

Review Paper

Mechanisms of Public Finance Digitalization and Methods of Implementing in the Public Administration System in Ukraine: European Experience

Inna Zhuk^{1*}, Oleksii Zakharkin², Iryna Vishka³, Svitlana Sharova⁴ and Iuliia Nabatova⁵

¹Department of Finance, Banking and Insurance, Interregional Academy of Personnel Management, Kyiv, Ukraine

²Department of Financial Technologies and Entrepreneurship, Sumy State University, Sumy, Ukraine

³Department of Administrative and Financial Management, Lviv Polytechnic National University, Lviv, Ukraine

⁴Department of Finance, Banking and Insurance, Zaporizhzhia Polytechnic National University, Zaporizhzhia, Ukraine

⁵Department of Finance, Banking and Insurance, Zaporizhzhia Polytechnic National University, Zaporizhzhia, Ukraine

*Corresponding author: zhuk_inna@i.ua (ORCID ID: 0000-0003-4998-1818)

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ABSTRACT

Digitalization is no longer an integral part of social relations at the stage of their development. It covers almost all areas of everyday life, and it is now impossible to do without it in some cases. Public finances are no exception since they are also undergoing significant changes in the new realities. The development of information technologies makes it possible to administer many processes in the field of public finance faster and more efficiently, including control over the accumulation and expenditure of funds. The academic paper defines the modern architecture of information systems used in the field of public finance; their general advantages are analyzed, such as: efficiency (speed), data compatibility, cost-effectiveness, convenience, transparency, consistency, reliability, and elimination of duplication. The architecture of information systems and technologies in the field of public finance in the EU and Ukraine is considered. The purpose of the academic paper is to define the structure of applying information technologies to modernize public and municipal financial management. The bibliographical research, both descriptive and analytical, was the main research method. The conclusion has been made in the present scientific work that there is a need for further digitalization of the above-mentioned sphere in Ukraine. In particular, it is proposed to develop the concept of e-government by fully digitalizing society, ensuring transparency and openness, reporting to citizens for public funds, and implementing feedback from them. At the same time, it is necessary to continue involving citizens in public finance management through feedback, voting and platform solutions. The development of national public finance management systems based on adopting the EU standards through applying information technologies represents a potential area for further studies.

HIGHLIGHTS

- ① The academic paper defines the modern architecture of information systems used in the field of public finance; their general advantages are analyzed, such as: efficiency (speed), data compatibility, cost-effectiveness, convenience, transparency, consistency, reliability, and elimination of duplication. It is noted that information systems and technologies, refracting through the prism of public finance, acquire specific features and a special purpose due to the strategic role of public funds for the state.
- ② The purpose of the academic paper is to define the structure of applying information technologies to modernize public and municipal financial management.

Keywords: Budget, information technology, digitalization, public funds, participatory budgeting, e-procurement

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Digital technologies significantly influence the social-economic conditions of people's lives: technology is changing (industrial robots are perceived as real competitors in the job market), business (Internet companies have become leaders in global economic development), finance (banks have appeared that do not have any offices to serve customers), social connections (they are increasingly moving to the Internet) (Popov *et al.* 2022; Skuratovskii, 2022; Slobodianyuk, 2022; Tymoshenko *et al.* 2022; Bayev *et al.* 2022; Novak *et al.* 2022; Bondarenko *et al.* 2022).

There are numerous problems in the field of public finance that cannot be solved by traditional methods, without the widespread use of digital technologies and artificial intelligence. Such challenges exist at all stages of the budget process. Many public entities must decide during the planning stage whether the budget's or estimate's structure matches the structure of citizens' needs. This calculation becomes more difficult by the availability of various data that can only be processed using artificial intelligence tools. The public procurement system experiences the most significant issues during budget execution.

It is necessary to introduce modern digital technologies as well as to build the entire public procurement system in this sphere on the basis of artificial intelligence principles. Many problems in public finance management are caused by insufficient attention to budget data and ensuring their openness.

