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ENHANCING INSTITUTIONAL CAPACITY
OF THE ICT-ENABLED GOVERNANCE DURING THE TIMES OF WAR

Background. *The use of information and communication technologies (ICTs) has become increasingly pervasive in governance processes, offering new opportunities and challenges for governments around the world. ICTs contribute to enhancing the institutional capacity of governments to fulfill their responsibilities and improve the delivery of public services. During times of conflict, such as the ongoing war in Ukraine, the utilization of ICTs in governance becomes even more critical and complex. This research aims to investigate the digitalization challenges and strategies associated with the use of ICTs in governance during the war in Ukraine. The study seeks to shed light on the unique digitalization landscape in this challenging environment by examining the vulnerabilities and threats faced by government systems and communication networks in the context of an armed conflict. Furthermore, the study delves into the identification of best practices and policy gaps providing recommendations to strengthen the digitalization of ICT-enabled governance settings during times of war and aftermath. By drawing attention to successful approaches and lessons learned, this research article aims to contribute to the development of robust digitalization strategies that can withstand the unique challenges presented by armed conflicts. The subject of this study is the digitalization strategies and ICT-enabled governance measures adopted by the Ukrainian government during the ongoing war.*

Methods. *To investigate the digitalization challenges and strategies in ICT-enabled governance during the war in Ukraine, a diverse and multi-faceted methodology was used. The following research approach included a literature review, a case study based on the open sources from Ukrainian state authorities and donors' reports on digitalization and e-governance, data, and cross-case analysis. However, the comprehensiveness of the methodology remains a subject of debate, highlighting the need for ongoing discussion and refinement in future research.*

Results. *The research findings indicate that the Ukrainian government has undertaken proactive measures to ensure the sustainability of public e-services, digital security, and the integrity of governmental ICT infrastructure, and to safeguard personal data throughout the conflict. The analysis is based on empirical evidence gathered from literature reviews, case studies using open sources from Ukrainian state authorities, and cross-case analysis, which allows for a thorough assessment of the effectiveness of these digitalization measures. Key findings include the identification of best practices and policy gaps, providing recommendations to strengthen the digitalization of ICT-enabled governance settings during times of war and aftermath. This structured approach ensures that the results are clearly derived from the described methodologies.*

Conclusions. *The research utilized a variety of methods, including a literature review, case studies based on open sources from Ukrainian state authorities, and cross-case analysis. This approach allowed for a thorough assessment of the digitalization challenges and strategies associated with ICT-enabled governance during the war in Ukraine, providing a solid foundation for the analysis of the effectiveness of digitalization measures.*

The study revealed that while the E-government 3.0 concept represents the most current and mature form of e-governance internationally, Ukraine has yet to develop a comprehensive e-governance strategy for both pre-war and post-war periods to achieve the same level of progress. The lack of detailed evidence-based policy justification for implementing digital transformation is still a significant barrier. Additionally, the outdated legislative framework and institutional governance model are the key obstacles, with piecemeal legislative updates failing to address the fundamental issues. This disconnect between strategic goals and current technological trends underscores the need for a thorough legislative overhaul to align with up-to-date requirements. The instability and underfunding within the Ukraine's National Informatization Program, which suffers from numerous normative and institutional deficiencies is the best illustration of such disorder. This program's effectiveness is further hampered by its excessive dependence on the current political and economic situation.

The study recommends a comprehensive review or replacement of the National Informatization Program with more practical documents. A crucial objective of the updated program should be to ensure the proper functioning of the National System of Indicators for Information Society Development and the National Register of Electronic Information Resources. The reinstatement of annual reports on the state of information society development is also suggested to provide valuable insights for adjusting strategic ICT development documents.

Furthermore, the ongoing war in Ukraine has highlighted critical needs for an updated and comprehensive e-governance strategy to support the country's recovery and reconstruction efforts. The study suggests that conceptualizing the Government 3.0 concept in public strategic documents, coupled with the allocation of international donor funds with appropriate oversight, can enhance government service efficiency and accessibility. Leveraging advanced technologies such as Artificial Intelligence, Block chain, and data analytics can improve decision-making processes and enable evidence-based policy formulation. The study also emphasizes the importance of training programs for civil servants to enhance their digital literacy and skills, as well as establishing dedicated units or agencies to oversee e-governance initiatives and coordinate cross-sectoral collaboration. The conclusions provide a clear and structured summary of the findings, ensuring that the results are directly linked to the described methodologies and the overall aim of the research.

Keywords: *e-governance, digital governance, ICT-enabled governance; institutional capacity; public administration during war; public administration, public policy recommendations.*

Background

The use of information and communication technologies (ICTs) has become increasingly pervasive in governance processes, offering new opportunities and challenges for governments around the world. However, during times of conflict, such as the ongoing war in Ukraine, the utilization of ICTs in governance becomes even more critical and complex. The war in Ukraine has not only brought about significant geopolitical and humanitarian consequences but has also posed unprecedented digitalization challenges for the government and significantly decreased the predictability of the e-governance strategy.

This research aims to investigate the digitalization challenges and strategies associated with the use of ICTs in governance during the war in Ukraine. By examining the vulnerabilities and threats faced by government systems and communication networks in the context of an armed conflict, the study seeks to shed light on the unique digitalization landscape in this challenging environment.

