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Resilience of public administration in the Bucharest Nine Countries and Ukraine

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Abstract: Ensuring the resilience of public administration is a critical challenge in the face of external shocks and internal transformations. Despite numerous studies on governance resilience, no unified quantitative approach exists, thus limiting cross-country comparisons. This study addresses this gap by developing and applying a Public Administration Resilience Index (PARI) - an integrative composite indicator that combines the Institutional Resilience Index and the Functional & Digital Resilience Index. The proposed framework captures both the structural integrity of governance institutions and their adaptive digital capacities, allowing for a multidimensional evaluation of public administration performance under stress. Using cross-country data for the Bucharest Nine countries and Ukraine in 2024, the analysis reveals high resilience levels in Estonia, Latvia, Lithuania, Poland, Slovakia, and Czechia, sufficient resilience in Hungary, Romania, and Bulgaria, and a medium level in Ukraine, driven by digital progress but weakened institutional foundations. Methodologically, the PARI index advances resilience research by offering a transparent, scalable, and comparable tool for cross-national assessment. From a policy perspective, the results highlight Ukraine's need to prioritize institutional reform, anti-corruption measures, and human capital development alongside continued digitalization to enhance its governance resilience and align with Euro-Atlantic standards.

Keywords: public administration, institutional resilience, digital governance, Ukraine, Bucharest Nine

Introduction

In the context of global instability, the European Commission and NATO consider the resilience of public administration as an integral part of infrastructure resilience, since it is effective state institutions that ensure the continuity of management processes, the protection of critical infrastructure and the coordination of actions in crisis situations. In this context, the Bucharest Nine (B9) countries, which are both members of the EU and NATO, have expertise in the process of compliance with the European and Euro-Atlantic standards, while Ukraine seeks to join these unions by strengthening its own institutional capacity. In 2016, at the

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Warsaw Summit, NATO identified seven basic requirements for national resilience, among which special attention is paid to the protection of critical infrastructure, ensuring the continuity of government and administrative processes, the resilience of energy systems, the security of the civilian population and the ability to conduct strategic communications. For NATO, it is important that public administration remains functional even in the event of cyberattacks, sabotage, large-scale man-made disasters or military actions, because it is the ability of state institutions to make decisions, coordinate actions with allies and provide basic public services, which determines the level of trust of citizens and the effectiveness of collective defence. The Alliance notes that resilient public administration is the foundation for interaction between civil and military structures, the rapid deployment of NATO forces on the territory of member countries and partners, as well as the key to preventing destabilization that adversaries can cause through hybrid operations. That is why NATO views public administration not only as an internal matter of the state, but also as part of a broader security architecture that requires systemic reforms, cyber defence, transparency, digitalization and integration with Alliance standards.

The relevance of the study of public administration resilience in the B9 countries and Ukraine is due to the need to find effective tools for assessing the ability of state institutions to withstand multidimensional crises and adapt to new conditions in the context of Russian military aggression, hybrid threats, cyberattacks, disinformation campaigns, economic turbulence and social challenges. For the B9 countries that form the eastern flank of NATO and the EU, as well as for Ukraine, which is fighting for its own statehood and integration into the European space, it is critically important to have an objective methodology for quantitatively assessing the resilience of public administration, which allows not only to determine the level of preparedness of management systems for crises, but also to compare indicators between countries and identify strengths and weaknesses of institutional development. As there is no unified methodology to assess the level of the resilience of public administration in the current economic literature, this study combines institutional and digital capacity indicators and indexes into one measurable composite index to assess the thresholds and formulate the resilience level of B9 countries and Ukraine.

The structure of the article is as follows: first, the methodology for calculating the level of public administration resilience is presented; then, the calculation and analysis of the Institutional Resilience Index of Public Administration is carried out; this is followed by the calculation and analysis of the Functional & Digital Resilience Index of Public Administration; finally, the Public Administration Resilience Index is assessed and the conclusions of the study are summarized.

1. Literature review

Public administration resilience is often viewed from the prism of maintaining a stable work performance even in turbulent times. The shocks of recent years, especially the 2008-09 financial crisis, the COVID-19 pandemic, large-scale refugee movements, inflation rates growth as the result of ongoing conflict in Ukraine have put the capacities of local and national authorities to the test. These turbulences have exposed critical gaps in institutional preparedness across European Union multi-level governance structures (Gonçalves et al., 2025).

The concept of resilience, initially accepted in the works of physics, has been adopted to the social science and psychology, and defined as an individual's or system's potential to withstand adversity, adapt, or undergo necessary change when confronting stressful or traumatic situations (Baggio et al., 2015). For public administration, this concept shifts focus to the institutional capacity required to manage the unforeseen and cope with constant changes while successfully ensuring citizens' well-being as public institutions are increasingly tested by a range of shocks and stressors, including political instability, economic crises, environmental disasters, and climate change (Profiroiu & Nastacă, 2021).

To operationalize institutional resilience, frameworks often align capacity measurement with four critical phases: Anticipation (foreseeing risks), Absorption (withstanding the immediate shock), Adaptation (adjusting procedures post-shock), and Transformation (fundamental, long-term change). The criteria of assessing any system resilience relies on the need to form an integrated capacity measurement, moving past assessments focused on single sectors or rigid institutional structures (Cardona et al., 2012) that was set as a cornerstone of current study.

