

STRATEGIC DIGITALIZATION AND STATE RESILIENCE: THE ROLE OF DIGITAL GOVERNANCE

© 2026 **TSYMBAL L. I., MELNYCHENKO O. V.**

UDC 351:004.9:338.2
JEL: H11; H83; O33; O38

Tsymbal L. I., Melnychenko O. V. Strategic Digitalization and State Resilience: The Role of Digital Governance

The article examines the development features of digital governance in Estonia, Singapore, and Ukraine in the context of the global digital transformation of public administration. A comparative analysis of the digitalization level of the countries under study was conducted on the basis of international indices and analytical indicators, which made it possible to identify patterns in the development of digital governance, determine the key factors of its efficiency, and assess the readiness of countries to implement modern digital management solutions. The technological, institutional, and organizational mechanisms for ensuring digital governance are systematized, including electronic identification, integrated State digital platforms, interoperability of information systems, data management, digital public services, and regulatory and legal instruments supporting digital transformation. The decisive role of digital infrastructure, platform-based interaction, and modern mechanisms of electronic identification in improving the efficiency of interaction among the State, business, and citizens, ensuring transparency, accountability, and the quality of public service delivery is substantiated. Based on the results of the study, strategic directions for the development of digital governance in leading countries are identified, and the possibilities for adapting their management practices to Ukrainian conditions are outlined. Priority directions for the development of digital governance in Ukraine are proposed, aimed at strengthening the institutional capacity of the State, increasing digital resilience, accelerating the digital transformation of the public sector, and ensuring sustainable socioeconomic development under conditions of digital globalization.

Keywords: digital globalization; digital governance; digitalization; electronic documents.

Tabl.: 2. **Bibl.:** 25.

Tsymbal Liudmyla I. – D. Sc. (Economics), Professor, Professor of the Department of International Economics, Kyiv National Economic University named after Vadym Hetman (54/1 Beresteyskyi Ave., Kyiv, 03057, Ukraine)

E-mail: l.tsymbal@ukr.net

ORCID: <https://orcid.org/0000-0002-0873-9227>

Melnichenko Olena V. – Postgraduate Student of the Department of International Economics, Kyiv National Economic University named after Vadym Hetman (54/1 Beresteyskyi Ave., Kyiv, 03057, Ukraine)

E-mail: lenochka.melnichenko@gmail.com

ORCID: <https://orcid.org/0009-0001-9808-5553>

УДК 351:004.9:338.2
JEL: H11; H83; O33; O38

Цимбал Л. І., Мельниченко О. В. Стратегічна діджиталізація та резильєнтність держави: роль цифрового управління

У статті розглядаються особливості розвитку цифрового управління в Естонії, Сінгапурі та Україні в контексті глобальної цифрової трансформації державного управління. Проведено порівняльний аналіз рівня діджиталізації досліджуваних країн на основі міжнародних індексів та аналітичних показників, що дозволило виявити закономірності розвитку цифрового управління, визначити ключові фактори його ефективності та оцінити готовність країн до впровадження сучасних цифрових управлінських рішень. Систематизовано технологічні, інституційні та організаційні механізми забезпечення цифрового управління, включаючи електронну ідентифікацію, інтегровані державні цифрові платформи, сумісність інформаційних систем, управління даними, цифрові публічні послуги та нормативно-правові інструменти, що підтримують цифрову трансформацію. Обґрунтовано вирішальну роль цифрової інфраструктури, взаємодії на базі платформ і сучасних механізмів електронної ідентифікації у підвищенні ефективності взаємодії між державою, бізнесом і громадянами, забезпеченні прозорості, підзвітності та якості надання публічних послуг. На основі результатів дослідження визначено стратегічні напрямки розвитку цифрового управління в провідних країнах та окреслено можливості адаптації їхніх управлінських практик до українських умов. Запропоновано пріоритетні напрямки розвитку цифрового управління в Україні, спрямовані на зміцнення інституційних можливостей держави, підвищення цифрової стійкості, прискорення цифрової трансформації державного сектору та забезпечення сталого соціально-економічного розвитку в умовах цифрової глобалізації.

Ключові слова: цифрова глобалізація; цифрове управління; діджиталізація; електронні документи.

Табл.: 2. **Бібл.:** 25.

