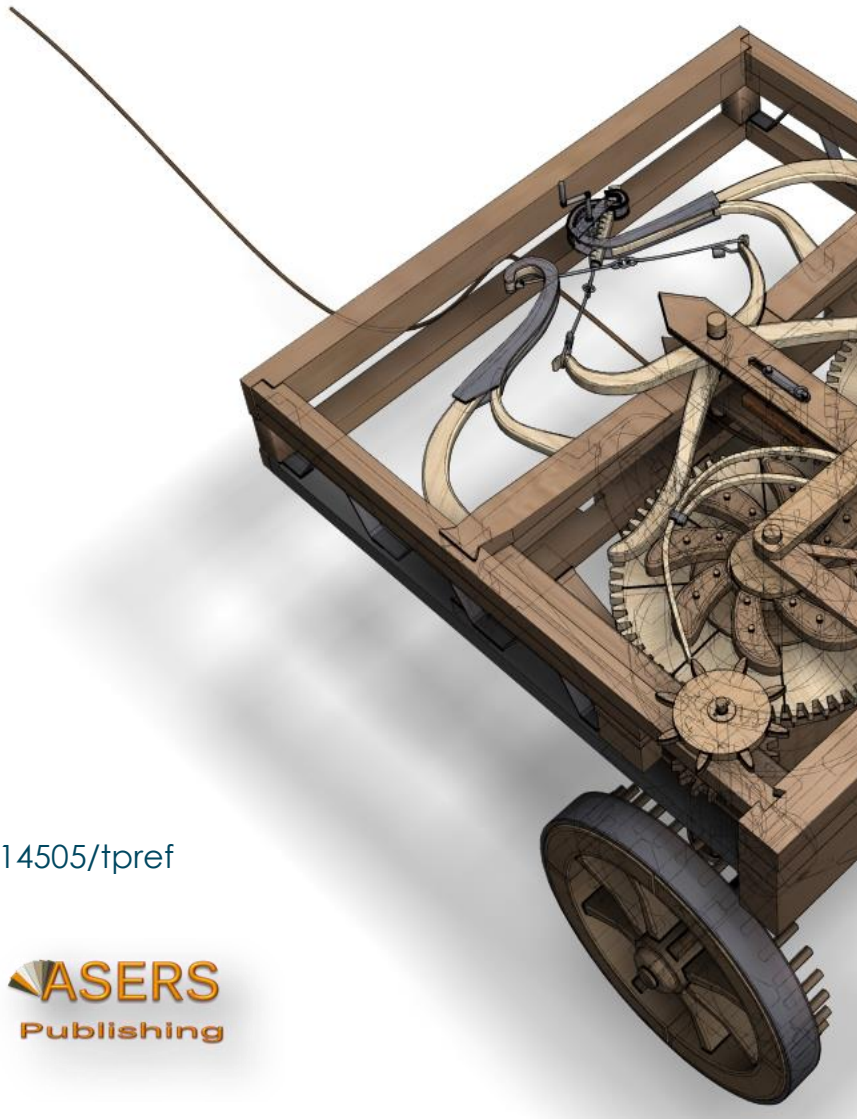
Theoretical and Practical Research in Economic Fields

Special Issue



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This Special Issue was created at the request of a group of researchers from Ukraine. It is a response to the challenging situation of Ukrainian scholars due to the Russian invasion as well as the growing demand for knowledge on Ukrainian issues.

We would like to express our endless thank to our colleagues, scholars from Ukraine who are working amid the war on topics that are important for all. Also, we thank all our international authors for their valuable contributions to this Issue.