Public administration or institutional resilience has been mostly described in two main ways: as the ability of an organization to recover and return to its pre-crisis state of stability (Balu, 2001; Rudolph & Repenning, 2002; Dutton et al., 2002; Gittell et al., 2006; Gunter, 2019) or as the capacity to move forward from crises and achieve even greater success than before (Freeman et al., 2004; Jamrog et al., 2006; Zhang et al., 2018; Gerasymenko et al., 2022; Shkuropadska et al., 2024). Another perspective highlights resilience as an organization's ability to foster a supportive environment that enables employees to strengthen their own resilience (Ledesma, 2014).

Bruneckiene et al. (2018), state that a system enhances its resilience by absorbing shocks and adapting to new circumstances through varying degrees of change, with the reactions of its components collectively shaping the overall level of resilience.

Public administration resilience can be understood as the capacity of institutions that are traditionally rigid in nature, to find tools to cope with unpredictability, absorb constant change, and embrace innovation while continuing to provide quality services to citizens (Profiroiu & Nastacă, 2021).

The OECD and other studies cite the public administration sector's need to become more resilient after the Covid-19 pandemic OECD (2023); Horák & Špaček, (2024); Zumbrunn (2023); Casalegno et al. (2023).

The local public administration's institutions find it more complex to build resilience, as because of constraints in budget, politics, manpower, laws, and other regulations. (Profiroiu & Nastacă, 2023).

Public sector resilience is inherently multi-dimensional, extending beyond physical infrastructure and emergency procedures. The necessary characteristic qualities of resilient infrastructure and systems span four interconnected areas: Technical, Organizational, Social, and Economic dimensions (U.S. Department of Homeland Security, 2018). Resilient and inclusive public financial management systems are fundamental stabilizing factors for public administration, significantly improving a government's capacity to manage disaster-related fiscal risks and sustain essential functions following a shock (World Bank., n.d.).

To enhance functional and digital robustness, forward-thinking agencies are embracing digital modernization. This strategy involves substantial investment in cloud-based systems, automation, and integrated data platforms designed to support faster decision-making and enhance operational agility (Tyler Technologies, n.d.).

Beyond structural and functional components, the underlying quality of governance determines the inherent resilience capacity of public administration. Certain "governance super-factors" have been identified as having a powerful positive impact, including the effective control of corruption, the presence of high-quality political leadership, and high levels of societal trust in public institutions (Chandler Good Government Index, n.d.). The resilience of public administration is manifested through the institutional capacity to make quick decisions, the ability to adapt public administration to uncertainty, and the level of citizens' trust in government structures (Boiko et al., 2022).

Despite the extensive scientific and applied research on the resilience of public administration, there is still no unified methodology for its quantitative measurement, which limits the possibilities for cross-country comparative analysis. Therefore, the aim of this study is to substantiate a methodology for calculating the Public Administration Resilience Index (PARI) and to test it using the example of the Bucharest Nine countries and Ukraine. The proposed methodology will contribute to the development of scientifically grounded recommendations for strengthening state institutions, enhancing their capacity to function effectively under external pressures and internal transformations, and will also help Ukraine to draw on the experience of its Bucharest Nine partners to accelerate the modernization of its public administration system.

2. Methodology for calculating the level of public administration resilience

The methodology has been developed to assess the ability of the public administration system to withstand internal and external challenges; to measure the resilience level of state institutions in crisis situations; and to identify the strengths and weaknesses of the functioning of the public administration system. The methodology defines the list of key indicators, their threshold values, as well as the algorithm for calculating the Public Administration Resilience Index (PARI). The list of indicators is formed on the basis of selecting those measures that most fully characterize the resilience of a country's public administration system in the following dimensions:

- *Institutional resilience of public administration* – the ability of the system of state institutions to ensure stability, legitimacy, and effectiveness of governance processes under political, social, and security challenges.
- *Functional and digital resilience of public administration* – the ability of public institutions to ensure the continuous performance of governance functions through the use of digital technologies and the protection of information systems under crisis conditions.

The assessment of the resilience level of a country's public administration is carried out in the following sequence:

- Formation of the list of indicators;
- Determination of threshold values of indicators;
- Calculation of the Institutional Resilience Index (IRI) and the Functional & Digital Resilience Index (FDRI);
- Calculation of the Public Administration Resilience Index (PARI).

The study employs a binary evaluation system and equal weighting coefficients, as the main goal is to develop a comparative analytical tool that enables the assessment of the degree to which public administration systems meet the basic criteria of institutional and functional resilience.

The choice of values (1 or 0) was based on the principle of average compliance of an indicator with a given standard (threshold value), which is consistent with the approaches recommended by the OECD (OECD/European Union/EC-JRC, 2008).

The list of indicators and sources of input data, the thresholds for the components of public administration resilience is presented in Table 1 (A1). The calculation of the Public Administration Resilience Index is based on the assessment of 16 indicators derived from statistical data.

The formation of the list of indicators is based on the principles of representativeness (inclusion of the most significant indicators determining the resilience level of public administration) and reliability and availability of data (official statistical data are used for calculations). Each indicator has a threshold value defined by the respective international organization that calculates it. If an

indicator meets its threshold value, it is considered positive; if it does not, it is considered negative.

After completing the indicator dataset, the Institutional Resilience Index (IRI) and the Functional & Digital Resilience Index (FDRI) are calculated using the following formulas:

$$\text{IRI} = \frac{\sum_{i=1}^{8} I_i}{8} \times 100\% \quad (1)$$

$$FDRI = \frac{\sum_{i=1}^{8} I_i}{8} \times 100\% \quad (2)$$

where Ii=1 if the indicator meets the threshold value, and Ii=0 if it does not.

