

Main directions for improving public administration mechanisms in Ukraine



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ABSTRACT

The aim of this study is to determine the prerogatives of digital modernization of the public administration system based on the assessment of the development of digital government and the identification of major barriers. That involves both organizational and procedural changes and cultural changes in public authorities, personnel and qualification structures, interaction with citizens, and the effectiveness of public services. In the course of the study, statistical methods were used (qualitative and quantitative analysis), and empirical methods. Despite the automation of public authorities in recent years, the results of the transfer of public services to electronic format remain unsatisfactory. Digital modernization of the public administration system involves expanding methods for analyzing and evaluating the implementation of state programs, including auditing the effectiveness of their implementation. Currently, the assessment involves calculating the degree of achievement of the target values of performance indicators of projects, and monitoring is the assessment of the share of key events (activities) that occurred on time. The use of technologies of predictive analytics, and artificial intelligence has significantly changed the quality of information and analytical support of decisions. "Big data" processing technologies contribute to the adaptation of public policy measures to the needs and characteristics of the recipients of regulation.

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1. Introduction

The World Economic Forum in 2020 estimated that digitalization has enormous potential for business and society and could bring an additional \$30 trillion in revenue to the global economy over the next 10 years. In addition, international research firm IDC predicts that 40% of leading companies may be displaced from the market by newcomers who initially embarked on the digital path. This demonstrates that digital transformation is one of the strategic directions of economic modernization.

The implementation of the key objectives of the country's socio-economic development is inextricably linked to the successful implementation of digital technologies in managerial, social, and business processes (Homburg, 2018; Jacob et al., 2019; Jehan and Alahakoon, 2020; Lemke et al.,

2021). However, these seemingly obvious goals cannot be achieved outside the digitalization of public administration.

The modernization of the system of public administration in Ukraine has been underway since gaining sovereignty and continues to this day. In 2014, a constitutional reform was carried out to redistribute powers between the branches of state power. The role of the Verkhovna Rada and control over the government were strengthened. A "compact government" responsible to citizens is being formed. Some functions and services are transferred to lower levels and to a competitive environment, which implies a desire to transfer more power to communities, renew the judiciary, strengthen guarantees of human rights protection, etc. In the public service, the principles of the meritocracy of the new system of evaluation of public servants are being introduced. In the past five years, the efficiency of government agencies has increased by 25%, and public satisfaction with the quality of public services has increased by 20% in the past two years alone, according to the 2019-2020 evaluation. However, in 2020, the World Bank's Public Administration Efficiency Index scored 41 points out of 100, while a

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group of 30 developed countries had scores of 75 or higher.

Despite the results achieved, problems related to the lack of openness, customer focus, and proactivity remain relevant. Currently, the system does not encourage innovation, as a result of which successful changes in the work of public authorities are purposeful and not widespread. Control mechanisms that encourage process orientation rather than results prevail.

Thus, we can conclude that the modernization of public administration in Ukraine requires the search for new conceptual approaches and methods, taking into account global trends and innovations in public administration.

Electronic records, online services, assistive decision-making systems: significant technological advances have characterized administrative modernization in recent years, both in research and in practice. The goals are varied: Digitalization is associated with increased efficiency and productivity (Veeramootoo et al. 2018), improved service delivery, and greater transparency, participation, and collaboration (Alcaide Muñoz et al., 2017). These goals are discussed in the literature as societal values associated with e-government (Twizeyimana and Andersson, 2019).

For example, apart from plans, goals, and intentions, there is still a lack of knowledge about the actual impact of digitalization on public administration. Empirical research on e-government has mainly focused on the status quo (Mergel, 2019), IT tools (Hwang and Murphy, 2017), citizen or employee expectations and acceptance (Heuberger and Schwab, 2021; Fischer and Proeller, 2019), acceptance (Jacob et al. 2019), and success criteria (Veeramootoo et al., 2018), but has not considered outcomes and its impact (Boin et al., 2020).

Note that the authors use many terms to describe the use of information and communication technology (ICT) to modernize administrative work: E-government, e-government, e-administration, e-service delivery, e-democracy, digitization, digitalization, digital transformation, and digital government (Wirtz and Daiser, 2018). E-government and related terms emerged in the early 1990s as governments began to enter the World Wide Web as a fundamental element of e-government. Broadly speaking, e-government refers to efforts to improve the efficiency and accessibility of service delivery to citizens through the Internet. and ICTs (Wirtz and Daiser, 2018).