This research used the terms e-governance, digital government, and online government as synonyms. While digital government is the most used term in the US, electronic government is most common elsewhere according to the concept proposed by Grönlund and Horan in 2005 (Grönlund, & Horan, 2005).

Within the last decade use of the modern technologies by the government of Ukraine for the provision of public services increased significantly. In addition, the importance of cybersecurity measures aimed at maintaining and securing governmental systems that process sensitive data about citizens of Ukraine and provide public e-services became a top priority under the ongoing military and cybersecurity attacks on the governmental infrastructure.

According to the report of the State Service of Special Communication and Information Protection of Ukraine – SSSCIP, 2,194 cyber incidents were proceeded manually by the governmental security operation center (CERT-UA) in 2023 (Russia's cyber tactics: Lessons learned 2022, 2023). At the same time, 1,148 critical and high-level incidents were investigated and mitigated by the CERT-UA. The war in Ukraine has created an environment where malicious actors exploit digital technologies to launch cyber attacks and disrupt governance processes. The government's reliance on ICTs for communication, decision-making, and the delivery of public services has made them particularly vulnerable to cyber threats. Understanding the specific vulnerabilities and risks that arise from this complex interplay between ICTs and armed conflict is crucial for formulating effective digitalization strategies.

Based on SSSCIP 2022 report, the objectives of cyberattacks were cyber espionage, aiming to gain continuous access and persistence within the targeted systems. Additionally, destructive activities were observed, indicating attempts to disrupt or damage critical infrastructure and government systems. Psychological operations were also identified as a goal, suggesting efforts to manipulate or influence public perception and opinion. The Ukrainian governmental sector in 2022 witnessed a series of cyber incidents targeting various key entities. These entities included local authorities, key ministries, regional governmental organizations, and state-owned enterprises and factories. According to SSSCIP report (Russia's cyber tactics: Lessons learned 2022, 2023), the goals of the cyber operations against the government sector encompassed several objectives.

Another significant objective of cyberattacks on Ukrainian governmental resources was the compromising of personally identifiable Information data, potentially exposing the sensitive personal information of individuals associated with the government sector. Account compromise was also identified as a goal, indicating attempts to gain unauthorized access to government accounts and systems.

The security of governmental infrastructure is envisaged by the National Cybersecurity Strategy adopted in 2016 in response to large-scale attacks on its critical infrastructure (Cybersecurity in Ukraine, 2017). The main objective of the Strategy, along with its annual Action Plan, is to establish a secure cyberspace and promote its beneficial utilization for individuals, society, and the Government. The Strategy primarily concentrates on three key areas: the development of a national cybersecurity system, the enhancement of capabilities within the security and defence sector, and the assurance of cybersecurity for critical information infrastructure and Government information resources.

Since the start of the full-scale war in Ukraine, the severity and frequency of cyber operations targeting governmental organizations in Ukraine have been notable. CERT-UA detection systems have identified hundreds of such incidents, underscoring the persistent threat landscape faced by the Ukrainian government and highlighting the importance of robust cybersecurity measures to safeguard critical government infrastructure and information (Russia's cyber tactics: Lessons learned 2022, 2023).

Ukraine has been actively pursuing digital transformation since 2012, and the establishment of the Ministry of Digital Transformation in 2019 highlights the government's commitment to e-governance, ICT-driven governance, and citizen access to online services (Plantera, 2021).

The Ukrainian government has recognized the importance of cybersecurity in maintaining the integrity of ICT-enabled governance during the war. This research aims to contribute to the existing body of knowledge by identifying best practices and policy recommendations for strengthening digitalization in ICT-enabled governance during times of war. By drawing upon the experiences and lessons learned from the Ukrainian context, this article intends to provide practical guidance for governments and policymakers dealing with similar challenges globally.

In summary, this research article provides a comprehensive examination of the digitalization challenges and strategies in ICT-enabled governance during the war in Ukraine. By delving into the peculiarities of tailored e-governance measures adopted by the Ukrainian government during the war, the study aims to enhance our understanding of the intricate interplay between ICTs and armed conflict. The insights and recommendations derived from this research can inform the development of robust digitalization frameworks to safeguard ICT-enabled governance systems in conflict-affected regions.

Sources. The literature review examines key sources pertaining to the conceptualization of strategies for e-governance, including the ICT-enabled governance concept. These sources contribute to a comprehensive understanding of the theoretical frameworks, practical approaches, and unique dynamics associated with leveraging information and communication technologies for effective governance in Ukraine, particularly in the context of ongoing armed conflict.

Based on the e-governance concept (Rossel, & Finger, 2007) e-governance goes beyond the mere use of information and communication technologies (ICTs) in government processes. We may agree that e-governance encompasses a broader scope, including changes in administrative practices, service delivery mechanisms, and interactions between the government and citizens. In addition, e-governance may be defined as the transformative process that involves rethinking and reconfiguring governance structures and relationships.

We may agree to some extent with the conclusion that the concept of e-governance expands the scope of traditional e-government by encompassing not only the use of technology in government processes but also emphasizing broader societal and democratic dimensions (Finger et al., 2006). This shift requires reviewing of technology management practices, as it entails a more holistic and participatory approach that considers not only technological aspects but also social, political, and organizational factors.