Цимбал Людмила Іванівна – доктор економічних наук, професор, професор кафедри міжнародної економіки, Київський національний економічний університет імені Вадима Гетьмана (просп. Берестейський, 54/1, Київ, 03057, Україна)

E-mail: l.tsymbal@ukr.net

ORCID: <https://orcid.org/0000-0002-0873-9227>

Мельниченко Олена Валентинівна – аспірант кафедри міжнародної економіки, Київський національний економічний університет імені Вадима Гетьмана (просп. Берестейський, 54/1, Київ, 03057, Україна)

E-mail: lenochka.melnichenko@gmail.com

ORCID: <https://orcid.org/0009-0001-9808-5553>

PROBLEM STATEMENT

The current stage of world economic development is characterized by profound transformation processes that fundamentally change the economic, political, and social foundations of national economies. Globalization, the rapid development of digital technologies, escalating geopolitical instability, the COVID-19 pandemic, military conflicts, cyber threats, and economic crises have highlighted the need to search for new models of public administration capable of ensuring the resilience, adaptability, and continuity of state institutions.

Under these conditions, digital transformation has ceased to be merely a tool for improving the efficiency of individual administrative processes and has become a strategic factor in ensuring national competitiveness, economic resilience, and public trust. Digital governance forms a new model of interaction among the state, business, and citizens by ensuring transparency, responsiveness, accessibility, and customer orientation in public services.

These issues are particularly relevant for Ukraine, which is simultaneously carrying out a large-scale digital transformation of the public sector and confronting unprecedented challenges caused by the full-scale war. In these circumstances, studying the experience of global leaders in digital governance, in particular Estonia and Singapore, provides an important basis for forming an effective model of a digital state capable of ensuring institutional stability, high-quality public services, and long-term socio-economic resilience. In this context, comparative analysis of national digital governance models is especially important, as it makes it possible to identify key success factors in the digital transformation of the public sector, evaluate the effectiveness of institutional and technological solutions, and determine the possibilities for adapting them to different socio-economic conditions.

In modern conditions, scholarly interest lies not only in assessing the level of digitalization of individual states, but also in studying different models of digital governance shaped by their institutional, economic, and technological characteristics. Comparing these models makes it possible to identify universal principles for building a digital state, determine the key factors of its effectiveness, and outline opportunities for adapting successful management practices to national conditions.

At the current stage of digital economy development, several models of digital governance can be distinguished. They differ in strategic priorities, institutional architecture, technological solutions, and mechanisms of interaction among the state, business,

and citizens. Their formation is driven by the historical, economic, political, and social characteristics of individual countries, which determine the specific implementation of digital transformation policy.

One of the most successful models is the comprehensive digital state model, based on integrated digital infrastructure, electronic identification, and the “digital by default” principle. Estonia is the most illustrative example of this model. Another model is represented by Singapore, where digital governance is developed as part of the “Smart Nation” concept and is based on strategic management, extensive use of data, digital platforms, and artificial intelligence technologies. At the same time, Ukraine is forming its own digital governance model, developing under wartime challenges and characterized by the rapid implementation of digital services, a focus on ensuring the continuity of public administration, and strengthening institutional resilience.

Digitalization of public services enables the optimization of management processes, reduces administrative barriers between the state and citizens, increases the transparency of public services and makes them more accessible, while significantly reducing the expenditure of resources and time. Digital technologies become especially important during crises, because economic stability requires uninterrupted service delivery, rapid data exchange, and prompt decision-making.

ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

Issues of digital governance, digital transformation of the public sector, and the development of the digital state are at the center of contemporary academic research. A significant contribution to the theoretical foundations of digital governance and the study of the impact of digitalization on the transformation of public administration systems has been made by M. Mikhrovska [1], I. Kantsur [2], and Ye. Ivanov [2]. The features of digital governance development in Ukraine, its current state, and directions for improvement are covered in the works of V. Zhovtok and N. Filipova [3].

The assessment of national digitalization levels, international comparisons, and the analysis of global digital transformation trends have been studied by V. Khaustova, Ye. Kriachko, and D. Bondarenko [4]. Scholars also pay special attention to mechanisms of digital transformation as a factor in ensuring the economic resilience of states, in particular I. Shevchenko [5]. The experience of digital transformation in European Union countries

and the prospects for its application are examined by I. Belova, O. Yaroshchuk, and A. Homotiuk [6], while I. Medvedenko studied the implementation of international digital governance experience in Ukraine's public administration system [7].

Despite significant scholarly achievements, current research is mainly focused on the digitalization of the public sector, the development of e-governance, digital services, electronic identification, and the assessment of the digital transformation level of individual states. At the same time, insufficient attention has been paid to digital governance as a strategic factor in ensuring state resilience, as well as to the comparative analysis of different digital governance models in terms of their ability to maintain the stability of state institutions under contemporary global challenges. In addition, the mechanisms for adapting best international digital transformation practices to Ukrainian conditions require further scientific substantiation, taking into account wartime, economic, and institutional challenges.