E-government models describe this construct as a linear, incremental, and progressive process from initial Internet presence to information delivery, interactivity, and transactional service delivery. Through these higher levels of maturity, e-government evolves from a front-office (website information) problem to a combination of front-office and back-office solutions (Homburg, 2018). There is reason to believe that “almost all models become quite normative when describing a fully developed e-government, and they assert what e-

government should become. The models implicitly assume that fully transactional systems are better and that more interaction with citizens equals better service” (Heuermann et al., 2018).

Currently, authors for the most part refrain from using the term “e-government” and use terms related to digitization (Lindgren et al., 2019; Jehan and Alahakoon, 2020).

Digitization is understood as the pure conversion of analog data for digital storage, hence the electronic replication of existing analog structures and processes without further changes to administrative, organizational, and technological structures (Mergel et al., 2019). Indeed, these efforts have already led to significant improvements in public organizations, for example through time savings in information transfer. At this point, however, it is often overlooked that an inefficient digital process is still an inefficient process, and too much emphasis is placed on the advances enabled by available technology.

In the next phase, digitalization is related to the transformation of analog processes into digital processes by redefining these processes and introducing new organizational models (Kompella, 2020). When processes are not only digitized but also more comprehensive institutional changes take place, we speak of digital transformation (Alcaide Muñoz et al., 2017). This term includes not only organizational and procedural changes but also major cultural changes in public authorities, personnel and qualification structures, interaction with citizens, as well as long-term changes in the efficiency of public service delivery.

The purpose of the study is to identify the prerogatives of digital modernization of the public administration system based on an assessment of the development of digital government and to identify the main barriers.

2. Data and methodology

2.1. Methodology for UN e-government index ranking

A number of organizations ranging from the UN Department of Economic and Social Affairs to a number of influential academic institutions (such as Tokyo Waseda University or the Taubman Center for Public Policy at Brown University) measure e-government development rankings in countries around the world.

The UN determines the extent to which countries are progressing in e-government using the Electronic Government Development Index (EGDI). The e-Government Development Index (EGDI) defines, highlights, and evaluates the conditions of e-government, which ensures that any group in a country has access to the public information and public services that people need. The results of ranking countries on the e-government readiness index are very strongly related to the level of economic, social, and democratic development

(Lemke et al., 2021; Tai et al., 2020). In mathematical terms, the e-Government Development Index (EGDI) is a weighted average of normalized indicators for three main aspects of e-government: The volume and quality of online services expressed as the Online Services Index (OSI); the status of telecommunication infrastructure development or Telecommunication Infrastructure Index (TII); internal human capital or Human Capital Index (HCI).

Each of these indices is a constituent indicator that can be extracted for an independent analysis.

$$EGDI = 1/3 (OSI_{normalized} + TII_{normalized} + HCI_{normalized}) \quad (1)$$

where, each indicator is normalized according to the rule $X_{normalized} = (X - \mu) / \delta$, μ is the average sample of all countries, δ is the standard deviation of the sample from all countries.

Then the composite value of each EGDI component index is averaged over a range of 0 to 1, and the total value is defined as the arithmetic average of the three-component indices.

3. Assessment of the development of digital government in Ukraine

Initial data collected for the UN study in 2020 showed that many more countries are pursuing digital government strategies, some of which are radically different from those that have guided previous e-government initiatives. Some of the new approaches used by governments for digital transformation include providing e-government as a platform, integrating online and offline multichannel delivery, flexibly developing digital services, expanding e-participation and partnerships, adopting information approaches, and strengthening digital capacity to deliver services. people-centered, and innovative use of new technologies such as artificial intelligence and blockchain, especially in developing smart cities (Schwanholz et al., 2021).

Even in countries in special situations, in developing and developed countries, digital government services can be a compensator. E-government can provide services and interaction opportunities directly to people in remote or excluded communities, giving them access at home or through digital kiosks in villages (Sterrenberg, 2017).

E-government is not just about delivering services; it also plays a role in fostering digital literacy, digital inclusion, digital connectivity, and digital identity (Lindgren et al., 2019; Ranerup and Henriksen, 2019; Schwanholz et al., 2021).

While countries around the world are striving to move forward with e-government, many governments still face challenges related to multiple contextual factors, such as limited resources, lack of digital infrastructure, and insufficient capacity or capability, especially in developing countries and

countries in special situations. Some countries face specific obstacles related to issues such as digital inclusion, data privacy, and cybersecurity (Tai et al., 2020).

