UDC 351.8:004.738(477):316.774.4
DOI https://doi.org/10.32782/tnv-pub.2024.3.3

ANALYZING THE UKRAINIAN'S GOVERNANCE OF THE DIGITAL ECONOMY: TRUST, REGULATION AND DIGITAL INEQUALITY

Ivanova N. S. *– Grand PhD in Economic Sciences,*
Associate Professor of the Kherson State Agrarian and Economic University
ORCID: 0000-0002-5010-2668

This study investigates the governance of the digital economy in Ukraine based on an analysis of the Governance subindex of the Network Readiness Index (NRI). The study employed a combination of methods, including bibliometric analysis, comparative and retrospective analyses, and profile building methods. Data from the Web of Science (WoS) Core Collection were processed using the R software package bibliometrix, along with the Network Readiness Index database.

These findings underscore the complexity and significance of trust, regulation, and inclusion in the context of digital technology development. According to the 2023 rankings, Ukraine holds the 58th position out of 134 countries. Ukraine ranks 78th in the government's role in promoting participation in the networked economy, 54th in trust envirofavourability, and 60th in digital inequality. A detailed analysis of governance metrics (trust, regulation, and inclusion) identified significant gaps hindering Ukraine's digital economy development: inequality in rural access to and adoption of digital technologies; inadequate adaptation of Internet content and services to local needs; insufficient quality, relevance, and utility of government websites; imperfect legal frameworks for user data privacy protection; and low commitment to cybersecurity. Therefore, there is a critical need for further enhancement of the regulatory environment to foster digital development, address digital inequalities, and increase trust in digital technologies in Ukraine.

This article provides a deep understanding of the current challenges and opportunities in managing the digital economy in Ukraine, which is pertinent to both academic research and practical applications.

Key words: *digital economy, governance of the digital economy, Network Readiness Index (NRI), trust in digital technologies, digital inequalities, cybersecurity, regulation of digital technologies, inclusion in digital space.*

Іванова Н. С. Аналіз управління цифровою економікою України: довіра, регулювання та цифрова нерівність

У статті досліджено рівень управління цифровою економікою в Україні на основі аналізу субіндексу Governance індексу Network Readiness Index (NRI). Для цього використовувалася комбінація методів, таких як бібліометричний аналіз, порівняльний та ретроспективний аналізи, метод побудови профілів. Дослідження проведено за базою даних Web of Science (WoS) Core Collection, обробка яких виконувалася за допомогою R-пакету програмного забезпечення bibliometrix, та базою даних розрахунку Network Readiness Index.

Представлене в статті дослідження управління цифровою економікою в Україні, проведене на основі аналізу субіндексу Governance індексу Network Readiness Index (NRI), підтверджує складність та важливість аспектів довіри, регулювання та інклюзії в контексті розвитку цифрових технологій. За результатами 2023 року Україна займає 58 місце серед 134 країн. При цьому за виміром ролі уряду у сприянні участі в мережевій економіці Україна займає лише 78 позицію; за рівнем сприятливості середовища довірі – 54 місце; за рівнем цифрової нерівності – 60 місце. Детальний аналіз управління за його вимірниками (довіра, регулювання та інклюзія) дозволили виокремити низьку прогалин, які гальмують розвиток мережевої економіки України: нерівність сільського населенням відносно здійснення або отримання цифрових; недостатній рівень адоптації Інтернет-контенту та послуг до потреб місцевого населення; недостатня якість, релевантність та корисність державних веб-сайтів; недостатній рівень адаптивності правової бази до новітніх технологій; недосконалі юридичні рамки для захисту конфіденційності користувачів Інтернету та їх даних; низький рівень зобов'язання з кібербезпеки. Отже, існує необхідність подальшого удосконалення регуляторного середовища для сприяння цифровому розвитку, вирішення проблем цифрових нерівностей та підвищення рівня довіри до цифрових технологій в Україні.

Стаття дозволяє отримати глибоке розуміння сучасних викликів та можливостей управління цифровою економікою в Україні, що є актуальним для академічних та практичних досліджень.

Ключові слова: *цифрова економіка, управління цифровою економікою, Network Readiness Index (NRI), довіра до цифрових технологій, цифрові нерівності, кібербезпека, регулювання цифрових технологій, інклюзія в цифровому просторі.*

Problem statement. Digital technologies are rapidly developing and penetrating all spheres of economic systems. The shift to remote work caused by the COVID-19 quarantine restrictions and Russia's full-scale war against Ukraine contributed significantly to this process. The question arises as to how this process should be controlled and what governance is necessary. It is worth noting that digitalisation processes are becoming more diverse and irreversible. Therefore, it is extremely important to understand how this tool can be used effectively.

