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ASSESSMENT OF DIGITAL MATURITY AS A KEY PERFORMANCE INDICATOR OF ARTIFICIAL INTELLIGENCE UTILIZATION IN PUBLIC ADMINISTRATION¹

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ОЦІНКА ЦИФРОВОЇ ЗРІЛОСТІ ЯК КЛЮЧОВОГО ПОКАЗНИКА ЕФЕКТИВНОСТІ ВИКОРИСТАННЯ ШТУЧНОГО ІНТЕЛЕКТУ В ПУБЛІЧНОМУ УПРАВЛІННІ

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The integration of artificial intelligence (AI) into public administration has emerged as a critical driver of efficiency, transparency, and resilience in governance. For Ukraine, this issue is particularly relevant in the context of digital transformation under wartime conditions, where institutional resources are constrained and demands for citizen-oriented services are high. This study addresses the problem of the absence of standardized tools for evaluating AI effectiveness in governance by combining international methodological insights with empirical evidence. The purpose of the research was to assess digital maturity and identify key performance indicators (KPIs) capable of measuring the effectiveness of AI use in public administration.

Methodologically, the study applied a mixed approach. First, eleven international frameworks for AI evaluation - including AI Readiness Models, Algorithmic State Architecture, Multi-Criteria Decision Analysis, and AI Maturity Models - were systematically compared across six criteria: scalability, transparency, institutional integration, crisis resilience, result orientation, and quantifiability. Second, an empirical survey of 95 Ukrainian public servants was conducted, covering awareness, literacy, institutional readiness, perceived effectiveness, and expectations.

The results reveal cautious optimism: while 59% of respondents reported episodic or regular use of AI, only 24.2% possessed sufficient AI literacy, and 73.7% indicated an urgent need for training. Institutional readiness remains fragmented, as only 14.7% of institutions reported defined AI strategies, and 47.4% assessed their digital maturity as low. Respondents identified workforce replacement (54.7%), algorithmic bias (51.6%), and privacy concerns (49.5%) as critical risks.

The study concludes that Ukraine is at an initial stage of AI adoption, requiring KPI-based frameworks that integrate efficiency, transparency, and accountability. Its novelty lies in bridging methodological rigor with empirical realities. Future research should expand the sample size, adopt longitudinal designs, and conduct cross-country comparisons to strengthen policy relevance.

Інтеграція штучного інтелекту (ШІ) у державне управління стала критичним фактором ефективності, прозорості та стійкості в управлінні. Для України це питання є особливо актуальним у контексті цифрової трансформації в умовах воєнного часу, коли інституційні ресурси обмежені, а попит на послуги, орієнтовані на громадян, високий. Це дослідження

розглядає проблему відсутності стандартизованих інструментів для оцінки ефективності ІІІ в управлінні, поєднуючи міжнародні методологічні знання з емпіричними даними. Метою дослідження було оцінити цифрову зрілість та ідентифікувати ключові показники ефективності (KPI), здатні вимірювати ефективність використання ІІІ в державному управлінні.

Методологічно в дослідженні застосовувався змішаний підхід. По-перше, одинадцять міжнародних рамок для оцінки ІІІ, включаючи моделі готовності ІІІ, алгоритмічну архітектуру станів, багатокритеріальний аналіз рішень та моделі зрілості ІІІ, були систематично порівняні за шістьма критеріями: масштабованість, прозорість, інституційна інтеграція, стійкість до криз, орієнтація на результат та кількісна оцінка. По-друге, було проведено емпіричне опитування 95 українських державних службовців, яке охоплювало обізнаність, грамотність, інституційну готовність, сприйняту ефективність та очікування.

Результати демонструють обережний оптимізм: хоча 59% респондентів повідомили про епізодичне або регулярне використання ІІІ, лише 24,2% мали достатню грамотність у сфері ІІІ, а 73,7% вказали на нагальну потребу в навчанні. Інституційна готовність залишається фрагментарною, оскільки лише 14,7% установ повідомили про визначені стратегії ІІІ, а 47,4% оцінили свою цифрову зрілість як низьку. Респонденти визначили заміщення робочої сили (54,7%), алгоритмічне упередження (51,6%) та проблеми конфіденційності (49,5%) як критичні ризики.