The *Public Administration Resilience Index (PARI)* is then calculated as the weighted sum of the two sub-indices:

$$PARI = w_1 \cdot IRI + w_2 \cdot FDRI \quad (3),$$

where w1,w2 are the weights (by default equal: w1=w2=0.5).

Then, the index values are estimated according to their thresholds and the resilience level evaluated according to Table 1.

Table 1. The levels of Institutional Resilience Index (IRI) and Functional & Digital Resilience Index (FDRI)

№	Measurement, %	Quantity of indicators with a positive value	Levels
1.	86–100	7-8	high level
2.	66–85	6	sufficient level
3.	45–65	4-5	medium level
4.	26–44	3	moderate level
5.	1–25	1-2	low level

Source: authors' representation

The system of quantitative and qualitative levels of public administration resilience for a country is presented in Table 2.

Table 2. Levels of Public Administration Resilience Index (PARI)

№	Measurement, %	Quantity of indicators meeting the threshold	Levels
1.	86–100	14-16	high level
2.	66–85	11-13	sufficient level
3.	45–65	8-10	medium level
4.	26–44	5-7	moderate level
5.	1–25	1-4	low level

Source: authors' representation

The level of resilience of public administration determines the degree of ability of state bodies to maintain effective functioning, ensure the continuity of public service provision, and adapt to external and internal challenges, including crisis situations.

3. Calculation and analysis of the Institutional Resilience Index (IRI) of public administration

The need to measure and analyse the institutional resilience of public administration is explained by several key arguments. First, it is to ensure the continuity of management. In crisis conditions, it is institutional resilience that determines whether the public administration system will be able to perform its functions without failures. Measurement makes it possible to identify weaknesses and prepare for possible challenges. Second, it is an assessment of the effectiveness of public policy. The analysis allows to determine the extent to which public institutions are able to implement political decisions, provide quality services and maintain the trust of citizens even in conditions of instability. Third, it is to determine the level of readiness for crises. Monitoring shows the extent to which authorities have clear response mechanisms to support management processes in crisis situations.

Therefore, measuring institutional resilience is a tool not only for control and evaluation, but also for management, which makes it possible to make public administration more reliable, adaptive and strategically oriented. The calculated Institutional Resilience Index (IRI) of the Bucharest nine and Ukraine in 2024 is given in Table 3.

The Rule of Law Index (RLI) analysis is an important tool for assessing the institutional resilience of public administration, since it is the foundation of the legitimacy of state institutions. Stable institutions are formed only if the authorities act within the law, ensure respect for human rights and avoid abuse. One of the key aspects is the ability of the judicial system to be independent, fair and accessible, because without effective justice, public administration cannot guarantee stability and predictability of administrative processes. In addition, the use of the RLI allows for international comparisons, which is important for determining Ukraine's progress in the field of reforms and integration into the EU. It is significant to note that all the Bucharest Nine countries have positive values according to this index, with the range from 0.51 to 0.82. Ukraine, on the contrary, has the value of this indicator at 0.49, which is below the threshold value of 0.5. Although this gap is insignificant, it is fundamentally important, as it fixes Ukraine's position below the minimum level accepted in international assessments.

Table 3. Indicators of Institutional Resilience Index (IRI) of the B9 and Ukraine in 2024

Indicators	Threshold	BG	EE	LV	LT	PL	RO	SK	HU	CZ	UA
Rule of Law Index	≥ 0.5	0.56	0.82	0.73	0.77	0.66	0.62	0.66	0.51	0.74	0.49
Regulatory quality index	>0	0.4	1.4	1.2	1.3	0.8	0.3	0.6	0.3	1.3	-0.3
Government effectiveness index	>0	0.0	1.3	0.7	1.1	0.4	-0.1	0.2	0.4	1.1	-0.4
Equal protection index	≥ 0.5	0.37	0.9	0.96	0.83	0.92	0.7	0.78	0.67	0.95	0.68
Corruption Perception Index	≥ 45	43	76	59	63	53	46	49	41	56	35
Chandler Good Government Index	≥ 0.5	0.580	0.743	0.660	0.687	0.639	0.564	0.625	0.590	0.687	0.472
Clean Elections Index	≥ 0.5	0.71	0.96	0.92	0.89	0.76	0.77	0.93	0.6	0.95	0.6
Open Government Index	≥ 0.5	0.54	0.72	0.73	0.76	0.65	0.53	0.71	0.51	0.64	0.56
Institutional Resilience Index (%)		62.5	100	100	100	100	87.5	100	87.5	100	37.5

Source: compiled by the authors

In Ukraine, the rule of law faces a number of systemic challenges. First of all, it is the insufficient independence of the judiciary, which remains vulnerable to political and business influence, that reduces public trust in the judicial system (Slipeniuk, 2023). An additional challenge is legal instability, which complicates the predictability of state policy, as well as the weakness of mechanisms for the implementation of court decisions, which often remain only a formality. The situation is complicated by the impact of the war, which has destroyed part of the judicial infrastructure, caused an increase in the number of war crimes in the territories occupied by Russia, and exacerbated the problem of protecting the rights of internally displaced persons (Kunitskyi, 2025). All this together forms a system of risks for compliance with the principles of the rule of law.