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The Influence of the Digital State on Preventing and Detecting Corruption in Ukraine

Yuliia KOBETS
Department of Political Institutions and Processes
Faculty of History, Politology and International Relations
Vasyl Stefanyk Precarpathian National University, Ukraine
ORCID ID: 0000-0001-9492-6119
uliapakul@gmail.com

Mariia DIAKUR
Criminal Law Department, Faculty of Law
Yuriy Fedkovych Chernivtsi National University, Ukraine
ORCID ID: 0000-0003-3265-6584
mariia.dyakur@chnu.edu.ua

Anatolii KYSLYI
Educational and Scientific Institute of Law, Prince Vladimir the Great
Interregional Academy of Personnel Management, Ukraine
ORCID ID: 0000-0002-4152-9539
nadiaksl52@yahoo.com

Marina SHULGA
Department of Public Administration, Educational and Scientific
Institute of Public Administration and Civil Service
Taras Shevchenko National University of Kyiv, Ukraine
ORCID ID: 0000-0001-8929-8111
marinashulga69@i.ua

Iryna TOROPCHYNA
Interregional Academy of Personnel Management, Ukraine
ORCID ID: 0009-0000-6132-9545
Irabankova93@gmail.com

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Abstract: The impact of state processes digitalization on preventing and detecting corruption in Ukraine is a key aspect for understanding the effectiveness of governance and the development of modern strategies in the fight against corruption. The utilization of digital technologies has the potential to substantially enhance transparency and diminish corruption hazards within governmental frameworks. The purpose of the article is to examine this effect in relation to contemporary challenges and opportunities. The article demonstrates that digital systems integration, such as e-declaration and e-procurement, assists in mitigating prospects for corrupt practices and increases citizens' trust in government. Correlation analysis shows the relationship between digitalization level and anti-corruption measures' effectiveness, emphasizing the importance of technological innovations in public administration. The obtained results of the correlation analysis show a connection at the level of 0.438, which indicates a moderate positive correlation between digitalization level of government processes and corruption decrease. The recommendations point to the need for an integrated approach where digital intervention is combined with other anti-corruption measures, including legal reforms and public engagement, to attain more substantial outcomes in the fight against corruption. The conclusions of the article highlight the significance of advancing digital infrastructure and legislative support for digital initiatives. The article draws attention to the imperative need to integrate digital strategies with the comprehensive anti-corruption policy in order to maximize their effectiveness and positive impact on society.

Keywords: digital state; fight against corruption; digitalization; corruption; innovations; cyber security.

JEL Classification: E69; D73; H89.

Introduction

The issue of corruption in Ukraine is deeply entrenched in its history. stretching from the Soviet past to the present. After the USSR collapse and the declaration of independence of Ukraine in 1991, the country faced numerous challenges, among which corruption persisted as a paramount concern. Systemic corruption schemes, which included abuse of power, bribery and inefficient management of public resources, became a major obstacle to the country's democratic and economic development. The extant issues have adversely affected Ukraine's global reputation, thereby hindering the progression of its European integration and calling into question the country's ability to carry out effective reforms.

The development of digital technologies and a new approach as a digital state emerged in Ukraine as a response to corruption-related challenges. Digitalization of government processes has opened opportunities for increasing transparency, reducing bureaucratic barriers and implementing effective control mechanisms. Initiatives such as the introduction of e-declaration, e-procurement and open data have become important steps towards government processes' modernization and democratization in Ukraine. Such measures contributed to increasing civil servants' responsibility and mitigating prospects for corrupt practices.

Europe's experience in the field of detecting and preventing corruption can serve as a valuable reference point for Ukraine (Tavolzhanskyi *et al.* 2023). Estonia, Finland and Denmark have demonstrated the effectiveness of using digital technologies in the fight against corruption. The aforementioned countries have implemented complex electronic governance systems, which ensured a high transparency level and citizen participation in public administration. Ukraine can assimilate this expertise by tailoring European methodologies to its unique circumstances and requirements.

In 2022, the war erupted in Ukraine; it ushered in novel obstacles to detecting and preventing corruption. In wartime, the importance of effective and transparent resource management becomes even more urgent (Miliienko, 2023). Overall, military conflicts often create a favorable environment for corrupt practices, which can undermine defense measures effectiveness and country's recovery. Ensuring transparency and control under martial law is critical to maintaining state's stability and security. The study of digital state's impact on preventing and detecting corruption in Ukraine opens new perspectives for understanding the role of technological innovations in modern governance. In light of the war hostilities, it is imperative to utilize all feasible methods in order to guarantee stability and transparency. These are crucial elements for ensuring citizens' trust and promoting sustainable development within the state.