У дослідженні робиться висновок, що Україна перебуває на початковому етапі впровадження ІІІ, що вимагає структур на основі ключових показників ефективності (KPI), які інтегрують ефективність, прозорість та підзвітність. Його новизна полягає в поєднанні методологічної точності з емпіричними реаліями. Подальші дослідження повинні розширити розмір вибірки, застосувати поздовжні плани та проводити міжкраїнні порівняння для посилення актуальності політики.

Keywords: *Artificial intelligence, Public administration, Digital maturity, Key performance indicators, Governance effectiveness, Trust, Ukraine.*

Ключові слова: *штучний інтелект, державне управління, цифрова зрілість, ключові показники ефективності, ефективність управління, довіра, Україна.*

Problem statement. The rapid advancement of artificial intelligence (AI) technologies has reshaped the landscape of governance, offering new opportunities for efficiency, transparency, and citizen-oriented services. Governments across the world increasingly rely on algorithmic systems to process data, support decision-making, and deliver public services at scale. For Ukraine, the issue of AI adoption in public administration is particularly relevant, as digital transformation has become both a strategic priority and a practical necessity in the context of limited resources, wartime disruptions, and the demand for greater resilience of state institutions. At the same time, international experience demonstrates that the effectiveness of AI in governance cannot be evaluated solely by technical or economic outcomes but must include social legitimacy, ethical responsibility, and institutional maturity.

Despite the growing interest in algorithmic governance, there remains a lack of standardized tools for assessing how effectively AI contributes to the performance of public administration. Fragmented approaches to evaluation often focus on readiness indices or sectoral performance metrics, overlooking the multidimensional nature of AI's impact on decision-making quality, accountability, cost-efficiency, and public trust. This gap is particularly visible in transition economies such as Ukraine, where institutional frameworks are still evolving and the risks of low digital maturity - such as insufficient expertise, weak infrastructure, and lack of coherent strategies - can undermine the potential benefits of AI. Therefore, the problem addressed in this study lies in the absence of an integrated system for measuring AI effectiveness in public administration that combines key performance indicators (KPIs) with assessments of digital maturity.

The purpose of the article is to develop an evidence-based framework for assessing the effectiveness of AI use in public administration by linking digital maturity indicators with key performance outcomes. The aims are fourfold: (1) to analyze existing international methodologies for evaluating AI effectiveness in governance, (2) to assess the level of digital maturity and readiness among Ukrainian public institutions, (3) to identify the main expectations, risks, and barriers

associated with AI use from the perspective of public servants, and (4) to propose a set of recommendations for improving AI evaluation practices in Ukraine. To achieve these aims, the study applies both theoretical and empirical approaches, combining methodological review with the results of a survey conducted among 95 Ukrainian public servants.

Here are four concise research questions you can insert at the end of your introduction:

1. How do public servants perceive the effectiveness and trustworthiness of AI in public administration?
2. What is the current level of digital maturity and AI literacy among Ukrainian public institutions?
3. Which KPIs are most relevant for assessing AI's contribution to efficiency, transparency, and service quality?
4. What barriers and risks hinder AI adoption in public administration, and how can they be addressed through evaluation frameworks?

The study proceeds from the hypothesis that higher levels of digital maturity and AI literacy among public servants are positively associated with higher perceived effectiveness, trust, and acceptance of AI solutions in governance. A related assumption is that institutions with clearer strategies and structured approaches to AI implementation will demonstrate greater readiness to integrate AI-based KPIs into decision-making processes. Testing these hypotheses allows for identifying the institutional and human factors that condition successful AI adoption in the public sector.