The aim of the study is to substantiate the role of digital governance as a strategic factor in forming state resilience through a comparative analysis of the digital transformation models of Estonia, Singapore, and Ukraine; to identify key technological, institutional, and organizational mechanisms that ensure the effectiveness of digital governance; and to develop practical recommendations for adapting international experience to strengthen institutional capacity, digital resilience, and the continuity of Ukraine's public administration system.

MAIN MATERIAL

In the context of the current global digital transformation, digitalization is becoming one of the main factors ensuring competitiveness, economic stability, and the institutional capacity of the state. The challenges faced by countries, including pandemics, wars, military conflicts, economic instability, and cyber threats, demonstrate that the effectiveness of public administration depends to a certain extent on the level of digital infrastructure development and the ability of public authorities to provide public services to citizens regardless of circumstances. Therefore, digitalization of the public sector is not only a direction of public administration modernization, but also an important instrument for ensuring state resilience.

The implementation of digital governance increases the efficiency of management processes, reduces administrative costs, ensures transparency in the activities of public authorities, minimizes bureaucratic procedures, and facilitates prompt interaction among

the state, business, and citizens. In addition, digitalization makes it possible to ensure the continuous functioning of state institutions even in unstable times, which is one of the key factors ensuring national resilience. Estonia, Singapore, and Ukraine are examples of countries that demonstrate different models of digital governance development and are at different stages of digital maturity. Accordingly, the digital governance of these countries differs substantially, as confirmed by international rankings and indices. Comparing key indicators makes it possible to objectively assess the level of digital development of states and their digital infrastructure. At the same time, the level of digital governance is determined not only by the availability of modern technologies but also by the effectiveness of their integration into public administration systems and the daily lives of citizens. The analysis of international indices makes it possible to identify the strengths and weaknesses of national digital ecosystems, as well as to assess the ability of countries to adapt to contemporary challenges and crisis situations. The obtained results can serve as a basis for developing recommendations aimed at further improving digital transformation processes and enhancing the level of national resilience. Therefore, it is appropriate to analyze Estonia, Singapore, and Ukraine by key indices (Table 1).

The analysis of international indices indicates a significant differentiation in the level of digital development among the countries studied. Singapore demonstrates consistently high positions in most international rankings, confirming the effectiveness of its innovation-oriented model of digital transformation. Estonia, although lagging behind Singapore in some indicators of digital competitiveness, remains one of the global leaders in digital governance, as confirmed by high values of the E-Government Development Index. Ukraine demonstrates positive dynamics in the development of digital services, but its positions in international rankings remain lower, which is caused by both economic and institutional factors and the consequences of the full-scale war. The results obtained confirm the feasibility of further comparative analysis of the digital governance models of these countries in order to identify mechanisms capable of strengthening Ukraine's digital resilience. High index values show that countries are effectively implementing digital transformation strategies and actively integrating digital technologies into public governance. In turn, Ukraine demonstrates dynamic development and belongs to the group of countries with a high level of digital governance development.

Estonia has gradually achieved a high level of digitalization. Starting in 1997, the country has in-

Table 1

International indicators of digital development and digital governance
in Estonia, Singapore, and Ukraine

Indicator	Estonia Rank	Estonia Score	Singapore Rank	Singapore Score	Ukraine Rank	Ukraine Score
IMD World Digital Competitiveness	24	73.09	1	100.00		
Networked Readiness Index, 2024	18	67.85	2	76.94	43	55.32
DiGix: The Digitalization Index, 2024	12	0.83	2	0.93	67	0.45
Global Digitalization Index, 2024	26	54.1	2	76.1	-	-
Knowledge Economy Index, 2024	25	60.5	7	69.2	56	47.6
E-Government Development Index, 2020	3	0.98	11	0.90	69	0.32

Source: compiled by the author based on [25].

troduced changes that allow citizens to receive 99% of public services online without visiting the relevant government institution, making Estonia a global leader in e-governance. This means that the country is moving away from bureaucratic principles. The government calculated that the country spends 2% of GDP on defense; if the time spent on obtaining public services is converted into monetary terms, it amounts to the same 2%. Thus, by implementing the e-governance system, the country saves a significant amount of money [8].

Estonia's digital governance is aimed at increasing the country's competitiveness in the global arena and improving the well-being of its citizens. The goal of this program is to ensure the functioning of services 24/7. For this aim, high-quality state databases and high-quality software were created. Three areas of e-governance can be considered: e-Administration, e-Participation, and e-Services. The first, e-Administration, was created to use information and communication technologies effectively and transparently for public administration. Citizens also have access to e-Services, meaning 100% of public services online, which makes the system transparent and convenient to use. The third area, e-Participation, was created to involve citizens in decision-making at the state level [9].