The Regulatory Quality Index (RQI) analysis reflects the government's ability to implement effective policies and regulations that promote business development, innovation, and economic competitiveness. High values of this index indicate a transparent regulatory environment, stable government policies, and reduced administrative barriers, while low values indicate unpredictability of decisions and weak governance mechanisms. All Bucharest Nine countries have positive RQI values, indicating that they meet the threshold value (>0). The values are heterogeneous among the Bucharest Nine countries. For example, Estonia, Lithuania, Latvia, and the Czech Republic have high values (above 1.2) of the indicator, while Bulgaria, Romania, and Hungary are close to the threshold, that speak of varying levels of regulatory policy effectiveness in the region. Ukraine shows a negative result (–0.3), which does not even reach the minimum acceptable level, which tells of inconsistency of regulatory policy, excessive administrative

barriers and vulnerability of public administration to political influence. This situation directly undermines institutional resilience, since without quality regulation, state institutions are unable to ensure the proper level of trust, efficiency and economic stability.

The Government Effectiveness Index (GEI) reflects the ability of the state to perform its functions and provide public services. The values of this index vary significantly across the Bucharest Nine countries. Estonia, Lithuania and the Czech Republic have high values of the index, exceeding 1. Latvia, Poland, Hungary and Slovakia have values close to the threshold level (>0). Bulgaria and Romania have not reached the threshold level, as their indicators are 0.0 and –0.1, respectively. Such results tell about the existing administrative barriers, bureaucratic obstacles and increased risks of political influence, which reduces institutional stability even in comparison with other Bucharest Nine countries. Ukraine also has a negative GEI value (–0.4) of the index, which indicates the need to implement reforms to ensure the resilience of public administration.

The Equal Protection Index (EPI) analysis reflects the ability of the state to ensure equality in the law process and equal protection of the rights of all citizens. High values of the index indicate transparent, fair and non-discriminatory activities of state institutions, which strengthens public trust and legitimacy of the authorities. Low values signal inequality in access to justice, selective usage of laws or bias in decision-making, which undermines social stability and the effectiveness of public administration. Within the Bucharest Nine, all countries except Bulgaria have positive EPI values. One of the key reasons for the low value in Bulgaria (0.37 with a threshold value ≥0.5) is the situation of the Roma community, which remains the most vulnerable social group in the country. Bulgaria has one of the largest Roma communities in the EU, estimated at 8 to 10% of the population. But Roma people are discriminated against in many parts of public life. Bulgaria has laws against discrimination, but they are not always followed correctly. The European Commission has repeatedly pointed out that local governments, employers, and law enforcement do not do enough to protect Roma from discrimination (Giteva, 2023). The low EPI value in Bulgaria is due to the fact that, even though there are laws in place, there is a big difference between what the law says and what the Roma minority can actually do to get justice and protect their rights. The threshold value is 0.68, which is higher than Ukraine's value. This indicates a significant capacity of state institutions to ensure equal protection of citizens, although there are challenges related to regional inequalities and social groups that have found themselves in difficult conditions due to the war.

The Corruption Perception Index (CPI) shows how people feel about corruption in government agencies. This affects how well they do their jobs and how much people trust them. There is a lot of variation in the CPI values among the Bucharest Nine countries. Estonia and Lithuania have a sufficient level of transparency and a low perceived level of corruption. The Czech Republic, Latvia

and Poland have medium CPI values. Corruption is present in these nations, particularly at the local level and within certain sectors (public procurement, political influence); however, the overall efficacy of state institutions is adequate to ensure resilience. Slovakia and Romania are at the threshold (≥45 points), which means that they have a lot of work to do to fight corruption. In Romania, for example, despite a strong anti-corruption body, political pressure and selective application of laws reduce the effectiveness of the fight against corruption and undermine citizens' trust. Slovakia faces similar challenges, particularly in the areas of public procurement and local government, where corrupt practices remain widespread.

The lowest CPI values are observed in Bulgaria and Hungary. In Bulgaria, systemic corruption and weak implementation of laws undermine the effectiveness of government and the equal protection of citizens' rights (Keranov, 2025). In Hungary, corruption is associated with the centralization of power, political influence on key institutions and limited transparency in the use of state resources. With 35 points, Ukraine has the lowest CPI level among all Bucharest Nine countries, which indicates serious transparency problems, further exacerbated by the war. So, according to the CPI index values, even countries of the same region and historical background can have different corruption risks.

The Chandler Good Government Index (CGGI) assesses the ability of states to coordinate and implement national policies. The CGGI values in the Bucharest Nine range from 0.564 in Romania to 0.743. Ukraine has the value of 0.472, which is below the threshold (≥0.5) and indicates problems with the efficiency and transparency of public administration.

The Clean Elections Index (CEI) measures the citizens' trust in political institutions. All Bucharest Nine countries exceed the CEI threshold (≥0.5), which indicates democratic electoral processes in the region. However, there is a slight difference with Estonia, Latvia, Slovakia and the Czech Republic performing well while the election process in Bulgaria, Poland, Romania, Hungary being less effective. As an example, on June 9, 2024 the early parliamentary elections in Bulgaria state the unstable political environment while in Poland the elections of October 15, 2023 were heavily criticized.

The parliamentary elections on December 1, 2024 in Romania were accompanied by a rise in support for radical right-wing forces. In Hungary, the parliamentary elections on April 3, 2022 brought victory to the ruling Fidesz party, but raised doubts in society about the state of democracy din the country (Iwaniuk, 2024; Scheppele, 2022). Ukraine has a positive CEI value (0.6), but holding elections is currently impossible due to martial law. Citizens' voting rights are temporarily restricted, and the democratic process is "frozen" until the end of the war.