Since the beginning of 2020, the global COVID-19 pandemic has intensified the role of e-government. The use of traditional digital government services is becoming more common as social distance encourages online interaction, but e-government platforms are also being used to manage the crisis in innovative ways.

Over the past 20 years since the UN first attempted to mark the state of e-government in 2001, it has evolved rapidly. The 2020 survey highlights the continuing positive global trend of e-government development. In 2020, 40 countries were rated "very high" with EGDI values between 0.75 and 1. By comparison, there were only 10 such countries in 2003 and only 29 in 2018. Since 2014, 193 states have had some form of an online presence. Fig. 1 shows the percentages of EGDI groups for 2020 and 2018 (DESA, 2018; 2020).

The number of countries with high and very high EGDI or values between 0.50 and 1.00 increased in 2020. The share of countries in the high and very high EGDI groups increased by 3 and 6 percent, respectively. As a result, the share of countries with high and very high levels of e-government together reached 58 percent or almost two-thirds of the total number of UN member states.

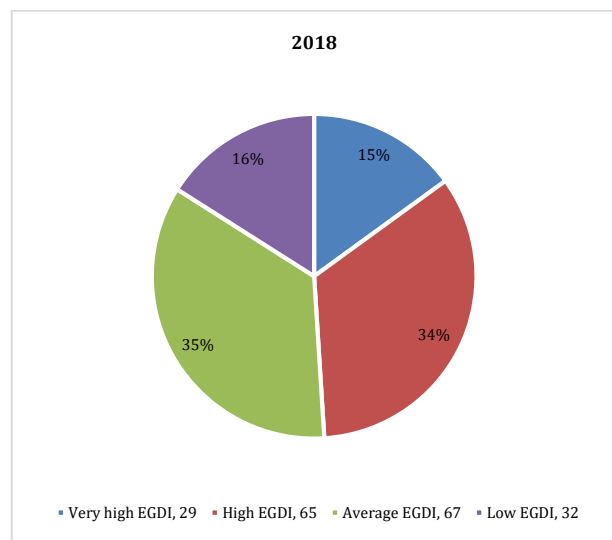


Fig. 1: Number of countries grouped by e-Government Development Index (EGDI) in 2018 and 2020; Source: Adapted by the author based on (DESA, 2018; 2020)

According to the UN E-Government Survey 2020 report, Ukraine ranks 39th with a score of 0.7597 (Fig. 2). The first three places in the ranking were taken by Denmark, Australia, and South Korea.

According to the UN 2020 report, Ukraine's online services subindex increased from 0.7681 to 0.8681, the telecommunications infrastructure subindex increased from 0.5668 to 0.5723, and the human capital subindex decreased from 0.8408 to 0.8 (Table 1).

Despite the results achieved, there are still dilemmas associated with a lack of openness, customer focus, and activity. The emergence of new technologies makes it possible to provide services of a higher quality than those currently being implemented. For example, the use of big data technologies can lead to a fundamentally new approach to analyzing the needs of the population and, as a result, improve the quality of service.