The purpose of the study is to analyze the impact of state processes digitalization on preventing and detecting corruption in Ukraine. The main tasks are determined within the study framework: 1. Establish a connection between public services digitalization and the effectiveness of the fight against corruption, using the European countries' experience. 2. To assess the effectiveness of modern European approaches regarding the reduction of corruption risks, focusing on comparative analysis with best practices. 3. To elaborate recommendations for improving digital processes and strategies in the fight against corruption, considering proposals for technological innovation, regulatory and legal changes and public engagement.

1. Literature Review

The issues of the digital state for preventing and detecting corruption in Ukraine are discussed among researchers who focus on technological innovations and digital systems integration into government processes. Contemporary studies into digital state's impact on preventing and detecting corruption in Ukraine present a range of divergent approaches perspectives and methodologies within existing literature. Astakhov (2023) emphasizes the importance of government processes digitalization as a key factor in the fight against corruption. According to Miroshnyk *et al.* (2023), the implementation of electronic documentation systems and control over public procurement can significantly reduce the corruption risks. As noted by Bratić *et al.* (2023), the success of European countries in the field of state's digitalization ensures the transparency of public services and increases citizens' trust. Letki *et al.* (2023) emphasize the blockchain technologies' potential in the fight against corruption, as they ensure data integrity and transparency Further, Corrado *et al.* (2023) emphasize the importance of integrating digital technologies into government processes from a technical point of view and from the point of view of changing management culture and practices. Guo *et al.* (2023) argue that digitalization should be developed accordingly through reforms of government institutions and increased awareness among citizens. Existing ideas are supported by Kanojia *et al.* (2023), noting that digital technologies' effective use requires a clear strategy and political will. Cazacu *et al.* (2023) highlights the potential risks of digitalization, such as the possibility of using digital data for illegal surveillance or political pressure. As noted in Shevchenko (2023) research, Ukraine has substantial prospects for the integrating digital advancements in its public governance. Yet this requires a comprehensive approach, including staff training,

public involvement, and improving legislation. Maslii *et al.* (2018) underscore the need to create strong institutional and legal foundations to support digital transformation. At the same time Pchelina (2022) examines examples of EU countries where digitalization contributed to increasing governance efficiency and reducing corruption. According to Karpacheva and Hock approach (2023), Ukraine can emulate the best practices of said nations, adapting them to its unique conditions and challenges. Balliu (2023) emphasizes the importance of integrating digital technologies into public administration, as such innovations can significantly increase the effectiveness of monitoring and analysis of state processes, reducing the possibility of corruption. Furthermore, Sokolenko (2023) confirms the practice that the introduction of electronic systems in public procurement has reduced corruption level in a numerous ministries and departments. Aldieri's *et al.* (2023) opinion focuses on the need for developing a regulatory framework that would support and regulate the digitalization process, as it ensures the legality and transparency of utilizing digital solutions. The significance of civil society in relation to digitalization and the fight against corruption is emphasized in the work by Kalienichenko and Slynko (2022), since the citizens' active involvement and digital literacy are key to the successful implementation of digital innovations. According to Motuzna and Reznik (2022), public involvement contributes to greater government actions' transparency and increases the level of trust and support for these initiatives. Tokarieva and Golub (2023) draw attention to the need to take into account local features and challenges when tailoring European digitalization experience to Ukraine. Shylo (2023) emphasizes that the effectiveness of digital initiatives depends on their relevance to local conditions and needs. Hrudovenko (2023) claims that in order to achieve significant results, Ukraine needs to implement comprehensive strategies that combine technological innovations, institutional reforms and active public involvement. Such an approach will enable not only detecting and preventing corrupt actions, but also contributing to the elaboration of a more transparent and effective governance. Tsymbalenko (2021) considers digitalization as part of a broader process of modernizing public administration. Anishchenko and Oharenko (2023) posit that the digital transformation in Ukraine has ushered in an era of increased governmental transparency, making it harder for corrupt practices to remain undetected. This sentiment is echoed by Cozma *et al.* (2023), where highlights the introduction of e-governance systems as instrumental in streamlining public services and reducing opportunities for corrupt interactions between citizens and state officials. Was provided an in-depth analysis of how e-procurement systems, by ensuring openness and competitive bidding, significantly lower the chances of corrupt deals (Kornienko and Tertyshnyk, 2021). Similarly, Vasylchyshyn (2021) discusses the role of electronic registries in promoting land transparency, thereby preventing fraudulent land transactions and misuse. Loishyna *et al.* (2019) emphasize the blockchain's capability to provide immutable records and secure transactions, which can be particularly effective in safeguarding state assets and preventing tampering with official documents. The researchers emphasize that the success of such initiatives depends on their integration with national development goals and strategies. Thus, the conducted analysis of the literary sources underscores the importance of a comprehensive approach that includes both technological and institutional changes, as well as the active participation of civil society to effectively address the problem of corruption and the development of a digital state in Ukraine.