LITERATURE REVIEW

The widespread implementation and use of digital technologies in various spheres of life have contributed to developing a new stage of the economy – the digital one. Digital technologies have become a part of modern public governance; they have influenced the management of public finances and the efficiency of the budget process. There is currently a lot of hope that digitization will enhance public finance management and make it more responsive to present challenges and expectations (Gupta *et al.* 2017; AlphaBeta, 2018). A significant part of this optimism is well-grounded. Digitalization is already changing the way governments administer taxes and expenditures and deliver public services. Digitalization (digitization) of the processes influencing the functioning of public finance gives

rise to a number of phenomena and concepts that have not been known to financial science until the present: digital controller profile, digital protocol, digital budget, distributed ledger technology (known as blockchain), etc. Their emergence, on the one hand, simplifies numerous processes that make up the mechanism of public finance management, accelerates and optimizes the latter, and minimizes the negative impact of the human factor. On the other hand, they impose a number of fundamentally new challenges for the state, such as training specialized personnel in the field of law and IT technologies for work and improving the digital skills of society. Study of computer modelling by students and postgraduates using open and specialized geoinformation systems (Iatsyshyn, A., Iatsyshyn, A., Kovach, V., Zinovieva, I., Artemchuk, V., Popov, O., ... Turevych, A., 2020), online coding platforms are additionally used for remote tools in programming learning (Zinovieva, I. S., Artemchuk, V.O., Iatsyshyn, A.V., Popov, O.O., Kovach, V.O., Iatsyshyn, A. V., ... Radchenko, O.V., 2021). Also, the use of information technology in the improvement of crime prevention mechanisms, using the example of the border regions of southern Ukraine (Hubanova, T., Shchokin, R., Hubanov, O., Antonov, V., Slobodianiuk, P., & Podolyaka, S., 2021), and using the approximation of the generalization of sampling series in lp - metrics (Burinska, Z., Runovski, K., & Schmeisser, H., 2006). Risk management in medicine: the process of identification, assessment and control of risks in medical practice.

Digitalization mechanisms are implemented in practice on the principles of extraterritoriality, information security and information support. The principle of information security means the necessity of enhanced protection of the information received by the relevant authorities in the course of implementing measures. It should be noted that this principle applies not only to state control in general but also to all social relations undergoing significant changes in their digitalization. The use of information technology has made electronic information interchange possible, which has substantially accelerated public financial management, according to the principle of information support. Currently, the EU pays the greatest attention to access to financial information and information security

(minimization of digital risks, cyber risks, etc.) in the context of developing the digital finance sector and the digital financial market.

Digitalization, that is, the integration of digital technologies into everyday life, has greatly expanded the ability to collect and use this information. It has already begun to change the way governments formulate and implement fiscal policy. They are able to recognize opportunities and begin to protect themselves from risks (Gupta *et al.* 2017).

Basiuk (2022) has analyzed automated information systems used to optimize the budget process in Spain and France, and to find local solutions in Belgium, Germany, and the UK. The scholar has substantiated the need to develop platform solutions for modernizing public finance in Ukraine. Khmelkov (2018) noted the lack of openness of data on public funds, in particular, the Consolidated Budget of Ukraine, which negatively affects the assessment of the stability of public finances and the solution of existing problems in revenues and expenditures.

The EU considers public procurement as a tool for influencing the economic and social spheres of society, allowing it to regulate, for example, the level of employment, investment, and economic growth (Bovis, 2020). Public procurement is currently viewed more generally in the framework of public finance in the EU, where it is considered as one of the tools for shifting to an innovative, resource-saving, and socially oriented form of economy. At the same time, one of the major trends in developing public procurement in the EU is its digitalization, including the mandatory transfer of procurement to electronic format since 2018.