There is a need to determine the level of trust in the elements of the digital economy in order to identify the factors influencing the formation of this trust and to investigate the level of regulation of these processes and the presence of digital inequality.

Analysis of studies and publications. The results of the bibliometric analysis of the Web of Science database confirm the growing interest in academia regarding the digital economy and its management. For the period 1998–2023 769 scientific documents have been published in the Web of Science scientometric database, with an average annual growth rate (Annual Growth Rate) of 24.63 % (Fig. 1).

The most cited paper [4] focused specifically on the study of digital surge scenarios and problems. In it R. De', N. Pandey and Pal discuss some of the most pressing issues of the digital surge in the post-pandemic period: increasing digitalisation, work-from-home and gig workers, workplace monitoring and technostress, online fraud, Internet access and digital divide, Internet governance: net neutrality and zero-rating, Internet governance: shutdowns, digital money, surveillance, and privacy.

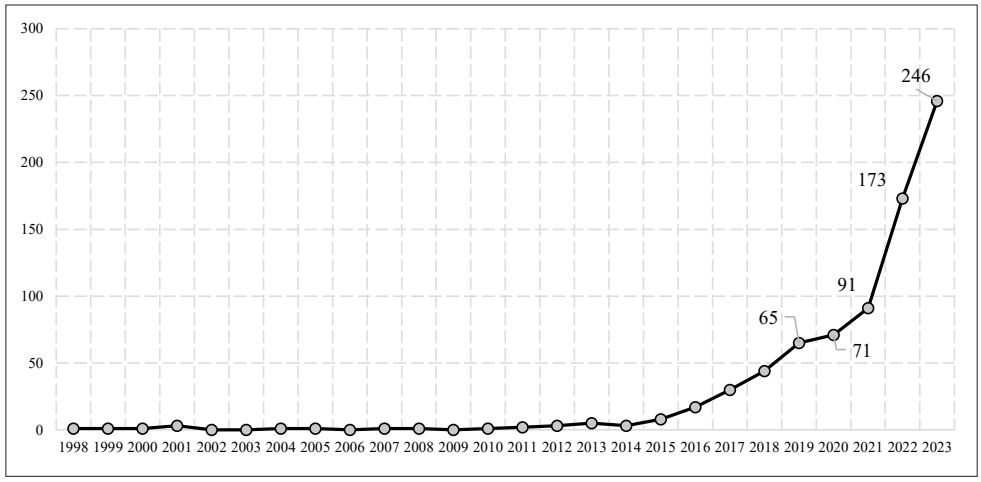


Fig. 1. Annual Scientific Production in the direction of "Governance of the Digital Economy" in the scientometric database WoS (1998–2023)

Source: authors' development via Biblioshiny app ([1–3])

J. Sadowski focuses on data as capital, because one of the striking consequences of digitalization processes is the creation and accumulation of a large amount of data. In his research, [5] he analyzes the way data are collected and distributed as capital and viewed by governments and firms as capital.

S. Vallas and J. B. Schor [6] define platforms as a distinct type of governance mechanism, distinct from markets, hierarchies, or products, and so they represent a unique set of challenges for regulators, workers, and their competitors in a conventional economy. The concept of platforming is devoted to the work of Poell T., Nieborg D. and van Dijck J. [7], which define platforming as the penetration of infrastructures, economic processes and governmental structures of digital platforms into various sectors of the economy and spheres of life, as well as the reorganization of cultural practices and perceptions around these platforms.

The results of the analysis of research and publications allowed us to determine the centres of research on the governance of the digital economy: blockchain (including blockchain technology), datafication, digital (digital finance, digital platforms, digital technology, digital transformation), economic development, entrepreneurship, gender, information security, information technology, and media (including mediating effect).

The present research is based on analytical materials about the Network Readiness Index (NRI), created by a group of scientists from the Portulans Institute and Saïd Business School, University of Oxford. The NRI is presented as a key metric for assessing digital trends and understanding the evolution of online trust in this networked era [8]. Despite the in-depth analysis of the digital trends of 134 countries presented in the reports for certain periods, we decided to study in more detail the retrospective analysis of the Governance subindex (Ukraine), which allows us to assess the structure of the network economy, which strengthens the entire network and ensures the safety of its users.