2. Materials and Methods

To conduct this study, an analysis of data from open sources was used, which includes statistical data and information on corruption indices and the level of digitalization. To undertake this study, an examination of data from publicly available sources was utilized, encompassing statistical data and details regarding corruption indices as well as digitalization levels. The major sources of information were resources such as Transparency International (2023) and Statista (2023), which provide updated and verified data on various aspects of global corruption as well as the digital economy. Transparency International is a leading international organization in the fight against corruption, and Statista provides a wide range of statistics data from various areas. The utilization of said resources facilitated the attainment of research objectivity and reliability.

Research methods include quantitative and open-source data analysis. The use of quantitative analysis makes it possible to objectively assess trends and relationships between different variables, such as corruption level and digitalization across different countries. Accordingly, sources that provide comprehensive information, including reports and databases, were used to collect data, allowing for qualitative analysis and conclusions.

The sample for the study covers Ukraine and European countries with a high digitalization level. This choice was made on the basis of previous analysis, which showed a potential connection between the countries' digitalization level and their corruption ratings. European countries with a high digitalization level tend to show low levels of corruption, which makes them ideal to be analyzed and compared with Ukraine, where digitalization is still developing and where high corruption levels pose a serious problem.

Correlation analysis and the use of statistical data processing served as the principal research tools.

Correlation analysis enabled the determining the extent to which digitalization levels and corruption indices are interconnected across various countries. The use of statistical methods made it possible to process large amounts of data and identify significant trends and patterns that can be used to develop strategies and policies.

Research ethics and relevant criteria are a crucial research component. All data were collected and analyzed in compliance with the principles of transparency, objectivity and confidentiality. It was ensured that information derived from various sources did not violate copyright or any other legal statutes. The ethical dimension of disseminating the research findings was also considered to preclude erroneous inferences or bias.

3. Results

The significance of the digital state in relation to preventing and identifying corruption in Ukraine has become particularly pertinent amidst ongoing military operations unfolding since 2022. The war that broke out in Ukraine has significantly impacted every facet of the nation's existence, particularly its economic stability and operational procedures. During this critical period, the fight against corruption becomes even more urgent, as its schemes undermine citizens' trust in the state, and significantly harm the country's defense capability and recovery. Public services' digitalization plays a key role in countering this problem. The adoption of clear electronic management systems guarantees transparency and hinders any potential for corrupt practices. A crucial aspect of the digital state lies in its capacity to collect, analyze and visualize copious amounts of data, thereby enabling effective detection and analysis of potential corruption risks. The contemporary digital state advocates for the civic society engagement in overseeing the actions taken by governmental entities, providing tools for public control and reporting. Consequently, the government's level of trust and accountability towards its citizens is elevated, while simultaneously creating a barrier to corruption, ensuring a stable and effective system of governance in a country during a military conflict.

Analyzing the Table 1 of corruption indices in Ukraine in recent years, it is feasible to discern specific patterns and identify key features in the fight against corruption. Since 2015 with an index of 27, Ukraine has shown certain progress. However, this growth is not permanent, as the index rose again to 32 points in 2018, but then decreased again to 30 points in 2019. It was crucial to maintain stability in the index (33 points) during 2022, despite the ongoing military conflict and its resulting aftermath. This indicated that combating corruption remains a top priority amidst the challenging conditions of war and crisis.