The evolution of the e-government theoretical concept has progressed from basic electronic delivery of services (e-government 1.0) to the use of social media and Web 2.0 technologies (e-government 2.0), resulting in significant changes in the roles of citizens and governments in public service delivery (Vrabie, 2023). The advent of innovative technologies like artificial intelligence (AI), blockchain, and the Internet of Things (IoT) has facilitated the emergence of a modern e-government paradigm known as e-government 3.0. This updated iteration of e-government is anticipated to revolutionize public service provision and governance by incorporating cutting-edge technologies into governmental functions. By integrating these emerging technologies, e-government 3.0 holds the potential to enhance the efficiency and effectiveness of government operations and service delivery according to Twizeyimana and Andersson (2019).

This research article takes into consideration that the e-government concept is often defined as the utilization of Information and Communication Technologies (ICTs) in conjunction with organizational modifications to enhance government structures and functions (Field et al., 2003). Furthermore, the adoption of e-government is anticipated to facilitate service delivery improvements and foster transformative interactions between governments, citizens, businesses, and other governmental entities (Grönlund, & Horan, 2009).

According to the modern research findings, in contrast to developed countries where e-government is well-established, there are many challenges for e-government in the least developed countries. These challenges include, but are not limited to, a large digital divide, inadequate e-infrastructure and a lack of skills and competencies for the design, implementation, use, and management of e-government systems (Twizeyimana, & Andersson, 2019).

To compare theoretic e concepts in Ukrainian context, the reports of international organizations such as UN, OECD, EU, as well as donor projects including IFES, EGAP, EGOV4UKRAINE, U-LEAD, E-GOV Academy, USAID, and Ukraine public authorities such as the Ministry of Digital Transformation, State Service of Special Communication and Information Protection of Ukraine, and State Agency on E-governance have been utilized in this study. These sources have provided valuable insights into various aspects of e-governance in Ukraine, including policy development, implementation strategies, capacity building, and the impact of information and communication technologies on governance processes. The research reports from international organizations and donor projects offer a broader perspective on global trends, best practices, and lessons learned from e-governance initiatives around the world. Furthermore, the involvement of Ukraine's public authorities ensures the inclusion of local context, specific challenges, and initiatives undertaken within the country. By incorporating these diverse sources, this research aims to present a comprehensive analysis of ICT-enabled governance in Ukraine, in the view of international experience and local realities. In addition, an overview of the legislation on e-governance was provided to assess challenges and gaps in digital transformation in Ukraine.

This research was based on publicly available information and data and faced limitations arising from the martial time restrictions in obtaining crucial data related to ICT infrastructure and governance. This lack of access to complete and accurate data posed challenges for in-depth analyses.

Methods

To investigate the digitalization challenges and strategies in ICT-enabled governance during the war in Ukraine, a comprehensive and multi-faceted methodology is proposed. The following research approach included a literature review, a case study based on the open sources from Ukrainian state authorities and donors' reports on digitalization and e-governance, data, and cross-case analysis.

The systematic literature review was conducted to gather existing knowledge and insights related to the concept of e-governance, and e-governance strategies in ICT-enabled governance during times of the war in Ukraine. Relevant academic journals, conference proceedings, government, and international organizations, as well as donor-funded project reports were examined to identify key themes, trends, and gaps.

A qualitative case study approach was adopted to gain an in-depth understanding of the specific digitalization challenges and strategies in the Ukrainian context. Multiple government organizations, including the Ministry of Digital Transformation of Ukraine, other ministries, and public authorities such as SSSCIP, CERT-UA, and donor-funded projects, were selected as case study sites. Data was collected through document analysis, and direct observations to capture the experiences, perspectives, and practices related to digitalization of ICT-enabled governance during the war.

Primary data were collected through publicly available in publicly available interviews with key stakeholders involved in ICT-enabled governance and digitalization efforts during the war in Ukraine. To avoid misinformation the scope of the interview analysis was limited by the government officials, ICT experts from international tech companies delivering assistance to the Ukrainian digital sector, public officials, and representatives from international organizations involved in supporting digitalization initiatives.

The collected data were analysed using thematic analysis techniques. The documents and other relevant materials were organized into meaningful themes and categories. Through the holistic process, patterns and connections were identified, and key findings related to digitalization challenges and strategies in ICT-enabled governance were derived.

In addition, cross-case analysis was conducted to compare the digitalization challenges and strategies across different governmental organizations in Ukraine. This analysis enabled the identification of common patterns, variations, and unique insights regarding the use of ICTs and digitalization measures during the war. Given the aim of this research article, the inclusion of materials focusing on digitalization practices and e-governance of local authorities was beyond its intended boundaries. Based on the findings from the case study analysis, best practices and policy recommendations were conceptualized to address the identified digitalization challenges of ICT-enabled governance during times of war.

By employing the proposed holistic approach, the research article aims to provide a comprehensive understanding of the digitalization challenges and strategies of ICT-enabled governance during the war in Ukraine, offering valuable insights and practical recommendations for improving governance in similar conflict settings.

Results

Conceptualizing E-governance in Ukrainian context. The term e-government (abbreviated from electronic government but also known as e-gov, digital government, online government, or connected government), first emerged in the 1990s when many buzzwords starting with the prefix "e-" were coined during the Internet boom (Vlahovic, & Vracic, 2014, pp. 2700–2708). However, e-government usually refers to the application of ICT and

methods of electronic commerce in governmental and public institutions that cater for the needs of citizens and entrepreneurs. In this view term e-government represents a novel medium for the communication of government and public institutions with other entities of a society.