The Open Government Index (OGI) reflects the transparency of the decision-making process in the government. OGI values in the Bucharest Nine countries range from 0.51 to 0.76, which indicates some difference in the level of transparency and openness of government. The highest indicators are in Lithuania, Latvia, Estonia and

Slovakia, which indicates significant accessibility of government information and active participation of citizens in the decision-making process. Poland, the Czech Republic, Bulgaria, Romania and Hungary have a medium level of openness, as they have certain problems in government accountability and media independence. Contrary to B9 countries, Ukraine performs better on, which is the result of open governance reforms; however, there is still room for improvement, especially in the field of accountability of state bodies, particularly in the conditions imposed by martial law.

Having analysed all the indicators, the Institutional Resilience Index (IRI) of Public Administration (Table 2) can be calculated. The IRI values in the Bucharest Nine countries range from 62.5% to 100%. In particular, Estonia, Latvia, Lithuania, Poland, Slovakia, the Czech Republic have a high IRI level - 100% (all analysed indicators correspond to the threshold values) and Romania, Hungary - 87.5% (7 indicators out of 8 correspond to the threshold values). Bulgaria has an average IRI level - 62.5% (5 indicators out of 8 correspond to the threshold value). For comparison, Ukraine has a moderate level of IRI - 37.5% (3 indicators out of 8 meet the threshold value). Accordingly, this result indicates serious problems with the efficiency, transparency and accountability of public administration, exacerbated by the effects of martial law and limited opportunities for the implementation of democratic procedures.

4. Calculation and Analysis of the Functional & Digital Resilience Index of Public Administration

The need to measure and analyse the functional and digital resilience of public administration is due to the fact that the digital infrastructure and the ability of authorities to act effectively in times of crisis are vital to the continuity of public administration and accessibility of public services for citizens. For Ukraine, this issue is especially relevant since Russian aggression is accompanied by massive cyberattacks and information operations, which requires constant improvement of digital tools and protection of administrative processes. For the Bucharest Nine countries, this task is also important, because regional security challenges increase the need to ensure the "digital resilience" of states and create conditions for the development of joint approaches to cyber protection and digital governance. The calculated Functional & Digital Resilience Index (FDRI) of the Bucharest nine and Ukraine in 2024 is given in Table 4.

The E-Government Development Index (EGDI) reflects the level of development of e-government, including the availability of online services, the quality of telecommunications infrastructure and the level of digital competences of the population. According to the results in the Table 4, the values of EGDI vary from 0.763 to 0.972. All the B9 countries and Ukraine significantly exceed the threshold

value 0f ≥0.5, which corresponds to a high level of digitalization in public administration.

Table 4. Indicators of Functional & Digital Resilience Index (FDRI) of the B9 and Ukraine in 2024

Indicators	Threshold	BG	EE	LV	LT	PL	RO	SK	HU	CZ	UA
E-Government Development Index	≥ 0.5	0.814	0.972	0.885	0.911	0.864	0.763	0.802	0.804	0.823	0.884
E-Participation Index	≥ 0.5	0.671	0.958	0.780	0.643	0.753	0.684	0.698	0.547	0.589	1.0
Online Service Index	≥ 0.5	0.772	0.995	0.809	0.883	0.803	0.654	0.709	0.714	0.700	0.985
Civil society participation index	≥ 0.5	0.81	0.89	0.9	0.84	0.71	0.53	0.68	0.44	0.79	0.76
Functioning government index	≥ 6	5.4	8.6	7.1	7.1	6.4	5.4	6.1	5.7	6.4	2.7
Government AI Readiness Index	≥ 60	60.64	72.62	61.87	67.8	67.51	58.08	63.69	63.63	70.23	60.57
Cybersecurity Index	≥ 50	72.1	93.7	78.1	89.3	91.0	89.1	91.2	82.9	84.1	79.7
Digital Evolution Index	≥ 60	58.90	78.62	65.53	70.22	65.17	57.44	62.96	63.14	70.81	52.7
Functional & Digital Resilience Index (%)		75.0	100	100	100	100	62.5	100	75.0	100	75.0

Source: authors' representation

The E-Participation Index (EPI) is a complement to the EGDI, and reflects not only the rate of digitalization of public administration, but also the involvement of citizens in decision-making processes through electronic tools. In 2024, Ukraine ranked first in the world in terms of citizen involvement in government online services. Digitalization has become an integral part of the lives of Ukrainians, currently the "Diya" application has 20.9 million users, for whom 21 documents and over 30 services are available. On the "Diya" portal, almost 6 million people receive more than 120 transparent services. Ukraine is building e-democracy through online surveys, launching services for citizens affected by the war. Even in crisis circumstances, the state ensures high openness and accessibility of digital tools for participation.

The value of EPI in B9 countries exceeds the threshold of ≥0.5, but the results also vary in the countries. With the value of the index 0.958, Estonia ranks second in the world and first among the B9 countries. Latvia and Poland have a sufficient level of EPI that state the adequate opportunities available to citizens in these countries. Slovakia, Romania, Bulgaria, Lithuania, the Czech Republic and Hungary all place at the medium level. The high scores of EPI across B9 countries reflect the results of long-run digitalisation strategies in the EU, such as the Digital Agenda for Europe. However, the existing gap between the leading country and the countries with a medium level of EPI can be explained by insufficient infrastructure quality and institutional capacity.