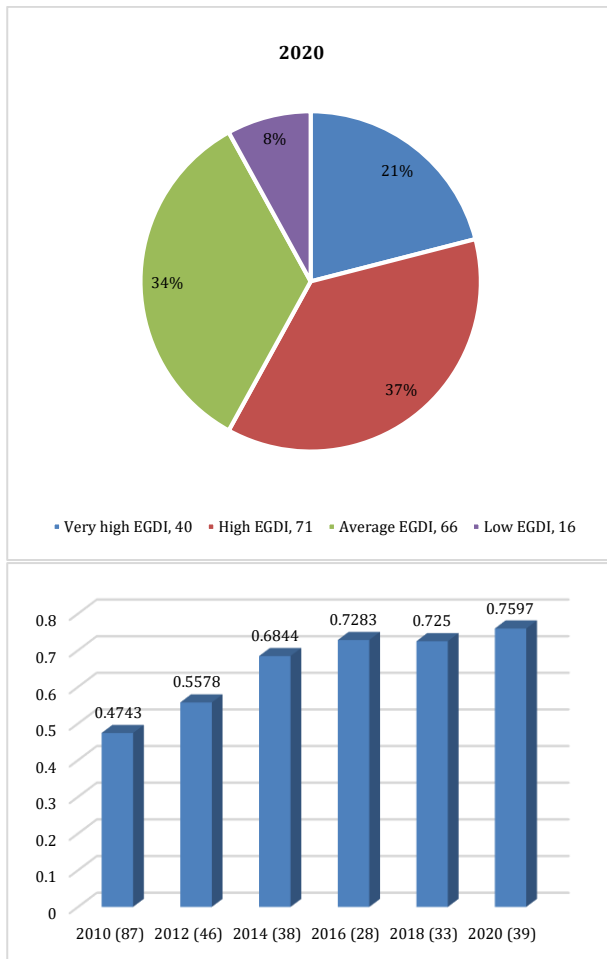


Fig. 2: The dynamics of Ukraine's position in the ranking of e-government development, 2010-2020; Source: Adapted by the author based on (DESA, 2018; 2020)

3.1. Barriers to digital modernization of the public administration system

Today's global economy is presented as a “new technological generation” economy and involves the development of super-modern “end-to-end technologies” such as artificial intelligence, blockchains, and big data in professional fields and everyday life (Wouters et al., 2021). Digital, mobile, and virtual technologies attract users of varying degrees of readiness, but there are always barriers and challenges to the process, whether it be physical barriers and lack of access, material resistance, aging infrastructure, or human fear.

Political will, market mechanisms, and a high level of information technology development are not enough for digitalization to be effective at all.

Recently, innovative technology has been actively implemented in all areas (Ranerup and Henriksen, 2019). Coupled with digital innovation are technological, sociocultural, and institutional barriers (Effah et al., 2020). Lack of access to the Internet and equipment such as computers, phones, and mobile devices was once considered a digital barrier. Technological advances and accessibility, such as cell phones, have remedied this situation. But new digital barriers have emerged, such as the speed and quality of these devices, digital literacy, or the ability to use them (Twizeyimana and Andersson, 2019). Thus, instead of a single digital barrier, many have emerged. This is not only a global problem, but also a local one, related to certain circumstances as far as resources, bandwidth, and skills are concerned. Table 2 demonstrates a set of digital barriers to the digital modernization of public administration in Ukraine. Addressing the needs of the poorest and most vulnerable populations is a prerequisite for sustainable and resilient societies. Given today's dilemmas, from humanitarian crises and migration processes to urban and rural poverty, technology makes it possible to reach everyone, increasing access to information and services for those who need them most.

Table 1: Top 12 developing countries for e-government-countries (DESA, 2018; 2020)

Country	Region	Subregion	OSI	HCI	TII	EGDI	EGDI level	2020 range
Ukraine	Europe	Eastern Europe	0.8681	0.8388	0.5723	0.7597	very high	39
Republic of Belarus	Europe	Eastern Europe	0.5681	0.5388	0.3723	0.6804	very high	44
Moldova	Europe	Eastern Europe	0.7708	0.7274	0.4787	0.6590	high	69
Kazakhstan	Asia	Central Asia	0.7681	0.7388	0.4723	0.6597	high	68
Azerbaijan	Asia	West Asia	0.7292	0.7369	0.5062	0.6574	high	70
Macedonia	Europe	South Europe	0.7153	0.6924	0.4859	0.6312	high	79
Uzbekistan	Asia	Central Asia	0.7917	0.7396	0.3307	0.6207	high	81
Armenia	Asia	Western Asia	0.5625	0.7547	0.4660	0.5944	high	87
Kyrgyzstan	Asia	Central Asia	0.6458	0.7628	0.3418	0.5835	high	91
Mongolia	Asia	Eastern Asia	0.5972	0.7899	0.3602	0.5824	high	92
Bolivia	America	South America	0.5625	0.7148	0.3148	0.5307	high	103
Paraguay	America	South America	0.5556	0.6701	0.3507	0.5255	high	108

4. Results

Despite the special attention of government agencies to automation in recent years, the visible

results of the conversion of public services to e-format are still unsatisfactory. In connection with the above, if at the beginning of 2020, 60% (or 447 out of 746) of services were available to the population

through the web portal of “e-government,” the actual volume of public services received through the portal was only 18.7% of the total (28.5 million out

of 152.6 million), in turn, half of them accounted for targeted information.