Estonians clearly understand the aim for which their personal data are used. The state receives information about a person only once and then reuses it. The state seeks to use personal data effectively, and therefore can provide data without waiting for a client's request. To save time and demonstrate the maximum transparency of the government system, e-Cabinet was created. Through it, information for the work of the Government can be obtained, which significantly reduces the time spent on bureaucratic processes. As

a result, the average duration of weekly government meetings decreased from 4–5 hours to only 30 minutes [9].

The state actively involves citizens in making changes to current legislation and improving public life. For this aim, a Public Initiatives Portal was created, where citizens can submit their ideas, discuss them, and send proposals to the country's Parliament using a digital signature. Over 10 years, from 2014 to 2024, more than 750,000 signatures were collected and more than 270 collective proposals were submitted [9].

About one million entries are added to the system every day. The Estonian State Forest Management Centre has an innovative solution for people who want to cut down a Christmas tree for the New Year. Citizens can access an application before going to the forest, select the necessary location, pay, and cut down the tree.

The MobileParking application enables Estonians to pay for paid parking services online. Through the application, one can find a parking space and pay for parking. The application also synchronizes with the car via Bluetooth and automatically starts counting time from the moment the engine is switched on. More than 90% of drivers use the MobileParking service. For bank transfers, there is the digital platform TransferWise, which allows money to be transferred abroad several times cheaper than through a bank [13].

In addition to services for citizens, Estonia enables non-residents to register a business online through the e-Residency platform and manage an Estonian company without being physically present. Through this service, the government issues online identity documents to non-Estonians. With this digital certificate, a business owner can send and encrypt files and sign documents online. Access to banking services and

tax declarations also becomes available. e-Residency does not grant the right to reside in the country and does not mean Estonian citizenship, but it enables business activity in Estonia and other European Union countries [14].

This vector makes Estonia a global leader in digital services. Its model is an example for the development of other European Union countries and prompts them to rethink bureaucratic structures and move toward the digitalization of state processes. In 2019, the global expat network InterNations published a ranking by the level of digitalization of economies. Estonia ranked first; it provides the entire country with internet coverage and believes that citizens have the full right to access it. Estonia is also the country that, in 2007, as a digital state, first experienced a serious cyberattack on its servers, which threatened national security. After this, in cooperation with NATO, Estonia proposed establishing a Cyber Defence Centre to prevent and assist in the event of future attacks [18].

Another digital leader among countries is Singapore. About 10 years ago, the country began developing digital public services through investment in the technology sector. Singapore is a hub of technical innovation and technology start-ups. Digitalization is implemented through the national DGB, the Digital Government Blueprint. The program has three areas for digitalization development: civil servants, business, and citizens. The state is building its own internal capacity through Singapore's Government Technology Agency, while consulting companies are also involved in the development process. As a result, over the past five years Singapore has held its place among the leaders in digital governance. The government follows the rule that the development of internal technologies should begin with teaching children at school and offering internships for students in programming. These skills should then be applied to the development of Singapore's digital environment [19].

In 2025, Singapore became the first port in the world to digitalize bunkering; all services are to be digitalized by default, and bunker delivery notes must also be electronic. This enables efficient data exchange between suppliers and buyers [20].

In general, the difference between digital governance in Estonia and Singapore lies in the fact that Estonia focused on a technically and legally established infrastructure of trust and minimally interferes with processes after they are digitized, while Singapore uses a strategy of centralized coordination. Overall, the question constantly arises as to which national digitalization system is the most successful.

Ukraine has another model of digital transformation of public administration, implementing digital changes under conditions of war and constant external threats. Despite the difficult conditions for project implementation, the country is introducing modern digital solutions that ensure the continuous activity of public authorities, increase institutional stability, and improve the accessibility of administrative services for the population. In 2019, the Ministry of Digital Transformation of Ukraine was created, and digitalization was defined as one of the key areas of state policy. Thus, the Diia ecosystem appeared in Ukraine, combining a web portal of public services and a mobile application. The platform makes it possible to receive dozens of administrative services online, register a business, use digital documents, apply for social payments, obtain extracts from state registers, and even marry and divorce online.

The integration of state information systems and the automation of many processes significantly reduce the time required to receive a service, decrease the burden on citizens and businesses, and increase transparency in the activities of public authorities. The state is also trying to digitalize other areas of Ukrainians' lives. For example, the Ministry of Digital Transformation created the state educational ecosystem Mriia, which is intended to unite educators in a single convenient digital environment. Teachers, children, and parents can use the platform. This significantly accelerates bureaucratic processes and makes it possible to create a library on the basis of the platform with all the digital materials necessary for learning [24].

Thus, Ukraine's experience of digital transformation proves that, despite the conditions of full-scale war, digitalization serves as a key instrument of national resilience and helps ensure transparency and the continuity of public administration. The success of the Diia ecosystem and the educational project Mriia demonstrates impressive innovation dynamics. Nevertheless, the development of digital infrastructure and cybersecurity, as well as further harmonization of public services with EU standards, require close international cooperation.