Table 1. Historical Corruption Data (index points) by years in Ukraine

Data	Period	Date
33	2022	31.01.2023
32	2021	04.04.2022
33	2020	02.02.2021
30	2019	23.01.2020
32	2018	29.01.2019
30	2017	22.03.2018
29	2016	11.08.2017
27	2015	31.12.2015

Source: Compiled from Transparency International (2023)

The dynamics of corruption indices illustrate the multifarious nature of combating corruption in Ukraine, where substantial endeavors and reforms alternate with periods of reduced action or the influence of crisis scenarios. At the same time, the stability of the index in recent years may be a sign of the growing resistance to corruption challenges on part of state institutions and society, especially during the war period. The digitalization index of Ukraine in 2023 was 0.632 points, and in 2022 it was 0.651 points out of the maximum one. To detect and prevent corruption, it is necessary to focus on foreign countries with a high level of digital development, described in more detail in Table 2.

Notably, countries that have not traditionally been considered digital leaders are also showing significant growth. For example, Spain and Germany showed a steady increase in their indices from 40.52 and 33.44 in 2017 to 60.77 and 52.88 respectively in 2022.

Table 2. Digital economy and society index (DESI) scores for the European Union

Characteristic	2017	2018	2019	2020	2021	2022
Finland	47.85	50.37	54.14	58.43	63.16	69.6
Denmark	46.48	48.69	52.05	55.97	65.25	69.33
Netherlands	45.59	48.06	50.52	54.68	62.36	67.37
Sweden	45.71	48.74	51.96	55.75	60.49	65.22
Ireland	41.34	44.1	46.7	50.81	57.11	62.74
Malta	41.69	43.85	47.45	51.52	54.46	60.88
Spain	40.52	43.37	47.04	49.72	54.81	60.77
Luxembourg	43.83	45.82	47.73	51.2	55.04	58.85
Estonia	41.34	43.98	46.57	49.05	53.15	56.51
Germany	33.44	35.3	38.35	42.06	47.07	52.88

Source: Compiled based on Statista (2023)

Current trends indicate that digital transformation is becoming a priority not only for traditionally 'technological' countries, but also for other European states. The positive growth is due to various initiatives, including government programs to support digital education, the development of broadband infrastructure and the encouraging innovation within the private sector. The dynamics of the DESI indices reflect the tendency towards a gradual but consistent digitalization increase in the countries of the European Union. Efficient administration is paramount to foster economic growth and increase competitiveness, while improving the standard of living through enhanced access to digital services, education and prospects. Digital transformation in Europe is widespread and diverse, covering various aspects of the economy and social life. We will analyze the corruption indices in Europe for 2022 in Table 3.

Table 3. Corruption Index in Europe, 2022

Country	Last	Previous
Finland	87	88
Denmark	90	88
Netherlands	80	82
Sweden	83	85
Ireland	77	74
Malta	51	54
Spain	60	61
Luxembourg	77	81
Estonia	74	74
Germany	79	80

Source: Compiled from Transparency International (2023)

Information on corruption in Europe shows that countries with high levels have fewer cases of corruption in the state and economy. Considering the peculiarities of integrating digital technologies in the European market, its favorable influence is evident in the advancement of digital technologies and electronic governance, as well as in promoting transparency and accountability within governmental structures. The development of digital tools that provide easier access to information and increase data openness can play a key role in countering corrupt practices. Strengthening the digital infrastructure and integrating technological innovations into social and political life can become an essential component in strengthening transparency and fighting corruption in Europe. The use of correlation analysis will be key to identifying possible relationships between a country's digitalization and its corruption index, so its results are shown in Table 4.

The obtained result indicates the existence of a moderately positive relationship between digitalization and a low corruption level. However, the p-value of the significance level is about 0.21, which is above the usual threshold of 0.05 for statistical significance. There is a certain positive relationship between public sector's higher digitalization and a lower corruption level. Taking into account the possible dependence on digital state's effectiveness, it is necessary to implement measures for Ukraine based on digitalization in Europe, the main ones are presented in Table 5.