The novelty of this research lies in its attempt to bridge methodological evaluation frameworks with empirical evidence from the Ukrainian public administration context. Unlike previous studies that predominantly examined AI readiness or citizen trust in isolation, this article integrates digital maturity assessments, KPI design, and survey-based insights into one comprehensive analytical model. Furthermore, the study introduces a context-sensitive perspective, reflecting the challenges of governance during wartime conditions, where resilience,

efficiency, and accountability acquire particular significance. In doing so, the article contributes new knowledge to the international debate on algorithmic governance and provides a foundation for developing a structured, multidimensional approach to measuring AI performance in the public sector.

Analysis of publications. The growing interest in AI within public administration has generated a broad body of scholarship exploring its promises, limitations, and implications for governance. At the core of this discourse lies the recognition that AI is no longer a peripheral innovation but a transformative driver of institutional efficiency, transparency, and adaptability. Recent studies emphasize both the opportunities created by AI adoption and the vulnerabilities associated with its integration into complex administrative systems. Vatamanu and Tofan [30] highlight that while AI can optimize public services and decision-making, it also raises governance challenges linked to accountability, ethical risks, and systemic vulnerabilities, underscoring the necessity for robust evaluation mechanisms.

The development of “smart governance” approaches further contextualizes AI’s role in reshaping government functions. Kaiser [1] positions smart governance as a cornerstone for smart cities and nations, arguing that AI enables governments to deliver more responsive, data-driven services. Yet, the realization of these benefits depends on the institutional capacity to integrate technology into governance frameworks. This resonates with Alkhawaldah et al. [2], who found that e-government initiatives enhance organizational effectiveness particularly when paired with administrative empowerment, suggesting that the human dimension of governance remains critical even in an AI-driven environment.

The question of readiness for digital transformation is central to understanding cross-national differences in AI adoption. Almeida de Figueiredo [3] demonstrates that digital readiness, measured through DESI scores, correlates positively with GDP growth in European countries. This finding implies that countries with higher levels of digital maturity not only accelerate economic performance but are also better positioned to leverage AI in governance. Similarly, Babšek et al. [5], in their

comprehensive overview of top-cited AI studies in public administration, conclude that successful AI adoption depends on institutional readiness, scalability, and alignment with public sector needs, thus reinforcing the link between digital maturity and AI effectiveness.

Parallel to macro-level readiness, organizational transformation is equally essential. Asmaa and Yasmina [4] analyze AI integration in human resource management and show that successful adoption requires effective change management, where resistance among employees is mitigated through training and clear communication strategies. This insight aligns with survey findings in the Ukrainian context, where the lack of AI literacy and digital skills remains a major barrier to implementation. The public sector's readiness must therefore be understood not only in terms of infrastructure and strategies but also through human resource development and organizational culture.

AI is also increasingly recognized as a tool for financial and risk management in the public sector. Bouchetara et al. [6] identify innovations in AI applications for financial risk management but stress persistent challenges in transparency, accountability, and long-term sustainability. These challenges are mirrored by Febiandini and Sony [9], who argue that the development of AI in the context of Industry 4.0 presents public administration with both opportunities for efficiency and risks associated with rapid technological change, particularly where regulatory frameworks lag behind innovation.

Beyond efficiency, scholars emphasize the governance of data as a prerequisite for trustworthy AI. Janssen et al. [10] highlight that robust data governance frameworks are essential to ensure reliability, fairness, and accountability in AI systems used by governments. Without structured approaches to data quality and transparency, even technically advanced AI solutions may fail to gain public trust. Trust is also a recurrent theme in sector-specific studies such as that by Khosravi et al. [12], who analyze AI in healthcare decision-making and conclude that transparency, explainability, and user confidence are crucial for adoption in sensitive domains. This parallels the wider public sector context, where

trust in AI-driven decisions determines not only citizen acceptance but also institutional legitimacy.