The aim of this article is to analyse the Ukrainian aspect of the governance sub-index within the Network Readiness Index (NRI).

Presentation of the main research material. Today, entities in a networked economy are surrounded by numerous digital technologies. The pace at which new digital solutions emerge is astounding, with technology companies competing with one another for dominance in the digital technology market. These trends offer numerous advantages to all participants in the process: users, producers, the general public, businesses, and the state. However, a certain turning point is approaching, marked by a transition from control to lack of control, from trust to doubt, and even suspicion, leading to and exacerbating gaps in digital awareness and provision.

The Ukrainian aspects of trust, regulation, and inclusion in the digital economy have been investigated based on data from NRI studies [8] for the period 2019–2023.

The NRI is defined as the degree of readiness of countries to participate in a networked world [9], consisting of four sub-indexes that collectively measure the impact of ICT on the development of countries in various aspects. The NRI ranking reflects the overall level of readiness in different countries. The main NRI sub-indices include technology, people, governance, and impact, each of which has a number of components.

An indicator that comprehensively describes the components that strengthen a holistic network, ensuring the safety of its users is the Governance subindex, which is an integral part of the NRI. The Governance sub-index emphasises the creation and accessibility of structures that stimulate the development of a networked economy in three dimensions: trust, regulation, and inclusion (Table 1, Fig. 2).

Table 1

Triad of Governance Subindex Constituents

Dimensions	Description	Criteria
1. Trust	assesses the state of security for individuals and corporations in the aspect of the networked economy, emphasizing a favorable environment of trust	1) Secure Internet servers 2) Cybersecurity 3) Online access to financial account 4) Internet shopping
2. Regulation	assesses the role of government in promoting participation in the networked economy through regulatory measures, strategies and foresight	1) Regulatory quality 2) ICT regulatory environment 3) Regulation of emerging technologies 4) E-commerce legislation 5) Privacy protection by law content
3. Inclusion	assesses digital gaps in relation to gender, disability and economic background	1) E-Participation 2) Socioeconomic gap in use of digital payments 3) Availability of local online content 4) Gender gap in Internet use 5) Rural gap in use of digital payments

Source: compiled by the author according to [8]

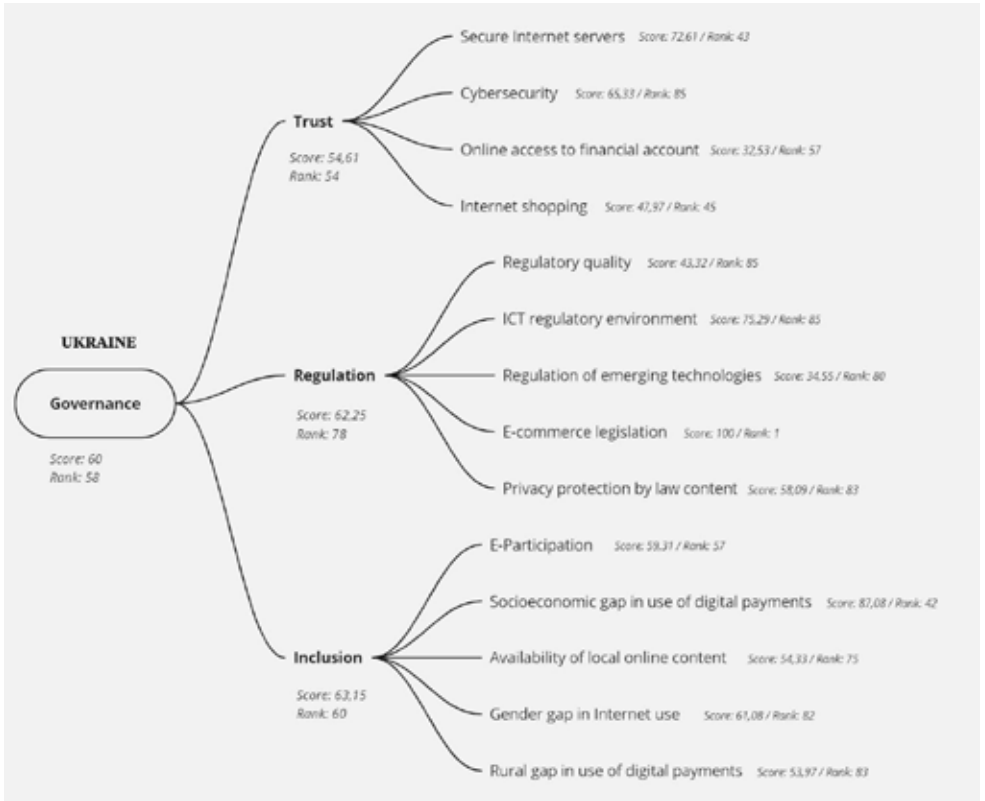


Fig. 2. The Governance subindex of Ukraine according to the 2023 assessment

Source: constructed by the author based on data from [10; 11]