The Online Service Index (OSI) assesses the provision of services via the Internet, the convenience of government websites and the ability of citizens to

receive the necessary services online. By OSI, Estonia ranked third in the world, and Ukraine ranked fifth. Among the B9 countries, Lithuania, Latvia and Poland have high indicators. Bulgaria, the Czech Republic, Slovakia, Hungary and Romania have Positive OSI values. Moderate index values in Hungary and Romania can be attributed to overall administrative centralization and uneven accessibility of online services, so the further progress in these countries depends less on technology and more on administrative reform.

The Civil Society Participation Index (CSPI) analysis is also an important indicator for assessing the functional and digital sustainability of public administration, as it reflects the degree of involvement of civil society organizations, initiative groups and citizens in decision-making processes and control over the activities of government. Accordingly, digital governance without citizen involvement risks to remain formal and to lose effectiveness. CSPI values in the B9 countries and Ukraine show that all except Hungary (0.44) exceeded the threshold value ($\geq$0.5). Hungary's result is due to restrictions on civil space, in particular due to legislative changes that complicate the activities of independent non-governmental organizations. In particular, the adoption of the Law on "Transparency of Public Organizations" in 2021, which obliges NGOs with an annual income of over 20 million forints to submit financial reports to the State Audit Office, creates additional administrative barriers to their activities (Council on Foundations, 2024). The highest values of the index are in Latvia (0.90) and Estonia (0.89), where public organizations have a significant influence on decision-making processes. Ukraine has a sufficient level of CSPI (0.76), which proves the resilience of Ukrainian society in war conditions.

For the functional and digital resilience of public administration, the FGI shows the extent to which state bodies are able to maintain the continuity of management processes, coordinate actions between departments and ensure the implementation of decisions in crisis conditions. The highest level of government functioning is demonstrated by Estonia, Latvia and Lithuania. Positive results are registered by Poland, the Czech Republic and Slovakia. Bulgaria, Romania and Hungary did not reach the threshold value, which is explained by the presence of systemic problems in the field of public administration, in particular, insufficient efficiency of institutions and the poor quality of public services. The lowest FGI value is in Ukraine, and the reason for this is the limited ability of institutions to effectively perform their functions in conditions of full-scale war and of public administration's dependence on external support.

The Government AI Readiness Index (GAIRI) shows the degree of a country readiness to use artificial intelligence in public administration and takes into account the level of digital infrastructure, the existence of national AI development strategies, human resources potential, and the institutional capacity of the government to implement innovations. GAIRI is of particular importance for assessing functional and digital resilience, as the effective use of AI can increase the transparency of

government processes, provide better quality public services, strengthen analytical capabilities and resilience to crisis situations. The threshold value ≥ 60 was exceeded by almost all the B9 countries and Ukraine, except for Romania (58.08). The leader is Estonia, which traditionally demonstrates a high level of digital governance and integration of AI into public services. Countries with results on the verge of the threshold are Bulgaria (60.64), Ukraine (60.57) and Latvia (61.87), which indicates the presence of potential, but also the need to strengthen institutional and human resources capacities.

Functional and digital resilience of public administration involves not only development of digital services, but also guarantees of their stability and security in crisis conditions. Accordingly, the Cybersecurity Index measures the state's ability to ensure the continuity of digital systems and the protection of critical infrastructure from cyber threats. Cyberattacks can paralyze public administration, the financial system or communication networks, which directly undermines the effectiveness of public administration.

The B9 countries and Ukraine exceeded the threshold of 50 points, the level of the Cybersecurity Index ranges from 72.1 to 93.7. The highest indicator is in Estonia (93.7), which is explained by systemic investments in the development of cyber defence, the development of national response centres and the integration of cybersecurity into public administration. High results were also demonstrated by Poland, Slovakia and Lithuania, which are actively ensuring cyber resilience in the context of growing hybrid threats. The high cybersecurity levels of Estonia, Poland, and Lithuania indicate a successful integration with NATO and EU cyber defence systems. At the same time, Ukraine, although it exceeded the threshold, has certain gaps. In particular, according to USAID, public sector companies currently cover only 20-25% of their cybersecurity needs, and government institutions - from 20% to 50% (Feyrlemb, 2021). At the same time, Ukraine is a country that has all the opportunities for further successful development of cybersecurity, given its unique experience in countering large-scale cyberattacks, active cooperation with international partners and gradual integration into European and Euro-Atlantic standards in the digital sphere. So, Ukraine's result is the example of extensive experience in cyber conflict with insufficient institutional funding that exposes the need in external financing.

Another important indicator for assessing functional and digital resilience is the Digital Evolution Index (DEI), which reflects the level of digital transformation of public administration and the ability of government institutions to implement innovative technologies. DEI analysis allows to assess the effectiveness of digital reforms, transparency and accountability of the public sector, as well as determine the readiness of the public administration system to respond to the challenges of the digital era. According to the threshold value (≥60), among the countries of the region, the required level is not achieved in Bulgaria (58.90), Romania (57.44) and Ukraine (52.7), which indicates the need to strengthen digital reforms and expand the

capabilities of public institutions in the field of e-government. At the same time, other countries demonstrate positive results, confirming the effectiveness of implementing public sector digitalization strategies.

Having analysed all indicators, the Functional & Digital Resilience Index (FDRI) of Public Administration can be evaluated. The FDRI values in the Bucharest Nine countries range from 62.5% to 100% (table 2). In particular, Estonia, Latvia, Lithuania, Poland, Slovakia, and the Czech Republic have a high FDRI level – 100% (all analysed indicators correspond to the threshold values). A sufficient level is reached in Hungary, Bulgaria, and Ukraine – 75.0% (6 indicators out of 8 correspond to the threshold values). Romania has a medium FDRI level – 62.5% (5 indicators out of 8 correspond to the threshold value).