In this context, cooperation with Estonia is an important step for Ukraine, as Ukraine is actively implementing the GovTech system. Since 2025, Estonia, Ukraine, and the United Kingdom have signed a memorandum of cooperation. The main areas include the exchange of experience in open data, artificial intelligence, and cybersecurity. Attention is also paid to the development of technologies that improve the provision of public services and digital governance. The countries also agreed to support start-up projects and

innovative companies. This will help achieve the goals of Ukraine's Digital Development Strategy [11].

Estonia, as a global leader in digitalization, is the founder and organizer of the Tallinn Digital Summit, hosted by the country's Prime Minister. The event is intended to foster cooperation among the private sector, international organizations, government officials, and policymakers in order to build resilience in digital transformation. Ukraine actively participates in the summit because, together with Estonia, it seeks to help democratic countries accelerate digital development. Since 2019, Ukraine has been implementing Estonian experience. For example, the Trembita data exchange system operates similarly to X-Road. Meanwhile, Estonia is developing the mRiik application based on the Ukrainian Diia application. Testing showed a user satisfaction level of 85% [12].

Such cooperation between countries confirms that successful digitalization of governance requires not only the creation of new tools, but also the adaptation of existing technologies to the specific needs of the economy, society, and national

security. The experience of the three countries studied above, namely Estonia, Singapore, and Ukraine, shows different but successful models of digital governance. Estonia has become a country that managed to build an infrastructure of comprehensive digital trust, where citizens have 99% of public services online and full control over personal data. Singapore, in turn, implements a model of centralized technological coordination and focuses on its own digital infrastructure developments and IT education from school age. Ukraine, meanwhile, has built the adaptive Diia ecosystem, proving that even under difficult wartime conditions the state can provide services to citizens. For a comprehensive understanding and systematic comparison of these countries' approaches in different sectors and the implementation methods through which digital transformation takes place, the information is grouped in Table 2.

The comparative analysis shows that, despite a shared strategic goal of digital transformation, Estonia, Singapore, and Ukraine implement different digital governance models formed under the influ-

Table 2

Comparative characteristics of the digital governance models of Estonia, Singapore, and Ukraine by key areas of digital transformation

Country	Public administration	Education sector	Economy and business	Transport infrastructure	Security and cybersecurity
Estonia	1) Government meeting time is reduced through the e-Cabinet service 2) X-Road data exchange system	1) Submission of proposals to Parliament with a digital signature (Public Initiatives Portal)	1) Business management for non-residents through e-Residency 2) TransferWise service	1) MobileParking application with Bluetooth automation 2) State Forest Management Centre service	1) NATO Cooperative Cyber Defence Centre of Excellence (CCDCOE) 2) Participation in the Tallinn Digital Summit
Singapore	1) Digital Government Blueprint 2) Developments of GovTech Agency	1) Programming education for schoolchildren and students	1) Investments in technology start-ups and involvement of consulting firms	1) Digitalization of bunkering, including electronic delivery notes in the port	1) Zero Trust concept (GovZTA) 2) Government Cyber Security Operations Centre (GCSOC) 3) ScamShield application
Ukraine	1) Diia system for receiving public services 2) Trembita registry-interaction system	1) Mriia educational platform 2) Diia.Education platform	1) Online registration of individual entrepreneurs and LLCs through the Diia portal 2) Diia.City legal regime	1) eCherha border queue system 2) Digital vehicle documents and car sales in Diia	1) Cloud technologies for state registers 2) eVorog chatbot 3) IT Army of Ukraine

Source: compiled by the author based on [8–14; 15–18; 20–23].

ence of national priorities and the specific features of social development. The Estonian model is based on the principles of interoperability of state information systems, digital identification, and integrated digital infrastructure, which ensures efficiency, transparency, and the continuity of public service delivery. The Singaporean model is oriented toward the strategic use of data, digital platforms, and artificial intelligence technologies as the basis for managerial decision-making and improving the effectiveness of public administration. The Ukrainian model, by contrast, is being formed under conditions of full-scale war and is characterized by the priority of ensuring the continuity of state institutions, accessibility of digital services, cyber resilience, and rapid adaptation to crisis challenges. Thus, in modern conditions, digital governance is not only an instrument for improving the effectiveness of public administration, but also a strategic mechanism for ensuring state resilience.

Digitalization of governance is one of the key factors in ensuring the economic resilience of the state under conditions of global instability. Digitalization of public services reduces the number of bureaucratic processes, lowers operational expenditures of resources and time, and increases the transparency of governmental processes. All of this allows citizens and businesses to receive public services continuously, regardless of external threats. The comparative analysis makes it possible to distinguish three models of digital transformation. The Estonian model is built on the principle of social digital trust, as demonstrated by the decentralized X-Road platform, digital identification, e-Residency and e-Cabinet services, which allow 99% of public services to be provided online and minimize state interference in administrative processes.