Taken together, the reviewed literature reveals three interconnected dimensions critical to assessing AI in public administration: digital readiness, which defines the capacity of states and institutions to adopt AI; organizational transformation, which ensures that human and structural factors align with technological innovation; and trust and accountability, which safeguard the legitimacy of AI-assisted governance. The novelty of the present study lies in combining these strands into a multidimensional framework that evaluates AI effectiveness using digital maturity indicators and KPIs tailored to Ukraine's governance context. By situating the Ukrainian case within international debates, this research contributes to bridging the gap between theoretical models of algorithmic governance and empirical realities in transitional and crisis-affected states.

Purpose of the article. The purpose of the research was to assess digital maturity and identify key performance indicators (KPIs) capable of measuring the effectiveness of AI use in public administration.

Method and methodology. The methodological design of this study was guided by the need to integrate theoretical approaches to assessing AI in governance with empirical evidence collected from Ukrainian public servants. The research employed a mixed-methods approach that combined conceptual analysis of international evaluation frameworks with quantitative survey data. This design ensured both the depth of theoretical grounding and the practical validation of findings in the specific institutional and socio-political context of Ukraine.

The study followed a two-stage procedure. In the first stage, a desk-based analysis of international methodologies for assessing AI in public administration was conducted. Eleven key frameworks - including AI Readiness Models, Algorithmic State Architecture (ASA), Human-in-the-Loop evaluation, Multi-Criteria Decision Analysis (MCDA), Public Value Approaches, AI Risk Management Frameworks, and AI Maturity Models - were systematically reviewed

and compared across six criteria: scalability, transparency, institutional integration, crisis resilience, result orientation, and quantifiability. This comparative analysis served as the conceptual foundation for identifying performance indicators and benchmarks relevant to the Ukrainian context.

In the second stage, an empirical survey was designed and administered to evaluate perceptions, experiences, and expectations regarding AI use in public administration. The survey instrument, developed in the form of a structured questionnaire, consisted of 16 items grouped into six thematic blocks: (1) respondent profile and professional background, (2) awareness and AI literacy, (3) practical experience of AI use, (4) perceived effectiveness and trust in AI systems, (5) institutional readiness for AI implementation, and (6) barriers and expectations related to AI adoption. The instrument included both closed-ended questions with multiple-choice and Likert-scale options and open-ended questions to capture qualitative insights. The design was informed by international surveys on AI governance and adapted to the Ukrainian administrative environment.

The survey sample comprised 95 respondents employed in different levels of public administration, including central government bodies, regional administrations, and local self-government institutions. More than half of the participants (54.7%) reported over ten years of professional experience in the public sector, while others represented younger cohorts with one to ten years of service. This ensured both the representation of senior officials with extensive institutional knowledge and younger specialists familiar with digital technologies. The survey was conducted online in 2024, during a period of intensified digital transformation initiatives under wartime conditions, which provided a unique contextual background for analyzing readiness and digital maturity.

Data analysis was carried out using descriptive statistics, frequency distributions, and comparative analysis of responses across groups of respondents. Key indicators included levels of AI literacy, perceived effectiveness of AI systems, degree of institutional readiness, and identification of barriers such as lack of funding, inadequate infrastructure, and insufficient staff qualifications. The results

were further contextualized by linking survey findings to international benchmarks such as the GovTech Maturity Index and OECD AI Principles, allowing for cross-national comparison of Ukraine's position in relation to global trends.

The methodological contribution of the study lies in combining the assessment of digital maturity with the design of KPI-oriented evaluation of AI in governance. The use of both theoretical models and survey-based evidence ensured that the analysis moved beyond abstract readiness scores to capture the lived realities of public servants. This dual approach makes it possible to propose a multidimensional framework for assessing AI effectiveness in public administration, one that integrates technical, organizational, and ethical dimensions into a single evaluative system.

The main material research. The empirical results of the study highlight both the opportunities and systemic challenges associated with integrating AI into public administration. The analysis is grounded in two complementary components: the evaluation of methodological frameworks for assessing AI effectiveness in governance and the results of an original survey of 95 Ukrainian public servants. Together, these findings provide a holistic picture of digital maturity, readiness levels, and the perceived impact of AI on public sector performance.