Table 4. Results of digitalization and corruption index correlation analysis

Country	Digitalization index of the public sector among European countries	Index of corruption among European countries	X·Y	X_2	Y_2
Finland	69.6	87	6055.2	4844.16	7569
Denmark	69.33	90	6239.7	4806.6489	8100
Netherlands	67.37	80	5389.6	4538.7169	6400
Sweden	65.22	83	5413.26	4253.6484	6889
Ireland	62.74	77	4830.98	3936.3076	5929
Malta	60.88	51	3104.88	3706.3744	2601
Spain	60.77	60	3646.2	3692.9929	3600
Luxembourg	58.85	77	4531.45	3463.3225	5929
Estonia	56.51	74	4181.74	3193.3801	5476
Germany	52.88	79	4177.52	2796.2944	6241
Amount	624.15	758	47570.53	39231.8461	58734

Source: calculated by the author

The correlation analysis between the Public Sector Digitization Index and the Corruption Index for the specified European countries shows a correlation coefficient of 0.44 (0.438).

Table 5. Measures to detect corruption in Ukraine based on European countries' experience

West	Description	European example
Implementation of the DESI index	The DESI index measures digitalization level of the economy and society. It was introduced in 2023, will be implemented in Ukraine from 2024, which will be a prerequisite in deterring corruption by monitoring digitalization effectiveness.	Estonia - the DESI index as a basis for assessing digitalization level and anti-corruption effectiveness.
Development of the electronic procurement system ProZorro	ProZorro makes the public procurement process more transparent and efficient.	Poland - the electronic procurement system 'e-Zamówienia' is similar to ProZorro
Using the e-declaration platform	A platform for submitting and monitoring officials' declarations regarding their income and property.	Sweden - 'Min Myndighetspost' platform for e-declaration
Implementation of the project 'Action. Digital education'	An educational resource for enhancing citizens' digital literacy.	Finland - 'Kansalaisten Digitalainen Sivistystyö' program for digital education
Launch of electronic justice	Simplifying and making the judicial process more transparent through digital technologies.	The Netherlands - the 'Rechtspraak' system for electronic justice
Automation of processes in public services	Automation of services to reduce the human factor and potential corruption risks.	Denmark - 'Borger.dk' service for automated government services
Implementation of electronic document management in government structures	Efficiency and transparency in documentation management.	Norway - the 'Altinn' system for electronic document management
Development and implementation of the mobile application 'Diya'	Allows citizens to receive government services and manage documents online.	Latvia - mobile application 'Latvija.lv' for access to public services
Creation of the Anti-Corruption Center in the field of public procurement	Monitoring and analysis of public procurement to identify corruption schemes.	Lithuania - 'CPO LT' system for monitoring public procurement
Implementation of the DESI index	The DESI index measures digitalization level of the economy and society. It was introduced in 2023, will be implemented in Ukraine from 2024, which will be a prerequisite in deterring corruption by monitoring digitalization effectiveness.	Estonia - the DESI index as a basis for assessing digitalization level and anti-corruption effectiveness.

Source: developed by the author

Currently, Ukraine faces a number of formidable obstacles, which include economic stability, political instability, military conflicts and corruption problems. One of the key obstacles on the way to socio-economic development and European integration is corruption. Basically, corruption undermines trust in government institutions, limits investment and the effectiveness of public administration. Modern challenges require innovative approaches and bold solutions to implement effective mechanisms to fight corruption and increase governance transparency.

European experience in the field of digitalization and e-government can become a significant source of inspiration for Ukraine. Accordingly, implementing digital technologies in the spheres of public administration, education, health care and social services can significantly increase the efficiency and transparency, reducing opportunities for corruption. Digital platforms for e-declaration, e-procurement and open data provide greater access to information, allowing the public to actively participate in monitoring and controlling government activities. Such initiatives, already successfully implemented in EU countries, can be adapted to Ukrainian realities, contributing to a more open and responsible management system. Improving the current situation in Ukraine depends on the country's ability to integrate positive European experience and adapt it to its own needs. It involves not only technological integration, but also the legal and regulatory framework, institutional capabilities strengthening and civil society development. A crucial factor lies in securing the backing of global allies and assimilating into Europe's economic and political framework, which will provide Ukraine with additional resources and opportunities to overcome internal challenges. Such a comprehensive approach can be a guarantee of achieving significant progress in the fight against corruption, increasing the government transparency and the overall nation's progression towards conforming to European norms and standards.