Figure 2 presents the results of the calculation of Ukraine's Governance subindex based on 2023 data [11] across its components. According to the 2023 results, Ukraine ranked 58th (60 points) out of the 134 economies. In terms of the role of the government in facilitating participation in the networked economy (Regulation), Ukraine ranked only 78th (62.25). The level of trust environment (Trust) ranks 54th (54.61 points), and in terms of digital inequality (Inclusion), it ranks 60th (63.15 points). Thus, it can be concluded that Ukraine, relative to some other countries, has a poorer status concerning regulatory measures, strategies, and forecasts for the networked economy, as it occupies a position below the median despite having a relatively high score in the Regulation dimension.

According to the 2023 results, Finland is the leader in the Governance subindex (Fig. 3).

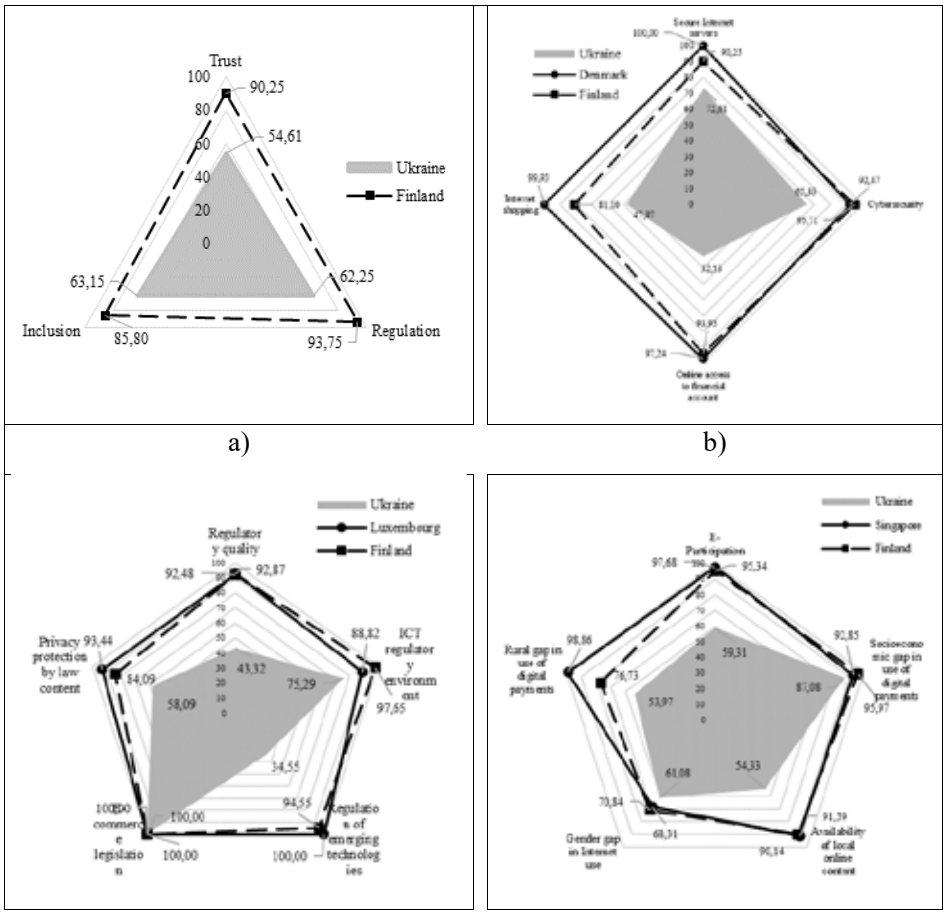


Fig. 3. Profiles of Ukraine and leading countries in the Governance subindex and its dimensions (3a – the Governance subindex; 3b – Trust; 3c – Regulation; 3d – Inclusion), 2023

Source: constructed by the author based on data from [10]

In the Trust dimension, the leader is Denmark (Fig. 3b), which has the highest scores in the respective criteria: Secure Internet servers (100 points versus Ukraine's 72.61 points), Cybersecurity (92.47 points versus Ukraine's 65.33 points), Online access to financial accounts (97.24 points versus Ukraine's 32.53 points), and Internet shopping (99.93 points versus Ukraine's 47.97 points).