The survey results demonstrate that public servants in Ukraine are at an early stage of digital maturity, with fragmented experience in the application of AI systems. While 59% of respondents reported episodic or regular encounters with AI in their professional activities, a significant share (40%) admitted to having no direct practical engagement, knowing only of AI's potential from secondary sources. The dominant areas of application were citizen communication through chatbots (56.8%), data analytics and forecasting (23.2%), and document processing (16.8%). More specialized use cases, such as risk detection and threat monitoring, remain marginal (8.4%), suggesting that AI is primarily being adopted in low-risk, service-oriented functions.

An important dimension of digital maturity concerns the level of AI literacy and confidence in responsible use. Only about one quarter of respondents (24.2%)

confirmed they had sufficient skills and knowledge to use AI responsibly, while 45.3% openly acknowledged their lack of preparedness and expressed the need for targeted training (Table 1). Consistently, 73.7% highlighted training and capacity-building programs as the most necessary form of institutional support, followed by methodological materials (55.8%) and access to best practices (48.4%). This indicates a pronounced skills gap, where enthusiasm for digital transformation is not yet matched by institutional capacity or personal preparedness.

Table 1. AI Literacy and Awareness

Indicator	Percentage (%)
Sufficient AI literacy (skills/knowledge)	24.2
Partial literacy	26.3
No literacy	45.3
Need training	26.3

Source: authors development.

Respondents’ perception of AI effectiveness also illustrates cautious optimism. The majority rated AI systems in governance between 5 and 7 on a 10-point effectiveness scale, with 29.5% at level 6 and 15.8% at level 7, but only 2.1% considered them highly effective (score 10). This pattern suggests that AI is recognized as a promising tool, but its integration has not yet yielded transformative results. Trust in AI-assisted decisions reflects a similar ambivalence: while 62.1% of respondents partially trust such systems, only 30.5% expressed full trust, indicating the presence of credibility and explainability concerns. These findings are aligned with international data showing persistent skepticism among civil servants and citizens, where trust in algorithmic governance depends heavily on transparency, fairness, and clear accountability mechanisms.

Institutional readiness emerges as a critical barrier. More than half of respondents (58.9%) acknowledged the existence of pilot initiatives but not comprehensive strategies, while 25.3% confirmed the absence of any AI plans

within their institutions (Table 2). Only 14.7% reported that their organizations have clearly defined AI strategies. This reflects a lack of strategic direction and coherent governance frameworks, which are necessary to embed AI into long-term policy cycles. In terms of digital maturity, 47.4% of public servants rated their institutions as being at a “low” level of readiness, while only 7.4% considered their organizations highly mature.

Table 2. Institutional Readiness and Digital Maturity

Indicator	Percentage (%)
Clear AI strategy exists	14.7
Some initiatives, no strategy	58.9
No plans	25.3
Do not know	1.1
High digital maturity	7.4
Medium digital maturity	23.2
Low digital maturity	47.4
Difficult to answer	22.1

Source: authors development.

The perception of risks further underscores the fragility of the implementation process. Concerns were concentrated around workforce replacement by machines (54.7%), algorithmic bias and errors (51.6%), and privacy violations (49.5%) (Table 3). These anxieties correlate with limited technical infrastructure (47.4%) and insufficient staff qualifications (43.2%) as reported obstacles, illustrating a dual gap: both in technological systems and in human capital. Importantly, 54.7% of respondents insisted that AI deployment must be accompanied by strong ethical standards and transparency safeguards.

Table 3. Perceived Risks of AI

Risk Factor	Percentage (%)
Workforce replacement by machines	54.7
Algorithmic bias/errors	51.6
Privacy/confidentiality violations	49.5
Low citizen trust	28.4
Insufficient technical infrastructure	33.7
Other risks	9.5

Source: authors development.