Table 2: Barriers of digital modernization of the public administration system in Ukraine

Barrier	Description
Access	It all starts with access or lack thereof: although Internet penetration has increased, it remains a key obstacle as more and more people around the world remain offline rather than online.
Accessibility	The gap between rich and poor affects the availability of ICTs and is an important indicator that shows the difference in technology adoption between regions within a country and between countries.
Age	Older people tend to use ICTs less than younger populations, despite the notion that they could benefit from online social and health services.
Throughput	International bandwidth and the ability to transmit and receive information over networks varies greatly from country to country and region to region, limiting potential useful ventures.
Content	Adequate resources in the local language are needed to encourage adoption.
Disability	People with disabilities face additional barriers to using ICTs if websites do not meet accessibility guidelines.
Education	Like social inequality, education and literacy are among the fundamental issues that need to be addressed to bridge the digital divide.
Gender	There is a small but persistent disparity in Internet use between men and women.
Migration	The level of digital skills of migrants may lag behind the population of their new country, and, if so, differences in resources and language may arise.
Location	Rural and remote areas are often at a disadvantage in terms of speed and quality of service compared to their counterparts.
Mobile	Mobile devices can close the access gap but can create new barriers in terms of technology, speed, and usage.
Speed	The gap between basic and broadband access creates a new barrier because speed is important to get all the benefits of a digital society.
Useful use	What people do with their access is a key difference in whether users take full advantage of ICTs, such as e-government services.

A number of public services, despite their availability on the portal, were received mainly by public authorities. Moreover, services for making an appointment and calling a doctor at home are not popular enough on the portal (only 6% are provided through the portal), which are usually provided by telephone and manual recording of patient data in information systems. This does not exclude the human factor; we mean labor costs on both sides and contradicts the principles of widespread automation. The situation is the same with the service of receiving documents and enrollment in school-84% of the total volume of this public service was provided in paper form.

The low popularity of the “e-government” web portal may have been due to technical problems and difficulties in working on the portal. In the media and social networks, as well as in public monitoring, there are regular technical failures and procedural

complications when authorizing the portal using electronic digital signatures (EDS). The main activities of government agencies are automated, but there are still areas of activity that are not sufficiently covered by informatization. The emergence of new technologies makes it possible to provide services of a higher quality than those currently being implemented (Tai et al., 2020).

However, the digital modernization of the public administration system in Ukraine has a positive impact on compliance with a number of principles of public administration. At the same time, the implementation of digital government has a positive impact on the balance of interests of all stakeholders, the balance of interests of present and future generations, the balance of preventive and reactive approaches to public policy, the balance of personal responsibility for the result and freedom of management (Table 3).

Table 3: Prerogatives of digital modernization of the public administration system in Ukraine

Principles of Public Administration	Assessing the impact of digital modernization
Balance of the interests of all stakeholders	Digital modernization creates conditions for greater compliance with this principle, including at the stage of planning, monitoring, and evaluation of the results of public policy, creates new forms of data collection and processing that reflect the interests of all stakeholders, including data collection in a passive mode (through analysis of social networks, search engines, etc.).
Balance of interests of present and future generations	Digital modernization is generally neutral concerning the implementation of this principle (digital technologies can be used for both strategic and tactical purposes).
Balance of expected results with available resources	Digital modernization of the public administration system as a whole has a positive impact on compliance with this principle, both through the introduction of special tools for justifying ICT projects (business cases), and through the collection and analysis of detailed information on the transaction costs of public authorities and, therefore, the possibility of optimizing these costs.
Balance of initiative and appreciation of achievements: A combination of proactive and reactive approaches	Digital modernization creates the conditions for better realization of this principle, including providing tools for early detection of problems (including the use of artificial intelligence) and preventive solutions.
Balance of personal responsibility for results and freedom of management	Digital modernization increases accountability of results by expanding the sources of data that can be used for monitoring and evaluation.

Thus, we can conclude that the digital modernization of the public administration system in Ukraine contributes to the following objectives:

- reduction of costs for the activities of public institutions through the optimization of auxiliary, invariant functions (back-offices of public institutions).
- increasing the productivity of civil servants in providing public services and carrying out control and supervisory activities through standardization and modernization of administrative and managerial processes.
- reduction of costs for the creation and administration of information resources and systems through the reuse of information technologies and services.
- improving the efficiency of budget expenditures on program (project) activities implemented by the authorities by promoting and stimulating the introduction of digital technologies in the sectors of the economy.
- increasing the level of trust of citizens and businesses in the authorities and officials, support of their decisions (policies)-through the formation of an ecosystem of public and private platforms.

5. Discussion

Analysis of the impact of digitalization on public administration has shown that the playing field is rather small. Few studies have focused on the impact of digitalization on public administration. [Allen et al. \(2020\)](#) showed that there is relatively little empirical research on e-government.