The Singaporean model demonstrates an approach of centralized technological coordination within the Digital Government Blueprint and GovTech Agency, where the key drivers are state investment in innovative start-ups, end-to-end IT education from school age, and the digitalization of critical infrastructure, in particular the seaport. The Ukrainian model is a unique example of highly adaptive and crisis-resilient digitalization under conditions of full-scale war. Built on the Diia ecosystem, the Trembita registry-interaction system, and the Mriia educational platform, it has proven the state's capacity to maintain the functionality of state institutions, ensure social services, and support business activity through the Diia.City legal regime even during continuous cyberattacks and the destruction of physical infrastructure. Synergy and exchange of experience among these countries, includ-

ing Estonia's adaptation of the Ukrainian Diia application in the form of the mRiik project and Ukraine's implementation of the Estonian X-Road architecture, confirm the effectiveness of international GovTech cooperation. To further strengthen Ukraine's economic resilience and institutional capacity, the priority areas for implementing international experience are harmonization of digital legislation with EU and NATO standards, transition to the Zero Trust cybersecurity concept following Singapore's example, expansion of digital entrepreneurship instruments based on Estonia's e-Residency model to attract foreign capital during post-war recovery, full digitalization of customs procedures, and the introduction of paperless government document management similar to e-Cabinet to accelerate decision-making and reduce budget expenditures. ■

BIBLIOGRAPHY

1. Міхровська М. С. Цифрове урядування як новий рівень взаємодії держави та суспільства. *Юридичний науковий електронний журнал*. 2020. № 7. URL: https://lsej.org.ua/7_2020/72.pdf
2. Канцур І. Г., Іванов Є. Ю. Майбутнє держави цифрове: як технології змінюють уряд. *Derzhavne upravlinnya udoskonalennya ta rozvytok*. 2024. № 12. DOI: <https://doi.org/10.32702/2307-2156.2024.12.17>
3. Жовток В., Філіпова Н. Актуальні проблеми та перспективи розвитку електронного урядування в Україні. *ЛОГОС. Мистецтво наукової думки*. 2020. № 9. С. 21–24. DOI: <https://doi.org/10.36074/2617-7064.09.004>
4. Khaustova V. Y., Kriachko Y. M., Bondarenko D. V. Evaluation of digitalization processes in the countries of the world and Ukraine according to world indices and rankings. *Business Inform*. 2024. Т. 9. № 560. С. 75–93. DOI: <https://doi.org/10.32983/2222-4459-2024-9-75-93>
5. Шевченко І. О. Механізми публічного управління для зміцнення економічної безпеки в умовах цифрової трансформації. *Український журнал прикладної економіки та техніки*. 2025. DOI: <https://doi.org/10.36887/2415-8453-2025-2-13>
6. Белова І., Ярощук О., Гомотюк А. Розвиток процесів цифровізації в Європейському Союзі: перспективний досвід для України. *Економічний аналіз*. 2023. Т. 33. № 1. С. 180–191. DOI: <https://doi.org/10.35774/econa2023.01.180>
7. Медведенко І. В. Електронне урядування: міжнародний досвід та перспективи для України. *Український економічний часопис*. 2024. № 6. С. 52–58. DOI: <https://doi.org/10.32782/2786-8273/2024-6-9>