According to the e-governance concept proposed by services Finger and Rossel (2006) there can be underlined typical e-services provided under the e-governance with the use of ICT tools. Among e-governance and e-government services implemented practically a division may be provided based on the administrative process: access to information, online applications, telecommunication services; specific services for citizens: smart cards, payment in the Internet, payment by SMS, interactive location maps, online booking services, access to libraries and online services; citizen's involvement services: online access to municipalities meetings, electronic votes, access to elected representatives. This basic concept of e-governance evolved much in the last two decades and is not reflecting anymore the current state of e-governance as the new approaches, such as e-government 2.0 and e-governance 3.0 appeared based on the matured technologies and ICT.

While e-government (referring here to the first generation of e-government) was just the simple manner of delivering public services via electronic means, e-gov 2.0 refers to the use of social media and Web 2.0 technologies in government operations and public service delivery. A relatively new concept of e-government 3.0 proposed recently is built upon the principles of e-government 2.0 but refers to the use of emerging technologies (e.g., artificial intelligence) to transform the delivery of public services and improve governance (Vrabie, 2023).

Conceptualized over decade already, e-government 3.0 concept refers to the use of disruptive ICTs (blockchain, big data and artificial intelligence technologies) in combination with established ICTs (distributed technologies for data storage and service delivery) and the wisdom of crowd (crowd-sourcing and co-creation) towards data-driven and evidence-based decision and policy making (Alexopoulos et al., 2018, pp. 1–2). Government 3.0 can mean a Semantic Web-based government that personalizes all government services according to the conditions and preferences of each individual.

Ukraine has been committed to digital transformation since 2012, and the Ukrainian State Agency for e-governance, established in 2014, is the main body responsible for policy formulation and implementation in this regard (Plantera, 2021). Since 2019, Ukraine has established the Ministry of Digital Transformation which is the main governmental body responsible for the development, coordination, and implementation of public policy in the sphere of digital transformation, ICT-driven governance, e-governance, citizens' access to the Internet, digital literacy, and e-services.

The evolution of Ukraine's e-governance maturity can be effectively explained using the "three generations of electronic government" framework, proposed by Charalabidis, Loukis, Alexopoulos, and Lachana in their 2019 conference paper. This framework outlines three stages: E-Government 1.0, which focuses on improving the efficiency of government operations and services through ICT; E-Government 2.0, which emphasizes transparency, citizen participation, and the use of open data and social media; and E-Government 3.0, which leverages advanced technologies such as big data, AI, and IoT for data-driven decision-making and policy analytics (Charalabidis et al., 2019). Ukraine has progressed through the first two generations, implementing e-services and open data initiatives, and is now on the path to integrating E-Government 3.0

capabilities to address complex societal challenges through more advanced technological solutions.

Based on recent research findings (Twizeyimana, & Andersson, 2019), it can be concluded that Ukraine faces similar difficulties as less developed countries when it comes to e-government. While developed countries have successfully established e-government systems, the challenges encountered in emerging economies are also prevalent in Ukraine. These challenges encompass a significant digital divide, insufficient e-infrastructure, and a lack of expertise and capabilities in designing, implementing, utilizing, and managing e-government systems.

Ukraine is far from discussions on e-government 3.0 especially during times of war as the country strives to maintain its basic functions in e-governance related to the delivery of e-services for the citizens in-and-out-of-country. However, the concept of e-government 3.0 holds the promise of enhancing local democracies by personalizing government services according to the conditions and preferences of each individual (Vlahovic, & Vracic, 2014). Under the martial law status, local self-governance functions are limited to a minimum, and the local military administrations are established to support basic governmental functions across the country. Consequently, e-government 3.0 is not a reliable strategy to be implemented at times of war as it also aims to empower citizens by providing them with more access to government information and services and by enabling them to participate more actively in government decision-making processes (Malodia et al., 2021). While Ukraine made considerable steps in the development of such e-government 3.0 tools as civic crowdfunding platforms (United24), mobile applications (Diia app), online participation platforms (online petitions, participatory budget platforms at the local level), social media engagement (public channels in Facebook, Telegram, Viber), the country is still need to re-thinking at governmental level the implementation of such technologies conceptualized in e-government 3.0 as e-clouds for public authorities, blockchain technology.

For instance, during times of war, Amazon Web Services (AWS) has been supporting Ukraine with cloud technologies to help the digital state and economy work stably. The company has already helped with the migration of about 100 Ukrainian state registers and critical databases to the Amazon AWS cloud environment. Amazon has committed more than $75 million in support to help the people of Ukraine address both immediate and long-term needs (Ministry of Digital Transformation, 2022). Currently, Ukraine is underway of developing relevant legislation for using commercial clouds for public purposes.

Also, Amazon provided seed funding, learning resources, and operational expertise for BecomingX Ukraine, a digital education platform being developed to help Ukrainians build digital skills, enhance their employability, and gain the confidence to succeed, as they look to rebuild their country. BecomingX Ukraine was co-founded by adventurer Bear Grylls, an ambassador for President Zelensky's charity UNITED24, and the new learning platform will launch in September 2022 (Amazon Staff, 2022).