In the Regulation dimension, Luxembourg is the leader (Fig. 3c), demonstrating the highest scores across various criteria: Regulatory quality (92.87 points compared to Ukraine's 43.32 points), ICT regulatory environment (88.82 points compared to Ukraine's 75.29 points), Regulation of emerging technologies (100 points compared to Ukraine's 34.55 points), E-commerce legislation (both countries scored 100 points), and Privacy protection by law content (93.44 points compared to Ukraine's 58.09 points). Weak areas for Ukraine in the Regulation dimension include Regulatory quality, which reflects the government's ability to formulate and implement effective policies and rules that facilitate private sector development [12]. Extremely low scores were recorded for the Regulation of emerging technologies criterion, which assesses the legal framework's adaptability to emerging technologies such as artificial intelligence, robotics, app- and web-enabled markets, big data analytics, and cloud computing. Privacy protection by law content evaluates existing legal frameworks for protecting Internet users' confidentiality and data, where Ukraine also shows a limited level of development. It is important to note the maximum possible score for the E-commerce legislation criterion, which indicates the legislative support level for e-commerce and adoption of relevant legislation [12].

In the Inclusion dimension, Singapore leads (Fig. 3d), demonstrating the highest scores across various criteria: E-Participation (97.68 points compared to Ukraine's 59.31 points), Socioeconomic gap in use of digital payments (92.85 points compared to Ukraine's 87.08 points), Availability of local online content (91.59 points compared to Ukraine's 54.33 points), Gender gap in Internet use (68.31 points compared to Ukraine's 61.08 points), and Rural gap in use of digital payments (98.86 points compared to Ukraine's 53.97 points). This confirms the existence of digital divides in Ukraine, including:

– disparity between the rural population and the overall population in terms of engaging in or receiving digital payments last year;
– insufficient adaptation of Internet content and services to local needs;
– low quality, relevance, and usefulness of government websites, where usefulness is defined as the ability of a website to provide citizens with online information, tools, and participation services [12].

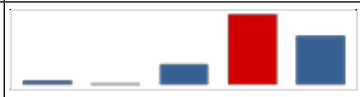
From 2019-2023, Ukraine has gradually strengthened the integrity of its network, ensuring the security of its users (Table 2).

Thus, the best positions in Ukraine's Governance subindex were recorded in 2021–2022, ranking 57th. In 2023, there was a decrease by one position to 58th place. Despite previous conclusions about the insufficient level of the Inclusion dimension and the presence of digital divide issues in Ukraine, the data in Table 2 indicate good dynamics and improvements in addressing problems related to various inequalities. According to the dynamics of this dimension, Ukraine in 2022–2023 has the best positions for the entire study period.

There is a deterioration in Ukraine's positions in the Regulation dimension; the worst value was recorded in 2022, at 84th place (out of 134 economies). This coincides with the emergence and increased use of new technologies such as artificial intelligence, robotics, and big data analytics. It can be argued that there is a lack of legal framework for emerging technologies and a weak governmental response to their development and implementation.

Table 2

Dynamics of the Governance subindex and its dimensions (positive trend: increase in score; decrease in rank) in Ukraine for 2019–2023

Dimensions	Metric	2019	2020	2021	2022	2023	Dynamics
Governance	score	58,32	58,19	58,93	60,81	60	
	rank	67	58	57	57	58	
Inclusion	score	60,69	62,42	62,19	67,7	63,15	
	rank	70	72	65	60	60	
Regulation	score	61,26	61,48	65,02	60,03	62,25	
	rank	72	83	61	84	78	
Trust	score	53,00	50,66	49,57	54,7	54,61	
	rank	70	49	55	54	54	

Despite gaps in regulatory policy and inclusion of the network economy, the value of the Trust dimension is improving, albeit slowly. A turning point occurred in 2020 when Ukraine improved its position relative to the previous period by 21 points. This trend can be explained by the increase in the proportion of individuals using a mobile phone or the Internet to access a financial institution account (criterion: Online access to financial account) and the proportion of individuals using the Internet to purchase something online (criterion: Internet shopping). The highest values were recorded during the quarantine restrictions caused by the COVID-19 pandemic. However, the value of Trust is hampered by a low level of commitment to cybersecurity; according to 2023 data, Ukraine ranks 85th in the Cybersecurity criterion.