In exploring this topic, we considered the impact of the relationship between global socioeconomic indicators on human development. Digitalization can also affect the testing of changes in average agricultural prices. Factors such as arrears and individual personality traits can make a difference ([Fukumoto and Bozeman, 2019](#)).

To assess the benefits of digitalization projects in public sector organizations, economic evaluation methods are well established ([Belcher and Palenberg, 2018](#)). However, they are less concerned with the long-term and social perspective, although qualitative criteria can be considered in addition to monetary criteria. Therefore, they are suitable for evaluating outcomes. In addition, the so-called information systems success model has been established. This model distinguishes between system quality, information quality, and use, user satisfaction, and individual and organizational impact. The success of information systems is a complex construct with many interdependencies between these dimensions, and therefore it is necessary to examine the relationships between them ([Effah et al., 2020](#)) rather than focusing on only one impact dimension. However, we argue that the impact of information systems extends beyond individuals and organizations. Therefore, we need to consider overarching categories of the impact that

also affect the social level, especially in the context of the public sector ([Wouters et al., 2021](#)).

Public organizations should create public value(s) because it meets the needs and desires of citizens and businesses in their various stakeholder roles (e.g., as politicians, taxpayers, and residents) ([Tetley-Brown and Klein, 2021](#)). Our research refers to multiple public values when referring to specific aspects or addressing specific target groups, and we use the term “public value” when referring to society as a whole ([Fischer and Proeller, 2019](#)). Thanks to digitalization and the associated opportunities for participation and co-creation, the digitalization of public power becomes more networked, more open, and more active ([Boin et al., 2020](#)). The use of public value theory in digital government research is well established ([Nabatchi, 2018](#); [Ranerup and Henriksen, 2019](#)). [Fukumoto and Bozeman \(2019\)](#) tried categorizing public values. By analyzing the impact of digital government through public value, using dimensions of public values, impact analysis goes beyond the intended goals and focuses on the more general impact on society, thereby helping to improve our understanding in the context of e-government impact.

6. Conclusion

Digital modernization of the public administration system is one of the objectives of public policy in Ukraine. Transforming the world and achieving the Sustainable Development Goals by 2030 requires a paradigm shift in public administration. This requires rethinking the role of the state and its interaction with civil society and the private sector in performing public functions in the country and meeting people's needs. Ukraine's ICT and digital government can ensure everyone's participation in sustainable development. The 2030 Agenda explicitly recognizes the vital role of these two components as a catalyst for realizing this vision and states that “the spread of information and communication technologies, as well as global cooperation, has great potential to accelerate progress, remove digital barriers and develop knowledge societies by, for example, developing scientific and technological innovation in various fields.”

Active digital modernization of the system of public administration in Ukraine involves the expansion of methods of analysis and evaluation of the implementation of state programs and projects, including the audit of the effectiveness and efficiency of their implementation. Currently, the effectiveness assessment is often reduced to the calculation of the degree of achievement of the target values of indicators of the implementation of programs and projects, and monitoring is based on the assessment of the share of key events (activities) that occurred on time or with violations of deadlines. The use of technologies of predictive analytics, and artificial intelligence has significantly changed the quality of analytics used in public administration and,

consequently, the quality of information-analytical support of decisions made. Moreover, the technologies of processing “big data” make it possible to identify new relationships between various parameters and adapt public policy measures to the needs and characteristics of the recipients of regulation. Bringing unstructured and partially structured data into the analysis of the effects of policy implementation, into the assessment of the problems the regulation aims to solve, and into the formation of the goals it should achieve, will improve the validity of decision-making. Moreover, it is necessary to take into account individual alternatives in decision-making, as well as to conduct a deeper and better analysis of the consequences of the implementation of those or other decisions, projects, and initiatives. In the same way, analysis using digital technologies can be conducted both ex-ante (including based on controlled sampling studies, regulation testing using social networks, and evaluation of the effectiveness of proposed measures) and ex-post (including based on various sets of “big data” and their processing by artificial intelligence).

Consequently, digitalization does not depend only on technology. This process requires a comprehensive approach that offers accessible, fast, reliable, and personalized services. The public sector in many countries is ill-prepared for this modernization. Traditional forms of regulation may not work and therefore require a paradigm shift in strategic thinking, legislation, and regulation. Governments can respond by developing the necessary policies, services, and regulations. This response would be fit for purpose and enhance the role of education in achieving key goals. Services can be tailored to specific needs and target audiences, including government, business, or civil society.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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