Government Resilience through the expanded use of ICT-tools. During the full-scale invasion in 2022, the existing governmental digital services in Ukraine showed adequate resilience. Following the invasion, the Ukrainian government implemented restrictions on access to registries and suspended online services to mitigate potential Russian cyberattacks. As the electronic identification system in Ukraine is based on the

governmental Diia application, the restrictions significantly decreased citizen's access to public e-services.

In 2023, despite of the wartimes, more than 5.5 million rural residents in Ukraine (12 % of the total population) and 17 thousand (61 %) of settlements or villages still need to be connected to high-speed Internet according Ministry of Digital Transformation (Ministry of Digital Transformation of Ukraine, 2023). Since the establishment of Ukraine's Ministry of Digital Transformation (MDT) in 2019, the US government, along with other donors, provided support to Ukraine by offering legal, financial, and technical assistance for the development of Diia, a mobile application and online portal. In addition, the United States has supported Diia which is accelerating Ukraine's digital transformation during the martial law period (U.S.-Supported E-Government App Accelerated…, 2023). Research also shows that local authorities and residents are highly interested in implementing and using digital tools. Both believe that the adoption of new technologies can improve their communities' quality of life through easier access to services and citizens' enhanced participation in local decision-making processes (Localizing digital transformation in Ukraine…, 2023).

Among the most reliable digital tools supporting governmental e-services is Diia application. It was launched in 2020 to allow Ukrainian citizens to use digital documents on their smartphones instead of physical ones for identification and sharing purposes. This application can house important documents and is the main form of identification for millions of citizens in Ukraine and abroad.

According to the decision of the government of Ukraine, Diia was unavailable since the start of the war only in February 2022, but already one month later it successfully restored business services, including registration, citizen data modification, and termination. This swift recovery proved critical for Ukrainians as accessing these services offline became nearly impossible due to disruptions in public registrars, notaries, and administrative service centers. The relaunch of online services for entrepreneurs provided a lifeline, offering the much-needed opportunity to register a business, modify business data, or close businesses amidst the crisis. The findings highlight the effectiveness of the Diia portal in facilitating crucial online transactions during times of societal shock and demonstrated a significant uptake of online business registrations during March and April 2022, with over 90 percent of new sole proprietorships registered online (Riabukha, 2023).

During the times of war Diia was still a platform aimed to enhance digital access to 120 government services, enabling Ukrainian citizens to engage with their government through a unified platform. Diia facilitated various activities such as benefit applications, tax payments, document access, business registration, and digital identification. With the onset of Russia's invasion of Ukraine in February 2022, In war-affected areas, Diia became crucial for Ukrainians in receiving social support and accessing vital services. The success of the application has led to its recognition as a leading example of e-government, prompting Ukraine to share its technology with other nations. For instance, during the World Economic Forum in Davos "Vice Prime Minister of Ukraine – Minister of Digital Transformation of Ukraine, Mykhailo Fedorov, and Vice Chancellor for Digital Development, Luukas Kristian Ilves, introduced the Estonian state application mRiik, which is based on the Ukrainian Diia platform" (The Ministry of Digital and Government of Estonia, 2023). Estonia has made notable progress in adopting the Diia-like application, collaborating with MDT on code transfer, user experience design, and user interface design, culminating in the formal adoption of a similar application for Estonian citizens.

Despite massive shelling and frequent blackouts, as of the beginning of 2023, 135,000 people have created businesses through Diia since the start of the full-scale war. Ukraine's business community does not give up despite the formidable challenges and continues to be the mainstay of our economy, while the government is doing everything to enable this nation to become a country of entrepreneurs. The successful practices of e-governance in Ukraine include online business services, which have made Ukraine a "tiger of digital transformation" (Riabukha, 2023).

Another substantial social demand to the government during the war in Ukraine relates to e-services enabling re-registration of the small entrepreneurs during relocation from the regions where active military actions are taking place. There was a substantial request for such e-service enabling entrepreneurs to change the location and name of their sole proprietorship (SP) amidst the ongoing war. Despite the conflict, entrepreneurs were compelled to sustain their operations, fulfill their tax obligations, and submit reports. Within a remarkably short period of two weeks, the Ministry of Digital Transformation and the E-Governance for Accountability and Participation Program (EGAP) successfully implemented this service, launching it by May, a mere three months after the invasion by Russia. The feasibility of such a rapid implementation had seemed implausible previously (Riabukha, 2023). Before the war, this service was exclusively accessible through offline channels, incurring higher costs. However, the introduction of a new e-service has allowed citizens to save time, and money associated with visiting government offices, and the stress that often accompanies waiting in queues. Furthermore, the convenience of online payment options, such as card payments, Google Pay, or Apple Pay, has further enhanced the user experience. As of mid 2023, approximately 15,000 sole proprietors have utilized this service.

Another novel electronic service introduced for entrepreneurs involves obtaining a document certifying their SP status. This document serves as a prerequisite for engaging in contracts, accessing banking services, or participating in tenders. Since its introduction, around 7,000 citizens have availed themselves of this service (Riabukha, 2023).

International Support to Ukraine's Digital Transformation. Since 2014, when Ukraine signed the association agreement with the European Union, the country has made e-governance and democracy two indivisible synonyms. With the help of Estonia, represented by the e-Governance Academy (eGA) and other EU Member States, the country's administrative structure has been blooming into pilot projects, reorganizations, and promising levels of digital maturity (Plantera, 2019). On the other hand, the roots of Ukraine's commitment to digital transformation are deep-seated. In 2016, innovation in the public sector picked up steam more decisively thanks to a large European program in support of the nation's efforts – U-LEAD with Europe. Within this framework, EGOV4UKRAINE project was deemed to be the ICT-centred branch of the initiative.