Conclusions. Networked societies operate with trust in information, communication, and relevant digital media and technologies. Recent studies indicate an increasing rate of trust erosion, which potentially constitutes a fundamental crisis for networked societies including Ukraine. This is driven by various factors, such as disinformation campaigns, advancements in surveillance technologies (including the widespread use of mobile phones), the emergence of “deepfakes”, and the rapid growth of artificial intelligence and Large Language Models, such as ChatGPT.

Research on digital economy governance in Ukraine, conducted based on the analysis of the Governance sub-index of the Network Readiness Index (NRI), confirms the complexity and importance of trust, regulation, and inclusion aspects in the context of digital technology development.

The results of this study are as follows.

– Ukraine ranks 54th in trust levels in a networked economy according to the 2023 data. Insufficient server security and cybersecurity are major challenges. Measures to enhance cybersecurity are required to increase trust in the digital space.

– In terms of digital technology regulation, Ukraine ranks 78th. The low adaptability of the legal framework to emerging technologies (artificial intelligence, robotics, markets accessible via applications and the Web, big data analytics, and cloud computing) and data confidentiality protection limits the development of the digital economy.

– Inclusion indicators in Ukraine highlight the existing digital divides, particularly between urban and rural populations, as well as access to digital payments and content. Promoting broader access to digital technologies across all segments of the population remains critical.

While Ukraine has demonstrated some progress in implementing digital technologies and improving digital governance infrastructure, significant challenges require immediate attention. Improvements in cybersecurity, the regulatory environment, and inclusion are crucial for further development of the networked economy in Ukraine. Achieving these goals requires systematic legislative reform and increased public awareness of cybersecurity in the digital realm.

REFERENCES:

1. Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11* (4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007 [in English].

2. R Core Team (2014). R: A language and environment for statistical computing. R foundation for statistical computing, Vienna, Austria. Retrieved from http://www.R-project.org/ [in English]

3. RStudio Team (2020). RStudio: Integrated development for R. RStudio, PBC, Boston, MA. Retrieved from http://www.rstudio.com/ [in English].

4. De', R., Pandey, N., & Pal, A. (2020). Impact of digital surge during Covid-19 pandemic: A viewpoint on research and practice. *International journal of information management*, 55, 102171. https://doi.org/10.1016/j.ijinfomgt.2020.102171 [in English]

5. Sadowski, J. (2019). When data is capital: Datafication, accumulation, and extraction. *Big Data & Society*, 6 (1). https://doi.org/10.1177/2053951718820549 [in English]

6. Vallas, S.P., & Schor, J.B. (2020). What Do Platforms Do? Understanding the Gig Economy. *Annual Review of Sociology*, Vol. 46, pp. 273–294. https://doi.org/10.1146/annurev-soc-121919-054857 [in English].

7. Poell, T., Nieborg, D., & van Dijck, J. (2019). Platformisation. *Internet Policy Review*, 8 (4). https://doi.org/10.14763/2019.4.1425 [in English].

8. Network Readiness Index. (n.d.). URL: https://networkreadinessindex.org/

9. Kirkman SG, Osorio AC and Sachs DJ (2002) The Networked Readiness Index: Measuring the preparedness of nations for the networked world. In Kirkman (ed.) *The Global Information Technology Report 2001–2002 Readiness for the networked world*. New York, Oxford University Press, pp. 10–29. [in English].

10. Dutta, S., & Lanvin, B. (eds.) (2023). The Network Readiness Index 2023: Trust in a Network Society: A crisis of the digital age? Washington DC: Portulans Institute. URL: https://networkreadinessindex.org [in English].

11. NRI: Country Profile. Ukraine. URL: https://networkreadinessindex.org/country/ukraine/

12. World Bank. (n.d.). *Worldwide Governance Indicators*. World Bank. URL: https://databank.worldbank.org/metadataglossary/worldwide-governance-indicators/series/RQ.PER.RNK.LOWER

13. United Nations Department of Economic and Social Affairs (UNDESA). *UN E-Government Knowledgebase*. URL: https://publicadministration.un.org/egovkb/en-us/About/Overview/E-Participation-Index