025 - with each iteration expanding the framework's scope in response to emerging technological and societal developments. This development resulted in DigComp 3.0 framework, which for the first time systematically integrates artificial intelligence competence across all five competence areas and introduces over 500 learning outcomes designed to support the bridging of digital skills gaps at the individual, organizational and policy levels (Cosgrove & Cachia, 2025). It is important to note that "the Digital Competence Framework for Citizens (DigComp) provides a common understanding of what digital competence is and supports the development of digital competence in Europe" (Vuorikari et al., 2022, p.7).

The European Digital Competence Framework for Citizens (DigComp 3.0, 2022) provides a comprehensive and structured model for understanding and developing digital competences in contemporary societies. It is organized into five key competence areas: 1. Information and Data Literacy, 2. Communication and Collaboration, 3. Digital Content Creation, 4. Safety and 5. Problem Solving. Citizens represent the demand side as users of digital public services. They need the skills to access, understand, and effectively use these services. Public officials, on the other hand, represent the supply side and are responsible for designing, delivering, and managing digital public services. These services must be implemented simultaneously for both groups, taking into account their roles, responsibilities, and competency requirements within digital public service ecosystems.

The first area of DigComp 3.0 is Area 1: Information and Data Literacy. In the context of e-administration and e-government, these competencies refer to citizens' ability to search for, evaluate, and effectively use information published on government portals and single digital gateway services. From a public administration perspective, officials are expected to manage, organize, and evaluate data quality in public information systems. They must also apply data protection principles to ensure compliance with GDPR (or other regulations on personal data access, processing or storage) at the operational level. In the second area of DigComp 3.0, Area 2: Communication and Collaboration, within the context of e-government, citizens need to be able to use digital communication channels to interact effectively with public authorities. This includes participating in public consultations, submitting applications online, and exchanging official administrative correspondence. Citizens should also understand the legal status and consequences of digital communication with public institutions, including its formal validity and effects. Furthermore, they must be aware of the commitments they undertake, their legal significance, issues of timeliness, and how to fulfill their obligations and exercise their rights within digital administrative processes. From a public administration perspective, officials are required to use digital collaboration tools to support inter-institutional coordination (the G2G dimension). Public officials should be able to communicate clearly and effectively through digital channels while maintaining legal and procedural standards. Additionally, they are expected to manage

digital correspondence in accordance with records management requirements and established procedures, which increasingly demonstrate potential for automation and support through emerging technologies, including big data analytics and artificial intelligence.

In the third area of DigComp 3.0, Area 3: Digital Content Creation, within the context of e-administration and e-government, citizens need to be able to correctly complete online forms. They should also be able to produce and submit complete digital documentation in accordance with instructions, guidelines, legal regulations, and administrative procedures. Citizens should understand and effectively use authentication and authorization mechanisms, such as trusted profiles and electronic signatures, which have legal equivalence to handwritten signatures or the presentation of identity documents. From a public administration perspective, officials are expected to create digital administrative documents in a manner that ensures full functionality, readability, accessibility, and security. This includes adhering to intellectual property laws and acknowledging the responsibility to provide information that citizens may perceive as authoritative and legally binding.

In the fourth area of DigComp 3.0, Area 4: Safety, within the context of e-administration and e-government, citizens need to protect their personal data when using digital public services. A key aspect in this area is the practice of digital identity security, including the correct and responsible use of mechanisms such as strong authentication. Equally important are resilience and the ability to recognize and avoid phishing attempts. Public institutions are increasingly becoming targets of cyberattacks, as they constitute critical components of the national infrastructure. In the context of social engineering, phishing, and manipulation, impersonating trustworthy public institutions can be extremely effective. People often tend to react immediately and trust communications that they believe come from entities such as tax offices, ministries, the police, or other public administration bodies. From the perspective of public administration, officials must process citizens' data securely, ensuring accountability and minimizing data security risks. They are also required to comply with GDPR (or equivalent) regulations and fulfill their obligations to report cybersecurity incidents. Public officials should regularly participate in cybersecurity training and awareness programs. Reports indicate, however, that this area of competence remains one of the least developed in the Polish public sector, particularly given the increasing number and scale of threats. The greater scale and increasing sophistication of attacks result from the implementation of advanced technologies, including artificial intelligence, synthetic media, and botnets.