In 2018, the Ukrainian Government finalized and launched the National Interaction system TREMBITA. The system, based on the Estonian interaction system X-Road, aimed at data exchange between the state information resources to ensure a high level of e-Services delivery system (Digital Government Factsheet 2019 …, 2020). In 2018, TREMBITA received certification of its data protection mechanisms in compliance with the legislatively mandated requirements for technical and cryptographic

data protection. Currently, experts are developing a comprehensive data protection system for the central part of the system. Currently, its owner is the Ministry of Digital Transformation of Ukraine. This interaction system guarantees state authorities and service centers access to the information contained in national registers and enables fast and high-quality provision of public services.

In 2019, with the change of government and the victory of Volodymyr Zelensky, the intention to pursue digitalization became stronger and clearer, to the status of priority. As stated above, e-government development in Ukraine was empowered by the commitment to increase transparency, accountability, and responsiveness in the public administration. As proof of such political will and support, the former State Agency for E-governance was turned into a full-fledged Ministry of Digital Transformation, with increased institutional capacity and responsibilities (Plantera, 2021). However, at the national level, there was no specific e-governance strategy in place before the war.

The legal prerequisites for the introduction of electronic government and the provision of electronic services by public authorities in Ukraine are due to the Laws of Ukraine "On electronic documents and electronic document management" dated May 22, 2003 No. 851-IV and "On electronic digital signature" dated 22 May 2003 No. 852-IV. Developing the provisions of these laws, taking into account domestic experience in this area, in 2016 formed the Concept for the development of electronic services in Ukraine, approved by the Order of the Cabinet of Ministers of Ukraine dated November 16, 2016, N918-r. In the provisions of this concept, the electronic service is defined as an administrative and other public service provided to the subject of circulation in electronic form using information, telecommunications, information, and telecommunications systems (Dubinskiy et al., 2021, p. 8).

Prioritizing E-governance Strategy in Ukraine. Strategic planning of e-governance in Ukraine was envisaged in the Regulation of the Cabinet of Ministers of Ukraine from 20 September 2017, 649-p, titled "On Approval of the Concept of Development of E-Governance in Ukraine". It covered the period until the end of 2020 and established a strategic framework for the advancement of e-governance in the country. This regulation underscores the government's commitment to harnessing digital technologies to transform public administration, improve service delivery, and foster citizen engagement. The regulation highlights the need for a comprehensive approach to e-governance development, recognizing it as a crucial enabler of democratic governance and transparency. It emphasizes the importance of adopting innovative digital solutions and promoting interoperability among government systems and databases to facilitate seamless information exchange and streamline administrative processes.

Except for the outdated Concept of Development of E-Governance in Ukraine described above, the legal framework for e-governance in Ukraine also includes several dozen regulatory legal acts. The most reliable piece of legislation enabling the development of public e-services in Ukraine is the Law of Ukraine "On Electronic Trust Services" which came in force in 2018 (On electronic trust services, 2023). This law regulates legal relations that arise during the use of electronic trust services, including electronic identification and electronic signatures. It establishes the legal validity of electronic signatures and electronic documents and sets out the requirements for electronic identification to be considered valid and secure in Ukraine. Importantly, that the law has introduced key principles of European electronic identification and trust services in according with EU eIDAS Regulation (Digital Government Factsheet 2019 …, 2020). Together with the National Informatization Programme, this piece of legislation provides a legal framework for the use of electronic trust services, electronic identification, and electronic signatures in Ukraine. They aim to promote the use of e-governance, which can help to improve the efficiency and transparency of administrative services in Ukraine.

Before 2022, a significant stride was made towards implementing the requirement of conducting electronic cases in the provision of administrative services through the enactment of Cabinet of Ministers Resolution No. 1035 on October 28, 2020. According to the resolution, starting from March 1, 2021, applications for specific social matters are exclusively accepted by officials from the executive body or the administrative services center, accompanied by the creation of an electronic case.

Discussion and conclusions

E-governance concept grew together with the maturing of technologies used by governments and public authorities to interact with citizens. While E-government 3.0 appears to be the most up-to-date and matured concept for the governments internationally, Ukraine has not prepared its e-governance strategy either before the full-scale war or for the post-war period.

Neither governmental concepts on e-governance in Ukraine, nor digital transformation plans do not contain calculations or scenarios needed for their implementation. Also, a significant factor contributing to Ukraine's lag in the field of digital and informational development is the profound inadequacy and obsolescence of both the legislative framework and the institutional governance/regulatory model in this domain. Attempts to make piecemeal changes to subordinate legal acts do not address the underlying issue, as they mostly modify legislative acts that are fundamentally outdated and rely on technology models, strategic objectives, and practices of public administration (both managerial and regulatory) that have long lost relevance in advanced societies. Consequently, the issue of aligning key legislative acts with the strategic goals of the state and current technological trends becomes relevant. Therefore, it is imperative to ensure that the essential legislative acts are brought into accordance with the strategic objectives of the country and the prevailing technological trends.