4. Discussions

Further investigation is needed to explore the impact of the digital landscape on anti-corruption measures in Ukraine and advance technological advancements. Unlike Aldieri *et al.* (2023), who focuses on the successes of using electronic systems in public procurement, the own study also notes the need for further development of the regulatory framework to support digital transformation. The obtained results also reflect Bratić *et al.* (2023) viewpoint concerning the pivotal function of civil society and digital proficiency, underscoring the significance of citizens' dynamic involvement in digital transformation procedures. At the same time, the conclusions regarding the necessity of amalgamating digital revolution with national development objectives and tactics (Bahoo *et al.* 2023) contrast with the viewpoint of Cazacu *et al.* (2023), who emphasizes the need for a broader approach that includes institutional reforms. Our research indicates that digitalization is not a cure-all solution for combating corruption in Ukraine, but rather an essential component of a comprehensive approach. This coincides with the conclusions (Shovkun 2023) about the adaptation of European experience to local conditions. According to Hrudovenko (2022), the importance of the cultural factor and mentality features that can influence the implementation of digital solutions is emphasized, which remains uncertain and requires further analysis. Letki *et al.* (2023) findings corroborate their own evaluations regarding the assimilation of a comprehensive perspective on the intricate and diverse character of the digitalization, its procedure in Ukraine drawing upon on the experience of European countries. The proposed hypothesis is reflected by Kubbe and Panov (2023) findings regarding the practical effectiveness of innovations in public administration. Unlike Kolomoiets and Makarenkov (2021), who focuses on Europe's successes in detecting corruption, the study demonstrates that Ukraine needs to take into account both European and Ukrainian experiences. This approach is supported by Kanojia *et al.* (2023) and Mmakwena *et al.* (2023) opinions about digital technologies' potential, as the study considers promising the utilization of cloud systems and innovative solutions. However, Shylo (2023) emphasizes the need for a clear strategy for the effective use of digital technologies. It was found that digitalization in Europe has a correlation with the economy digitalization level. Thus, the discourse expands the horizons of comprehending how digitalization can impact anti-corruption endeavors in Ukraine and highlights the necessity for additional investigation and formulation of explicit tactics to detect and overcome it.

Conclusions and Further Research

The research conducted indicates that the digitalization of state processes is crucial in combating corruption within Ukraine. The implementation of digital technologies, such as electronic declaration systems, e-procurement and access to open data, contributes to increasing transparency as well as government structures accountability. That said, the proposed initiatives can significantly reduce opportunities for corruption while also increase citizens' trust in state institutions. Digitization opens up new opportunities for involving citizens in control and decision-making processes at the government level, which can increase the level of citizen participation and responsibility. Further development will foster a culture of transparency and accountability in government, which is critical for detecting

corruption. An essential aspect is the enhancement of global collaboration concerning the transfer of knowledge and best practices of digital transformation, which provides Ukraine with additional resources and knowledge for the effective implementation of these technologies. The process of digital transformation cannot be standardized and necessitates a thorough and all-encompassing strategy that includes institutional reforms, a change in management culture, and the active involvement of civil society.

However, digitalization is associated with certain problems and global challenges. For instance, there is a risk of abuses in data privacy and digital surveillance, which can undermine citizens' trust in digital initiatives. Technical aspects of digital transformation, including ensuring cybersecurity and systems' reliability, are critical to prevent new forms of corruption. Given the above, it is important to take into account the risks associated with the digital divide and unequal access to digital technologies among different regions and social groups. The circumstances require meticulous strategizing and implementation of inclusive policies to ensure that the benefits of digitalization are available to all citizens, regardless of their location or socio-economic status. It is imperative to prioritize the cultivation of digital literacy among both the general populace and public officials as they play a crucial role in the efficacious integration and utilization of digital innovations.

In the light of the conducted analysis, it is necessary to provide recommendations in accordance with key measures to improve the situation in Ukraine. It is crucial to devise and execute all-encompassing plans for digital transformation that take into account the specifics of the Ukrainian landscape, including institutional, legal and cultural aspects based on European experience. The emphasis ought to be placed on fortifying the cybersecurity and data safeguarding infrastructure in order to ensure digital systems' reliability and security. It is imperative to elevate the standard of digital proficiency and aptitude in utilizing technological resources among both the citizens and civil servants. The suggested measures, in conjunction with an open dialogue between the government, civil society and the private sector, will facilitate the development of a transparent and reliable digital governance system that will effectively fight corruption and increase citizens' trust in public institutions.