Expectations regarding AI benefits reveal a pragmatic orientation. Public servants anticipate primarily operational gains: 61.1% expect a reduction in workload, 58.9% foresee improved citizen services, and 50.5% believe AI can enhance decision-making quality (Table 4). Only 17.9% identified cost optimization as a direct priority, which contrasts with global best practices where efficiency savings are often emphasized as key performance indicators. This suggests that in Ukraine’s context of wartime governance, resilience, service continuity, and responsiveness to citizens outweigh purely financial motives.

Table 4. Expected Benefits of AI

Expected Result	Percentage (%)
Workload reduction	61.1
Improved decision-making quality	50.5
Cost optimization	17.9
Improved citizen service	58.9
Other results	10.5

Source: authors development.

Comparative analysis of digital maturity indices further contextualizes these findings. While advanced GovTech leaders such as Estonia or Singapore achieve high readiness scores through integrated AI maturity models and algorithmic

governance frameworks, Ukraine's trajectory remains constrained by resource limitations, fragmented institutional strategies, and an ongoing crisis environment. The survey results mirror the methodological insights of AI readiness models, which highlight policy coherence, human capital, and infrastructure as core determinants of success. By contrast, frameworks such as Public Value Evaluation or Human-in-the-Loop emphasize inclusivity, accountability, and ethical safeguards - elements that Ukrainian respondents explicitly linked to their trust concerns.

Overall, the results reveal a complex picture. On the one hand, Ukrainian public servants recognize AI as a catalyst for improving decision-making, efficiency, and citizen service quality. On the other hand, limited skills, low institutional maturity, fragmented strategies, and ethical risks hinder transformative adoption. These findings support the argument that AI performance in public administration should not be evaluated solely by economic metrics but through a multidimensional lens of effectiveness, transparency, inclusiveness, and resilience.

In conclusion, the evidence demonstrates that Ukraine is in the initial phase of AI adoption in public administration, characterized by pilot initiatives, moderate awareness, and cautious trust. The country's digital maturity is lower compared to international benchmarks, but expectations of AI-driven improvements in service delivery and decision-making are high. To move from potential to measurable impact, it is essential to institutionalize AI assessment frameworks, develop clear KPIs for efficiency, transparency, and service quality, and build a structured roadmap for capacity development. Only by aligning methodological rigor with empirical realities can AI adoption in Ukraine's public administration transition from experimental use to strategic integration.

Discussion. The findings of this study align with and extend current research on digital maturity, AI adoption, and governance transformation. Tubis [28] emphasized that digital maturity assessment requires considering both organizational and process dimensions, which resonates with our results showing that institutional readiness and AI literacy are as important as technological infrastructure. Similarly, Krulčić et al. [14] proposed an adaptive AHP-based model

for digital maturity assessment in SMEs, confirming that multidimensional approaches are essential - a perspective consistent with our integration of KPIs across readiness, effectiveness, and trust indicators.

At the macroeconomic level, Magoutas et al. [17] demonstrated that ICT progression significantly contributes to GDP growth in EU countries, which supports our observation that countries with higher digital maturity scores, such as Estonia, outperform those with fragmented strategies. Lloret et al. [16] also showed that smart cities benefit from AI, IoT, and dashboards in accelerating digital transformation, reinforcing the notion that Ukraine's fragmented but evolving infrastructure could be strengthened through integrated data-driven frameworks.

Mishra et al. [18] argued that AI has the potential to revolutionize government operations, but only if transparency and accountability are ensured. Our findings of partial trust and high concerns about algorithmic bias echo these conclusions, highlighting the ongoing gap between potential and perception. Similarly, Brătucu et al. [7] found that AI's effectiveness in companies is strongly determined by digital maturity levels, mirroring our results that Ukrainian institutions with low maturity struggle to achieve meaningful AI outcomes.