Within the state system for implementing tasks and projects of the National Informatization Program, numerous normative and institutional deficiencies systematically hinder Program effective and sustainable functioning. It is inherently unstable and excessively dependent on the current situation in the country, suffering from chronic underfunding. Therefore, it requires a serious review and update, or replacement with more comprehensive practical documents. One of the main objectives of the updated National Informatization Program should be ensuring the proper functioning of the National System of Indicators for Information Society Development and the National Register of Electronic Information Resources. Additionally, the preparation of annual reports on the state of information society development in Ukraine should be reinstated, providing both government bodies and the public with appropriate indicators of the state of development in this field and well-founded reasons for adjusting strategic documents in the field of ICT development.

Described above cases of introducing new e-services during the war demonstrate a non-holistic approach for resolving current problems. However, the ongoing war in Ukraine has highlighted the critical needs in updated and

comprehensive e-governance strategy that can effectively support the country's recovery and reconstruction efforts. Conceptualizing the Government 3.0 concept in public strategic documents in addition to the allocation of international donors' funds with oversight to avoid its overlapping would assist in the integration of advanced technologies to enhance the efficiency and accessibility of government services in Ukraine. This may include the development of robust digital platforms, such as the Diia-like application, to facilitate seamless interactions between citizens and the government. Furthermore, leveraging emerging technologies like artificial intelligence, blockchain, and data analytics can improve decision-making processes and enable evidence-based policy formulation. Such endeavours should involve investing in training programs for civil servants to enhance their digital literacy and skills necessary for effective e-governance implementation. Furthermore, establishing dedicated units or agencies responsible for overseeing e-governance initiatives and coordinating cross-sectoral collaboration. Applying a holistic approach that integrates technological advancements and policy reforms may help in strengthening institutional capacity at all levels of government.

Among the current problems limiting digitalization and e-governance is ongoing during last decades changes in the legislation on citizens identification. There are two types of internal passports in Ukraine – an ID card and a 1994 model passport booklet with a pasted photo card. According to the most recent data, only 5.6 million Ukrainians (out of 40 million) have digital IDs, while the country's citizen registry requires broad reform and modernization (Savelii, & Applegate, 2021). Those citizens who do not possess ID cards to receive some online services, had to notarise a copy of their internal passport. For example, to certify their status as a beneficiary of an LLC. Of course, this is inconvenient, so many people continue to receive services offline (Riabukha, 2023).

The problem of citizens identification through one single document also hinders Ukraine's ability to introduce new voting technologies, such as Internet Voting. International Foundation of Electoral Systems (IFES) in its Feasibility study on the introduction of New Elections Technology for Ukraine underlined the importance of engaging the Central Election Commission with every proposed initiative under the Digital Transformation vision, to ensure that every innovation is electorally compatible (Feasibility study on introduction of new election technology in Ukraine, 2020). According to IFES, authentication (identifying the voter) and coercion (protecting the secrecy of the ballot) are issues that need to be more fully understood and widely debated in Ukraine (Feasibility study on introduction of new election technology in Ukraine, 2020). Poorly developed voter identification system for voter verification for electronic Voting or Internet Voting will become the highest risk for the first post-war elections. This problem is important for discussions of the most feasible ways to organize the first post-war elections in Ukraine, especially taking into consideration the number of Ukrainian voters relocated abroad. According to UNHCR, almost 6 million Ukrainians who have fled Ukraine since 24 February 2022 recorded as refugees across Europe (Ukraine Refugee Situation, 2023). Ukrainian legislation envisages that voting abroad organized only in-person through the polling stations located in the embassies and consulates of Ukraine abroad. Among the options to consider the voting for Ukrainian citizens abroad is Internet voting method which demands feasible electronic voters' identification to be in place.

Adopted before the war Administrative Procedure Code of Ukraine could significantly enhance the rise of e-services both at national and local levels. However, implementation of this legal act is still pending due to the ongoing military actions in Ukraine. Upon examination of the aforementioned content, it becomes evident that the implementation of the Administrative Procedure Code of Ukraine is poised to address several key issues. Firstly, it will rectify the absence of comprehensive legislation governing the procedure for providing administrative services, including the establishment of cases, particularly electronic ones. Secondly, it will tackle the matter of defining the scope of administrative services, the jurisdiction of relevant entities, and the extent of their authority, which, in turn, influences the process of case formation. Lastly, it will address the insufficient integration of information systems in electronic document management, including the limited adoption of such systems across various departments. This deficiency is attributable to the prevailing notion among governmental entities that e-government merely entails the computerization of specific documents.

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ПІДВИЩЕННЯ ІНСТИТУЦІЙНОЇ СПРОМОЖНОСТІ ВРЯДУВАННЯ НА ОСНОВІ ІНФОРМАЦІЙНО-КОМУНІКАЦІЙНИХ ТЕХНОЛОГІЙ ПІД ЧАС ВІЙНИ