5. Assessment of Public Administration Resilience Index

The *Public Administration Resilience Index (PARI)* is calculated as a weighted sum of the Institutional Resilience Index and the Functional & Digital Resilience Index. The calculated PARI for the Bucharest Nine countries and Ukraine in 2024 is presented in Table 5.

Table 5. Public Administration Resilience Index (PARI) of the B9 and Ukraine in 2024

Countries	Levels	Quantity of positive indicators	Public Administration Resilience Index (%)	Institutional Resilience Index (%)	Functional & Digital Resilience Index (%)
Estonia	high	16	100	100	100
Latvia	high	16	100	100	100
Lithuania	high	16	100	100	100
Poland	high	16	100	100	100
Slovakia	high	16	100	100	100
Czechia	high	16	100	100	100
Hungary	sufficient	13	81.25	87.5	75.0
Romania	sufficient	12	75.0	87.5	62.5
Bulgaria	sufficient	11	68.75	62.5	75.0
Ukraine	medium	9	56.25	37.5	75.0

Source: authors' representation

Thus, according to the calculations, the Public Administration Resilience Index (PARI) demonstrates a high level of resilience of the public administration system in Estonia, Latvia, Lithuania, Poland, Slovakia and the Czech Republic (100%), which is due to simultaneously high values of both the Institutional Resilience Index and the Functional & Digital Resilience Index.

In contrast, Hungary (81.25%), Romania (75.0%) and Bulgaria (68.75%) are characterized by a sufficient level of resilience of public administration. Their lower

results can be affected by weaker institutional trust, slower digital transformation and limited transparency. The lowest result was recorded in Ukraine (56.25%), where the medium level of PARI is explained by a significant disproportion between institutional (37.5%) and functional-digital resilience (75.0%). This result indicates that digital transformation in Ukraine is developing more dynamically than institutional support, however, the lack of balance between these components significantly reduces the overall level of public administration resilience. While Ukraine has achieved significant progress in digital transformation, driven by innovations such as the Diia ecosystem and other e-participation tools, the institutional foundations required to support these digital advances remain fragile.

To increase PARI, Ukraine should focus on effectively ensuring the institutional resilience of public administration in the following areas:

- *strengthening the institutional capacity of the state* by reforming the civil service system and increasing the professional competence of public servants; developing mechanisms for strategic planning and coordination between government bodies; developing transparent decision-making procedures, especially considering Ukraine's efforts in the EU ascension process;
- countering corruption through *strengthening the independence and effectiveness of anti-corruption institutions* (such as the National Agency on Corruption Prevention – NACP, the National Anti-Corruption Bureau of Ukraine – NABU, and the High Anti-Corruption Court – HACC); developing mechanisms for public control and open data for government accountability;
- developing a *resilient human resource and organizational culture* through systematic training of civil servants in the field of digital literacy and crisis management; forming a management culture focused on innovation, transparency and ethics;
- *strengthening cooperation with international partners* through the adaptation of EU best practices in public administration and anti-corruption policy; attracting international expert support for public sector reform.

Accordingly, Ukraine, which currently demonstrates only a medium level of PARI, should focus efforts on increasing institutional capacity, as compared to functional and digital capacity, which remains the weak point to overall public administration resilience level.

6. Discussions

The novelty of this research resides in the combination of indicators of institutional (Institutional Resilience Index (IRI)) and digital resilience (Functional & Digital Resilience Index (FDRI)) for the assessment of institutional and digital capacity of countries to withstand crises represented by Public Administration Resilience Index (PARI).

The proposed methodology combines institutional and digital capacities indicators and indexes into one measurable composite index to assess the thresholds and find the resilience level of countries that distinguishes this approach from the existing that address various individual aspects of resilience, such as:

1. Proprietary Resilience Indices: tools like the FM Resilience Index assess a country's vulnerability and speed of recovery from disruptive events, utilizing 18 equally weighted resilience factors. This index measures how quickly countries recover from shocks, indicating operational robustness and functionality. (FM Global. n.d.).
2. Digital Governance Benchmarks: the OECD's Government at a Glance and its Digital Government Index offer a comprehensive overview of digital government practices, transparency for assessing digital readiness (OECD, 2025).
3. Quality Management Tools: the European Union's Common Assessment Framework (CAF) model is used to self-evaluate organizational operations and performance, of public administrations, particularly digital and operational adjustments following major shocks (OECD a, 2023).

The study by Profiroiu and Nastacă (2021) proposes a conceptual framework to measure the capacity factors of institutional resilience of public administration, providing quality indicators (such as innovation, forecasting and strategic planning, stakeholders' involvement, transparency, etc.) and quantity indicators for measurement. This study concentrates on the system's organisational resilience, while the proposed PARI methodology assesses resilience thresholds on two dimensions: institutional and digital, which allows for specific dimensional measurement. The degree of public administration resilience has not been extensively studied using a comparable methodological approach, which makes the findings of this study relevant. By applying this methodology to B9 countries and Ukraine, a unique study of Central and Eastern Europe's resilience level and capacity of public administration is performed.