8. Естонія: підприємницький ландшафт // kmbs. URL: <https://kmbs.ua/ua/article/estonia>
9. e-Estonia – We have built a digital society & we can show you how // e-Estonia. URL: https://e-estonia.com/wp-content/uploads/factsheet_e-governance.pdf
10. Why Estonia Is Europe's Digital Powerhouse: A Study in E-Governance Transformation // Frost & Sullivan Institute. URL: <https://frostandsullivaninstitute.org/why-estonia-is-europes-digital-powerhouse-a-study-in-e-governance-transformation/>
11. Україна, Велика Британія та Естонія розвиватимуть співпрацю у сфері цифрових технологій та інновацій // Міністерство цифрової трансформації України. URL: <https://thedigital.gov.ua/news/technologies/ukrayina-velyka-brytaniia-ta-estoniia-rozvyvatymut-spivpratsiu-u-sferi-tsyfrovyykh-tekhnohohiy-ta-innovatsiy>
12. Цифрове майбутнє: Україна та Естонія об'єдналися на Талліннському цифровому саміті – 2024 // EU4Digital. URL: <https://eufordigital.eu/uk/digital-futures-ukraine-and-estonia-unite-at-tallinn-2024/>
13. Цифрова Естонія: 12 онлайн-сервісів, які запроваджені в країні // Гал-Інфо. URL: https://galinfo.com.ua/news/tsyfrova_estoniya_12_onlaynservisiv_yaki_zaprovadzheni_v_kraini_321476
14. Що таке E-Residency в Естонії та як воно працює? // White and Partners. URL: <https://whiteandpartners/shho-take-e-residency-elektronne-rezydentstvo-v-estoniyi-ta-yak-vono-pracyuye/>
15. Smart way to identify yourself // Smart-ID. URL: <https://www.smart-id.com>
16. Avaleht // Partnerkaart. URL: <https://www.partnerkaart.ee/et/>
17. Avaleht // Terviseportaal. URL: <https://www.terviseportaal.ee/>
18. 5 найкраще оцифрованих країн // BBC News Україна. URL: <https://www.bbc.com/ukrainian/vert-tra-48832313>
19. Цифрова держава: алгоритм успіху від Сінгапуру // UASpectr. URL: <https://uaspectr.com/2020/12/21/algorytm-uspihu-vid-singapuru/>
20. Сінгапур стане першим у світі портом, в якому цифровізують постачання бункера на судна // Центр транспортних стратегій. URL: https://cfts.org.ua/news/2024/10/09/singapur_stane_pershim_u_sviti_portom_v_yakomu_tsifrovizuyut_postachannya_bunkera_na_sudna_80723
21. Global Digitalization Index (GDI) 2024 // Huawei. URL: <https://www.huawei.com/en/gdi>
22. World Digital Competitiveness Ranking 2025 // IMD Business School. URL: <https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/>
23. Україна стала п'ятою країною за рівнем надання цифрових державних послуг // AIN. URL: <https://ain.ua/2024/09/20/reiting-krayin-za-rivnem-rozvitku-elektronnogo-uriduvannia/>
24. Мрія: цифрова екосистема, що об'єднує українську освіту // Міністерство освіти і науки України. URL: <https://mon.gov.ua/news/mriia-tsyfrova-ekosistema-shcho-obiednuie-ukrainsku-osvitu>
25. Tsybmal L. Databank of global digitalization indices. KNEU, 2025. Zenodo. DOI: <https://doi.org/10.5281/zenodo.18105027>

REFERENCES

- AIN. (2024). Ukraina stala piatou krainoiu za rivnem nadannia tsyfrovyykh derzhavnykh posluh [Ukraine became the fifth country in terms of the level of digital public services provision]. <https://ain.ua/2024/09/20/reiting-krayin-za-rivnem-rozvitku-elektronnogo-uriduvannia/>
- BBC News Ukraina. 5 naikrashche otsyfrovanykh krain [5 best digitized countries]. <https://www.bbc.com/ukrainian/vert-tra-48832313>
- Belova I., Yaroshchuk O. & Homotiuk A. (2023). Rozvytok protsesiv tsyfrovizatsii v Yevropeiskomu Soiuzi: perspektyvnyi dosvid dlia Ukrainy [Development of digitalization processes in the European Union: promising experience for Ukraine]. *Ekonomichnyi analiz*, 1(33), 180–191. <https://doi.org/10.35774/econa2023.01.180>
- e-Estonia. e-Estonia – We have built a digital society & we can show you how. https://e-estonia.com/wp-content/uploads/factsheet_e-governance.pdf
- EU4Digital. (2024). Tsyfrova maibutnie: Ukraina ta Estoniia obiednalsia na Tallinnskomu tsyfrovomu samiti – 2024 [Digital Future: Ukraine and Estonia Unite at the Tallinn Digital Summit – 2024]. <https://eufordigital.eu/uk/digital-futures-ukraine-and-estonia-unite-at-tallinn-2024/>
- Frost & Sullivan Institute. Why Estonia Is Europe's Digital Powerhouse: A Study in E-Governance Transformation. <https://frostandsullivaninstitute.org/why-estonia-is-europes-digital-powerhouse-a-study-in-e-governance-transformation/>
- Hal-Info. Tsyfrova Estoniia: 12 onlain-servisiv, yaki zaprovadzheni v kraini [Digital Estonia: 12 online services introduced in the country]. https://galinfo.com.ua/news/tsyfrova_estoniya_12_onlaynservisiv_yaki_zaprovadzheni_v_kraini_321476
- Huawei. (2024). Global Digitalization Index (GDI) 2024. <https://www.huawei.com/en/gdi>
- IMD Business School. (2025). World Digital Competitiveness Ranking 2025. <https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/>
- Kantsur I. H. & Ivanov Ye. Yu. (2024). Maibutnie derzhavy tsyfrove: yak tekhnolohii zminiuiut uriad [The future of the state is digital: how technologies change the government]. *Derzhavne upravlinnya udoskonalennya ta rozvytok*, 12. <https://doi.org/10.32702/2307-2156.2024.12.17>