В с т у п. *Наголошено, що використання інформаційно-комунікаційних технологій (ІКТ) стає все більш поширеним у процесах врядування, пропонуючи нові можливості та виклики для урядів у всьому світі. ІКТ сприяють підвищенню інституційної спроможності урядів у виконанні свої повноважень та покращують надання публічних послуг. Під час конфліктів, таких як війна в Україні, що триває, використання ІКТ у врядуванні стає ще більш критичним і складним. Метою дослідження було вивчити виклики та стратегії цифровізації, пов'язані з використанням ІКТ у державному управлінні під час війни в Україні. Висвітлено унікальний ландшафт цифровізації в цих складних умовах, аналізуючи вразливості та загрози, з якими стикаються урядові системи та комунікаційні мережі в умовах збройного конфлікту. Крім того, ідентифіковано найкращі практики та прогалини в політиці, надано рекомендації щодо зміцнення цифровізації налаштувань ІКТ-орієнтованого управління під час війни та післявоєнного періоду. Зауважено, що використання успішних підходів та здобутого досвіду сприятиме розробленню надійних стратегій цифровізації, які можуть витримати унікальні виклики, що виникають під час збройних конфліктів. Предметом цього дослідження є стратегії цифровізації та заходи ІКТ-орієнтованого управління, ухвалені українським урядом під час війни, що триває.*

М е т о д и. *Для дослідження викликів та стратегій цифровізації в ІКТ-орієнтованому управлінні під час війни в Україні використано різноманітну та багатогранну методологію. Дослідницький підхід включав огляд літератури, кейс-стаді на основі відкритих джерел від українських державних органів та звітів донорів щодо цифровізації та електронного урядування, а також дані та крос-кейс аналіз. Втім, комплексність методології залишається дискусійною, що підкреслює необхідність постійного обговорення та вдосконалення у майбутніх дослідженнях.*

Р е з у л ь т а т и. *Засвідчено, що уряд України вжив проактивних заходів для забезпечення стійкості державних електронних послуг, цифрової безпеки та цілісності державної ІКТ-інфраструктури, а також для захисту персональних даних протягом конфлікту. Аналіз ґрунтується на емпіричних даних, зібраних за допомогою огляду літератури, кейс-стаді з використанням відкритих джерел від українських державних органів та крос-кейс аналізу, що дозволяє ретельно оцінити ефективність цих заходів цифровізації. Ключові висновки включають ідентифікацію найкращих практик та прогалин у політиці, надаючи рекомендації щодо зміцнення цифровізації налаштувань ІКТ-орієнтованого управління під час війни та післявоєнного періоду. За допомогою цього структурованого підходу забезпечено отримання чітких результатів із описаної методології.*

В и с н о в к и. *Використано різноманітні методи, включаючи огляд літератури, кейс-стаді на основі відкритих джерел від українських державних органів та крос-кейс аналіз. Такий підхід дозволив ретельно оцінити виклики та стратегії цифровізації, пов'язані з ІКТ-орієнтованим управлінням під час війни в Україні, забезпечуючи міцну основу для аналізу ефективності заходів цифровізації.*

Виявлено, що, незважаючи на те, що концепція E-government 3.0 являє собою найбільш актуальну та зрілу форму електронного урядування на міжнародному рівні, Україна ще не розробила всебічну стратегію електронного урядування як для довоєнного, так і для післявоєнного періоду, щоб досягти такого ж рівня прогресу. Акцентовано, що відсутність детально обґрунтованої політики для впровадження цифрової трансформації залишається значною перешкодою. Крім того, застаріла законодавча база та інституційна модель управління є ключовими перешкодами, причому фрагментарні оновлення законодавства не розв'язують фундаментальних проблем. Розкрито, що цей розрив між стратегічними цілями та поточними технологічними тенденціями підкреслює необхідність ґрунтовного перегляду законодавства для приведення його у відповідність з актуальними вимогами. Нестабільність та недостатнє фінансування у межах Національної програми інформатизації України, яка страждає від численних нормативних та інституційних недоліків, є найкращою ілюстрацією такого безладу. Показано, що ефективність цієї програми додатково ускладнюється її надмірною залежністю від поточної політичної та економічної ситуації.

Рекомендовано провести всебічний перегляд або заміну Національної програми інформатизації на більш практичні документи. Ключовою метою оновленої програми має бути забезпечення належного функціонування Національної системи індикаторів розвитку інформаційного суспільства та Національного реєстру електронних інформаційних ресурсів. Також запропоновано відновлення щорічних звітів про стан розвитку інформаційного суспільства, що надасть цінні інсайти для коригування стратегічних документів з розвитку ІКТ.

Крім того, визначено, що війна в Україні підкреслила нагальну потребу в оновленій та всебічній стратегії електронного урядування для підтримки відновлення та реконструкції країни. Запропоновано концептуалізацію концепції Government 3.0 у державних стратегічних документах, що в поєднанні з виділенням міжнародних донорських коштів за належного контролю може підвищити ефективність та доступність державних послуг. Розкрито, що використання передових технологій, таких як штучний інтелект, блокчейн та аналіз даних, може покращити процеси прийняття рішень та забезпечить формування політики на основі доказів. Також наголошено на важливості програм навчання для державних службовців з метою підвищення їх цифрової грамотності та навичок, а також на необхідності створення спеціалізованих підрозділів або агентств для нагляду за ініціативами електронного урядування та координації міжсекторальної співпраці. Висновки забезпечують чіткий і структурований підсумок отриманих результатів, гарантують, що результати безпосередньо пов'язані з описаними методологіями та загальною метою дослідження.

К л ю ч о в і с л о в а: *е-урядування, цифрове урядування, урядування за допомогою ІКТ, інституційна спроможність; державне управління під час війни, державне управління, рекомендації публічної політики*