In the financial domain, recent research also connects digital transformation to governance effectiveness. Koldovskiy [13] emphasized strategic infrastructure transformation in financial management, while Prokopenko et al. [23] highlighted blockchain's role in ensuring transparency in accounting. Shafranova et al. [26] extended this debate to CBDC and quantum systems, underlining that digital maturity is critical for trust in new technologies. These findings resonate with our observation that AI adoption in governance is inseparable from broader digital trust frameworks.

Rekunen et al. [24] confirmed that technology adoption drives public sector transformation but stressed the need for clear methodologies, which directly aligns with our aim to propose KPI-based frameworks tailored to Ukraine. Engin et al. [8] proposed the Algorithmic State Architecture (ASA) as a framework for evaluating AI maturity in government, emphasizing the need for multidimensional assessment.

Our results support this approach, as Ukrainian institutions showed uneven progress across literacy, strategy, and trust, illustrating that maturity must be measured holistically.

The challenges identified by Janssen and Kuk [11] regarding the limits of big data algorithms - particularly issues of bias, opacity, and institutional resistance - remain highly relevant, as our respondents expressed significant concerns over algorithmic errors (51.6%) and confidentiality risks (49.5%). This is echoed in the work of Nannini et al. [19], who highlight explainability as central to building trust in AI within public administration. Our findings of partial trust (62.1%) in AI-assisted decisions reinforce the argument that without explainability, citizen acceptance and institutional legitimacy remain fragile.

Global policy frameworks provide additional context. The OECD AI Principles [21] emphasize human-centered values, fairness, and accountability, while the OECD [20] highlights how governments increasingly leverage AI for growth. Both align with our conclusion that adoption must be accompanied by ethical safeguards and measurable KPIs to ensure trust and legitimacy. Similarly, Peeters [22] stresses the agency of algorithms in administrative decision-making, a theme visible in our data where civil servants cautiously acknowledged AI's usefulness but feared over-reliance without clear accountability mechanisms.

From a methodological standpoint, Rekunen et al. [25] developed an approach for assessing AI effectiveness in public administration, underscoring the role of performance indicators. Our study builds on this by operationalizing KPIs in the Ukrainian context, thereby contributing to a more context-sensitive framework. The sectoral analysis by Sun and Medaglia [27] further showed that AI in healthcare faced similar challenges of integration and trust, paralleling our results in public governance. Likewise, Wirtz et al. [31] underscored both opportunities and risks in applying AI across the public sector, a duality reflected in our respondents' optimism about efficiency and service quality gains alongside concerns about risks.

Finally, Latupeirissa et al. [15] confirmed that digitization initiatives significantly improve public service delivery but require long-term strategies and

institutional readiness. This observation aligns closely with our findings, where fragmented initiatives exist but comprehensive AI strategies are rare (14.7% of institutions).

Collectively, the literature supports our argument that AI effectiveness cannot be reduced to efficiency metrics alone but must be assessed through digital maturity, ethical safeguards, and trust-building mechanisms. Our results contribute by empirically validating these arguments in the Ukrainian context, thereby bridging conceptual models with practical realities.

Limitation. The study has several limitations that need to be acknowledged. First, the survey was conducted with a relatively small sample of 95 public servants, which restricts the generalizability of the findings across the broader public sector. Second, the research relied on self-reported perceptions rather than objective performance metrics, which may introduce bias in assessing digital maturity and the effectiveness of AI. Third, the analysis was limited to the Ukrainian context during wartime conditions, meaning that institutional challenges and resource constraints may differ significantly from peacetime or international benchmarks. Fourth, the study primarily compared existing international methodologies without implementing full-scale empirical testing of KPI frameworks in practice. Finally, the cross-sectional design does not allow for tracking changes in attitudes, readiness, or AI adoption dynamics over time, which would require a longitudinal approach for deeper insights.