In the fifth area of DigComp 3.0, Area 5: Problem Solving, in the context of e-administration and e-government, citizens must be able to deal with technical issues related to digital public services. This includes awareness of risks, issues related to service continuity, and the ability to effectively seek out and apply alternative solutions. From a public administration perspective, officials are expected to identify and implement digital solutions to administrative problems rather than default to analog processes. Progress in this domain is essential for addressing societal challenges through digital and social innovation. Furthermore, they are expected to contribute to process improvement by leveraging digital technologies. It is also worth noting that, within DigComp, problem-solving goes beyond purely technical issues and includes proactive actions, seeking and providing support, aspects that are often overlooked in approaches based solely on technology.

Discussion

In this article, DigComp 3.0 serves as the fundamental framework for both assessing and developing digital competences among citizens and public administration officials. Neither digital competences nor trust in institutions, when considered the pace, scale, scope, and level of implementation of e-administration and e-government services in Poland and Türkiye. It should be noted that the explanatory mechanism is based on their interaction or synergy, rather than on additive effects. The combination of competence without trust, i.e., citizens who are technically proficient but limit their use of services due to insufficient trust in institutions or platforms, is insufficient for the adoption of public e-services. Also, trust without competence, i.e., citizens who trust the administration but lack digital competence, technical skills, and problem-solving abilities, does not contribute to the implementation and use of e-administration and e-government. The

coexistence of competence and trust ensures sustained adoption. The citizen's ability to cope with system failures, recognize threats (e.g., phishing, impersonation), and adapt to platform changes, defined as civic resilience, plays an important role in the process.

his diagnosis justifies a new interpretation of the role of trust. In this context, trust acts as a moderator of the relationship between competencies and implementation. As noted in the article, areas 4 (Security) and 5 (Problem Solving) of the DigComp 3.0 framework are particularly important. They have a direct impact on interactions with public administration entities and representatives. Efforts focused solely on building trust will be ineffective without digital competencies, and competence-building programs will be insufficient in the absence of trust in institutions. These paths complement each other rather than replace one another.

Conclusions and Recommendations

Digital skills are an inherent component and enabler of social innovations such as e-administration and e-government. Rapid technological progress in Poland and Türkiye, along with the growing range of digital public services, presents significant opportunities to improve efficiency, transparency, and social inclusion. However, the pace of technological change is outpacing both citizens' digital skills and the readiness of many public sector employees. Unfortunately, legal regulations that should ensure the safety and security of users of new ICT solutions implemented in social e-services are insufficient. The pace of technological development is so rapid that the legal framework cannot keep pace. At the same time, an increasingly demanding cybersecurity threat environment makes the development of safety-related skills particularly urgent for the Polish public sector, given the critical nature of public information systems and their exposure to cyber risks. DigComp 3.0 helps to translate these insights into specific training curricula, competence standards, and evidence-based policy instruments for public administration at the national and local levels.

Effective use of digital public services requires that citizens possess sufficient digital competence, which varies considerably across age groups, levels of education, and place of residence. Adult digital literacy programs may therefore benefit from incorporating real e-administration use cases, with particular attention to older adults and residents of rural or socio-economically disadvantaged areas, where engagement with online public services tends to be limited. As indicated earlier, these groups can benefit most from public e-services, including e-government and e-administration. National e-government platforms designed in accordance with accessibility and inclusivity standards can lower the skill threshold required to use them effectively. As a result, digital public services will become more accessible to the entire population.

In public administration, the systematic and consistent development of civil servants' digital competencies is essential to ensuring the quality and resilience of e-services. Matching employee competency profiles with the DigComp 3.0 framework guidelines across all five competency areas is crucial for the implementation of public e-services. Security and problem-solving are particularly important. They can support a more consistent and secure delivery of electronic services. Integrating competency assessment and development into recruitment, onboarding, and professional development processes can enable organizations to respond more effectively to evolving digital requirements. In this context, DigComp 3.0 can serve as a common reference point linking citizens' competence needs with the capacity of public administration to deliver secure, inclusive, and high-quality digital services.

Limitations of the study

This article is conceptual in nature and does not include an empirical validation of the proposed framework. The competency indicators proposed by the authors requires empirical confirmation. Findings pertaining to specific countries may not be uniformly applicable in the diverse contexts of Poland and Türkiye.

Future research directions

Future research on the applicability of the DigComp 3.0 framework in the area of digital public services requires systematic empirical verification. The next step should be to verify the DigComp 3.0 standards using survey data, for example, by translating selected competencies

into measurable indicators and examining their distribution while taking into account both the demand (citizens) and the supply side (public administration representatives). This would help assess whether the proposed assessment adequately reflects digital competence profiles in an administrative context.

Conflict of Interest Statement

There is no conflict of interest.

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