Credit Authorship Contribution Statement

The authors equally contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

Declaration of Competing

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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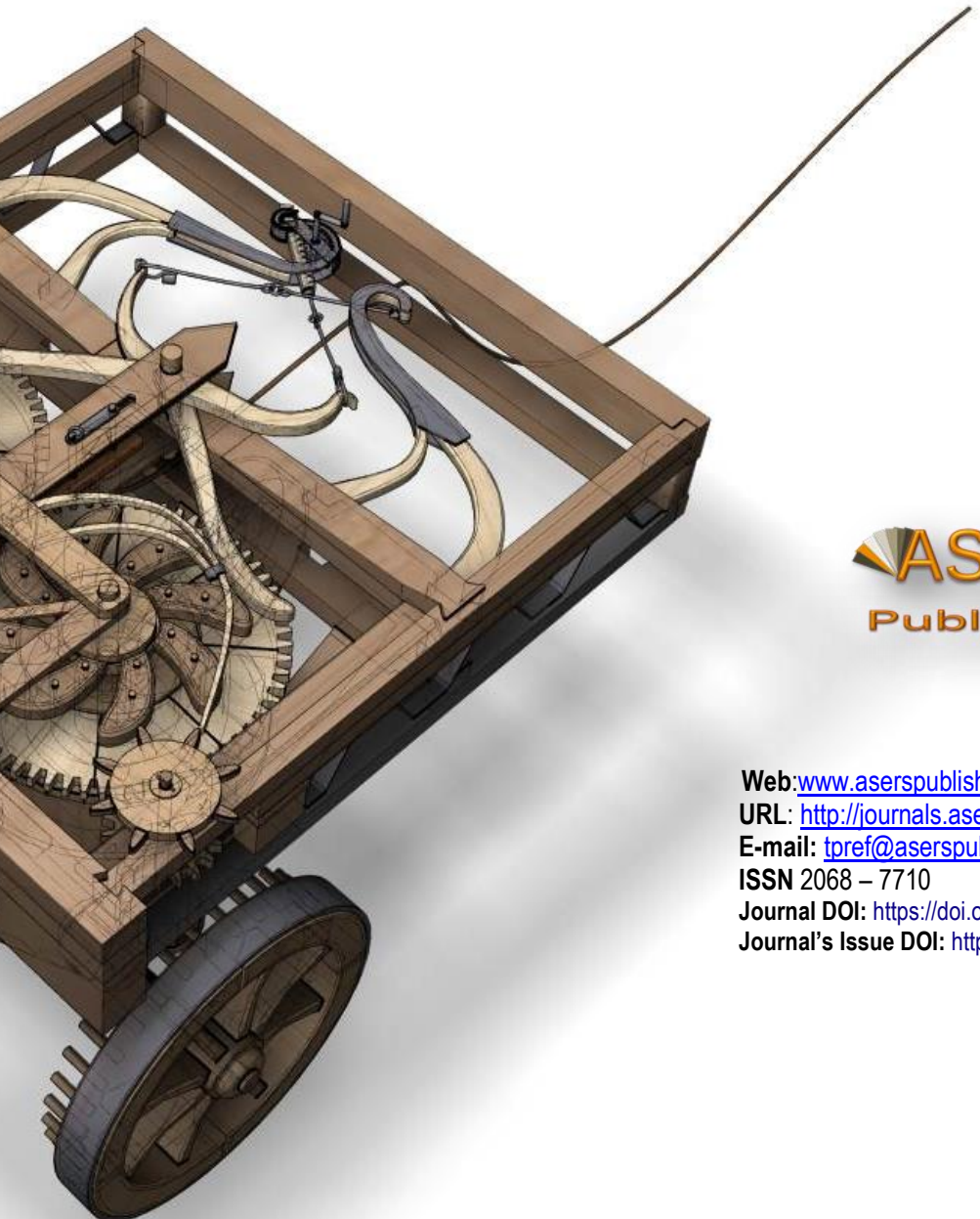

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