- Khaustova V. Y., Kriachko Y. M. & Bondarenko D. V. (2024). Evaluation of digitalization processes in the countries of the world and Ukraine according to world indices and rankings. *Business Inform*, 560(9), 75–93. <https://doi.org/10.32983/2222-4459-2024-9-75-93>
- kmbs. Estoniia: pidpriiemnytskyi landshaft [Estonia: entrepreneurial landscape]. <https://kmbs.ua/ua/article/estonia>
- Medvedenko I. V. (2024). Elektronne uriaduvannia: mizhnarodnyi dosvid ta perspektyvy dlia Ukrainy [Electronic governance: international experience and prospects for Ukraine]. *Ukrainskyi ekonomichnyi chasopys*, 6, 52–58. <https://doi.org/10.32782/2786-8273/2024-6-9>
- Mikhrovska M. S. (2020). Tsyfrovi uriaduvannia yak novy riven vzaïemodii derzhavy ta suspilstva [Digital governance as a new level of interaction between the state and society]. *Yurydychnyi naukovi elektronnyi zhurnal*. https://lsej.org.ua/7_2020/72.pdf
- Ministerstvo osvity i nauky Ukrainy. Mriia: tsyfrova ekosystema, shcho obiednuie ukrainsku osvitu [Mriya: a digital ecosystem uniting Ukrainian education]. <https://mon.gov.ua/news/mriia-tyfrova-ekosystema-shcho-obiednuie-ukrainsku-osvitu>
- Ministerstvo tsyfrovoy transformatsii Ukrainy. Ukraina, Velyka Brytaniia ta Estoniia rozvyvatymut spivpratsiu u sferi tsyfrovyykh tekhnolohii ta innovatsii [Ukraine, Great Britain and Estonia will develop cooperation in the field of digital technologies and innovations]. <https://thedigital.gov.ua/news/technologies/ukrayina-velyka-brytaniia-ta-estoniia-rozvyvatymut-spivpratsiu-u-sferi-tyfrovyykh-tekhnohii-ta-innovatsiy>
- Partnerkaart. Avaleht. <https://www.partnerkaart.ee/et/>
- Shevchenko I. O. (2025). Mekhanizmy publichnoho upravlinnia dlia zmitsnennia ekonomichnoi bezpeky v umovakh tsyfrovoy transformatsii [Public management mechanisms for strengthening economic security in the conditions of digital transformation]. *Ukrainskyi zhurnal prykladnoi ekonomiky ta tekhniky*. <https://doi.org/10.36887/2415-8453-2025-2-13>
- Smart-ID. Smart way to identify yourself. <https://www.smart-id.com>
- Terviseportaal. Avaleht. <https://www.terviseportaal.ee/>
- Tsentr transportnykh stratehii. (2024). Sinhapur stane pershym u sviti portom, v yakomu tsyfrovizuiut postachannia bunkera na sudna [Singapore will become the first port in the world to digitalize bunker supply to ships]. https://cfts.org.ua/news/2024/10/09/singapur_stane_pershim_u_sviti_portom_v_yakomu_tsifrovizuyut_postachannya_bunkera_na_sudna_80723
- Tsymbal L. (2025). Databank of global digitalization indices. *KNEU*. <https://doi.org/10.5281/zenodo.18105027>
- UAspectr. (2020). Tsyfrova derzhava: alhorytm uspihu vid Sinhapuru [Digital state: success algorithm from Singapore]. <https://uaspectr.com/2020/12/21/alhorytm-uspihu-vid-singapuru/>
- White and Partners. Shcho take E-Residency v Estonii ta yak vono pratsiuie? [What is E-Residency in Estonia and how does it work?]. <https://whiteand.partners/shho-take-e-residency-elektronne-rezydentstvo-v-estoniyi-ta-yak-vono-pracyuye/>
- Zhovtok V. & Filipova N. (2020). Aktualni problemy ta perspektyvy rozvytku elektronnoho uriaduvannia v Ukraini [Actual problems and prospects of electronic governance development in Ukraine]. *ΛΟΗΟΣ. Mystetstvo naukovoï dumky*, 9, 21–24. <https://doi.org/10.36074/2617-7064.09.004>

Дослідження не отримувало зовнішнього фінансування.
Автор заявляє про відсутність конфлікту інтересів.
Інструменти ШІ у підготовці цієї роботи не використовувалися.

Стаття надійшла до редакції / Received: 23.07.2026
Статтю прийнято до публікації / Accepted: 12.08.2026
Оприлюднено / Published: 08.10.2026