It should be noted that the study has some limitations, though. First, the set of indicators on which IRI and FDRI are based relies on secondary, cross-national data, which may not reflect all the necessary data of administrative systems effectiveness. Second, the use of equal weights for the sub-indicators of the IRI and FDRI is justified by the need to maintain a balance between the institutional and functional components of resilience, whose contributions are considered equivalent, which can be arguable. Third, this analysis focuses on data for 2024 and, consequently, does not account for changes in institutional and digital capacities for resilience. And last, as the purpose of the article was to assess the level of resilience by determining compliance with threshold values for specific indicators, rather than to explore the interrelations or interdependencies among them, the sensitivity and collinearity analyses were not conducted. The PARI indicator is considered to be a composite

indicator of compliance with threshold values rather than a statistical model of relations between indicators.

This will be tackled in future research by applying longitudinal data and more sophisticated statistical and modelling techniques in order to validate and optimize the index structure. Other promising directions may include scenario-based modelling and sensitivity analysis in order to test the resilience of public administration systems under various stress conditions, for example, war, cyber threats, or governance crises. The usage of the PARI index to other regions might further enhance the explanatory power of the index, especially regarding the comparison of all countries-candidates to the EU.

Conclusions

The conducted research made it possible to develop a methodology for assessing the resilience of public administration based on the integrated indicator Public Administration Resilience Index (PARI), which combines institutional and functional-digital components that most fully reflect the ability of public administration to function effectively in the complex conditions of modern challenges. The application of this methodology to the Bucharest Nine countries and Ukraine showed that most of the Central and Eastern European countries have achieved a high level of resilience of public administration, which ensures the stability of political institutions, the effectiveness of government structures and a high level of digital transformation. At the same time, a number of countries, in particular Hungary, Romania and Bulgaria, demonstrated a sufficient level of PARI, which indicates the existence of certain institutional and digital limitations that need to be further eliminated to increase the overall resilience of management. Ukraine, unlike other countries in the region, is characterized by a medium level of PARI, the main reason for which is the relatively low values of the institutional component, associated with public administration efficiency problems, a limited level of rule of law and widespread corruption practices, which significantly reduce public trust in state institutions. At the same time, Ukraine demonstrates fairly high results in the functional-digital component, which indicates significant potential in the field of digital transformation and use of innovative tools in public administration.

It should be noted that the comparative assessment of public administration resilience between long-standing EU and NATO members of B9 countries and Ukraine, as a candidate country to the EU, has some methodological limitations. The obtained results should not be interpreted as suggesting that Ukraine's lower PARI values imply institutional weakness capable of undermining collective regional security. The differences in PARI between Ukraine (56.25) and several EU member states such as Romania (75.0) and Bulgaria (68.75) demonstrate that Ukraine is already approaching the resilience levels of the region, particularly in the sphere of functional and digital resilience.

In general, the Bucharest Nine countries ensure a high and sufficient level of resilience of public administration, which creates the basis for the stability of regional governance, increased competitiveness and consolidation of efforts in the field of European and Euro-Atlantic integration. It is important for Ukraine to take into account the identified imbalances and focus on strengthening institutional resilience, which, combined with further digitalization, will create the prerequisites for a gradual approach to the level of the Bucharest Nine countries and ensuring effective governance in crisis conditions.

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APPENDIX

Table. Indicators for assessing the Public Administration Resilience Index

№	Indicator	Indicator Characteristics	The threshold value	Source of input data
1.Institutional resilience of public administration				
1.	Rule of Law Index	Measures the extent of adherence to the rule of law in the country.	≥ 0,5	World Justice Project
2.	Regulatory quality index	Measures the government's capacity to formulate and implement effective policies and regulations that promote private sector development and economic growth.	>0	The World Bank
3.	Government effectiveness index	Measures the quality of public services, and the professionalism and independence of the public sector.	>0	The World Bank
4.	Equal protection index	Measures the extent to which the state guarantees equal protection of rights and freedoms for all citizens regardless of their social status.	≥ 0,5	Varieties of Democracy (V-Dem)
5.	Corruption Perception Index	Measures the perceived level of corruption in the public sector.	≥ 45	Transparency International
6.	Chandler Good Government Index	Measures the state's capacity for effective governance, including the quality of institutions, political stability, rule of law, transparency, policy implementation, and public trust in government.	≥ 0.5	Chandler Institute of Governance
7.	Clean Elections Index	Measures the fairness and transparency of electoral processes, including the absence of fraud, abuses, coercion, and bribery.	≥ 0.5	Varieties of Democracy (V-Dem)
8.	Open Government Index	Measures the level of government openness and transparency, citizen access to public information, opportunities for participation in decision-making, and the effectiveness of accountability mechanisms.	≥ 0.5	World Justice Project

Functional and digital resilience of public administration				
9.	E-Government Development Index	Measures the development of e-government across three components: availability of online services, state of telecommunications infrastructure, and development of human capital.	≥ 0.5	United Nations
10.	E-Participation Index	Measures the extent of citizen participation in governance and decision-making through digital means.	≥ 0.5	United Nations
11.	Online Service Index	Measures the accessibility and quality of e-government services.	≥ 0.5	United Nations
12.	Civil society participation index	Measures the extent of civil society involvement in governance processes.	≥ 0.5	Varieties of Democracy (V-Dem)
13.	Functioning government index	Measures the ability of state institutions to ensure stable functioning.	≥ 6	Economist Intelligence Unit
14.	Government AI Readiness Index	Measures the readiness of the state to integrate artificial intelligence into public administration.	≥ 60	Oxford Insights
15.	Cybersecurity Index	Measures the capacity of the state to prevent, detect, and respond to cyberattacks.	≥ 50	FM Global
16.	Digital Evolution Index	Measures the level of digital development of the state, including the degree of digitalization of public administration.	≥ 60	Tufts University

Source: authors' representation