Recommendations. Based on the findings, several recommendations can be proposed to strengthen the integration of AI in public administration. First, it is important to develop a national system for assessing digital maturity as part of key indicators of artificial intelligence effectiveness, which would meet both international standards and the specific governance context of Ukraine. Second, targeted training programs and continuous capacity-building initiatives should be introduced to enhance AI literacy among public servants and reduce the identified skills gap. Third, institutions should adopt hybrid evaluation methodologies that combine efficiency metrics with ethical audits, transparency requirements, and

citizen feedback to build trust in AI-driven decisions. Fourth, pilot projects need to be scaled into systematic strategies supported by clear regulatory guidelines and sustainable funding mechanisms. Finally, fostering international cooperation and knowledge exchange with leading GovTech countries can accelerate Ukraine's progress toward more resilient, transparent, and effective AI-enabled governance.

Conclusions. The conducted study confirms the high relevance of assessing digital maturity and developing KPIs for evaluating the effectiveness of artificial intelligence in public administration. In an era when governments are under constant pressure to deliver services more efficiently, transparently, and inclusively, the Ukrainian case demonstrates both the opportunities and constraints of AI integration in governance. The initial problem of fragmented evaluation approaches and the lack of unified assessment frameworks was successfully addressed by combining an in-depth review of international methodologies with empirical evidence drawn from a survey of 95 public servants.

All purposes and objectives of the research were achieved. The comparative analysis of eleven international evaluation frameworks made it possible to identify the advantages and limitations of existing approaches, highlighting the importance of scalability, transparency, institutional integration, and crisis resilience as critical dimensions of assessment. At the same time, the survey provided valuable insights into the state of digital maturity and readiness in Ukrainian public institutions. It revealed that while 59% of public servants already had episodic or regular encounters with AI in their work, only 24.2% demonstrated sufficient AI literacy, and 73.7% emphasized the urgent need for training and capacity building. Institutional readiness was shown to be limited, as only 14.7% of respondents reported the existence of clear AI strategies in their organizations, while 47.4% assessed their institution's digital maturity as low.

The findings also revealed a cautious optimism among public servants. AI was rated moderately effective (with most respondents placing it between 5 and 7 on a 10-point scale), and trust in AI-assisted decisions remained partial, with 62.1% of respondents indicating conditional trust. Key risks identified included workforce

replacement (54.7%), algorithmic bias (51.6%), and privacy concerns (49.5%), which mirror broader global debates on responsible AI governance. Nevertheless, expectations from AI adoption were pragmatic and positive: 61.1% of respondents anticipated workload reduction, 58.9% expected improved citizen services, and 50.5% anticipated better decision-making quality. These results demonstrate that despite resource constraints and institutional fragmentation, public servants perceive AI as a tool capable of delivering tangible improvements in efficiency, transparency, and citizen engagement.

The study concludes that Ukraine is at an initial stage of AI adoption in public administration, characterized by pilot projects, moderate awareness, and cautious trust, but lacking systematic strategies and advanced institutional maturity. Bridging this gap requires embedding KPI-based evaluation frameworks into national digital transformation policies, combining technical performance indicators with measures of transparency, inclusiveness, and accountability. By linking empirical evidence with international benchmarks, this research contributes to the development of a multidimensional framework for assessing AI effectiveness, tailored to the challenges of wartime governance and future post-war recovery.

Future research should build on these findings by expanding the sample size and including longitudinal data to capture the dynamics of digital maturity over time. More sophisticated quantitative methods, such as econometric modeling, could be employed to test causal relationships between AI readiness, institutional maturity, and perceived effectiveness. In addition, cross-country comparative studies would provide valuable insights into Ukraine's relative position within the global AI governance landscape and help identify best practices adaptable to its context. Finally, further research should address sector-specific assessments - for example, in healthcare, taxation, or social protection - where AI has the potential to generate measurable improvements in efficiency and public trust.

In summary, the study provides both theoretical and empirical evidence that the development of KPI-based digital maturity assessment systems is not only feasible but necessary for advancing effective, ethical, and resilient AI-enabled

governance in Ukraine. The article thus contributes original insights to the international discourse on algorithmic governance and sets a foundation for practical reforms in the evaluation and implementation of AI in the public sector.

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