The digitalization of public procurement is aimed at simplifying participation in procedures for businesses (including small and medium-sized entities) and facilitating procurement procedures for public procuring entities. Electronic tools will make public procurement more transparent and goal-oriented (Pircher, 2019).

Aims

Despite numerous studies outlining the fundamentals of the EU's financial sector's current digitalization, and its trajectory towards a complete digitalization of the financial process at the supranational and

national levels, it is the specifics of its application to public finance require further investigation and evaluation. Currently, the number of such studies is insufficient forasmuch as most of them consider only partial aspects or digitalization development of public finance in a particular country.

The purpose of the research is to determine the structure of applying information technologies in the modernization of public and municipal finances.

This goal can be achieved by solving the following tasks:

- ♦ studying the modern space of administering the financial and accounting system of public finance, using digitalization and creating communication platforms and platforms for intensifying financial processes between participants in the EU;
- ♦ studying the possibilities of solving several problems of public finance management in Ukraine through introducing digital technologies for administering the financial and accounting system while using modern information technologies.

METHODS

Public finances are understood as a system of social relations regarding the formation and allocation of funds aimed at ensuring the fulfillment of public interests.

The fundamental principles of the idea of public finances form the methodological basis, and one of their determinants is the extent to which the economy and society are undergoing digital modifications. The result of such transformations is an increase in the publicity and transparency of financial relations at all levels of the economic system. One of the effective mechanisms of security digitalization is, first and foremost, transparency of financial and economic relations at the public level, which requires new studies in this area.

The research is based on general scientific principles and methods of logical, comparative and prognostic analysis; qualitative investigation of the major trends in society development. The regulatory framework governing the digitalization of public finance in the EU and Ukraine, as well as the scientific advancements and practical developments

of scientists and practitioners in Ukraine and abroad, served as the informational and analytical basis for the research.

RESULTS

The modern digital economy is based on new rules and methods and includes new areas such as: Big Data, data analysis, various mobile technologies. The primary factor influencing the advancement of financial technology is the development of the Internet and digitalization. The openness and transparency of information, feedback, e-voting, and platform administration are some of the strategies used in the EU to digitalize public finance.

The major European standard, the Convention of the Council of Europe "On Access to Official Documents" as of June 18, 2009, No. 994_001-09, serves as a framework for guaranteeing the use of public funds. In the EU, public authorities are required to publish data on the intended and actual use of public funds, together with procedures to ensure responsibility for violations of this obligation.

Budget transparency is the timely and systematic full disclosure of all necessary tax and budget information. It should ensure the clarity, completeness, reliability, timeliness, accessibility and usability of public reporting on public finances, as well as the possibility of citizens' participation in the budget process. The benefits of budget transparency include increased accountability, legitimacy, integrity, inclusiveness and high-quality budget decisions. All of this should ultimately help strengthen trust between governments and citizens. Thus, the main goal of budget openness is usually formulated as increasing the level of public trust in the government, taking into account its accountability to society. This approach is widely accepted and supported by numerous experts and international organizations. The idea of budget openness is as follows: budget data create the basis on which a more modern and efficient public finance management system will be established.

Openness and transparency can act as a constraint to corruption in public expenses. The current lack of an open budget and data on expenditures makes it impossible for citizens to get a full overview of how the EU funds are allocated. OpenBudgets.eu aims to bring greater transparency and accountability

to the EU's budgets and public expenditure by providing a unified platform for the EU's budget and expenditure data. The Open Data platform visualizes and provides open data on hundreds of national, regional and interregional programs funded by the EU budget. Several EU funds are managed by DG AGRI, DG EMPL, DG HOME, DG MARE and DG REGIO. The platform mainly provides data from the EU's budget for 2014-2020 and 2021-2027.

Let us also outline the feedback mechanism since it is this mechanism that forms the principles of flexible public finance management. E-government is one of the "feedback" elements, and it is implemented on three different levels: firstly, between the authorities, that is, branches and levels of government; secondly, between the state and the business community; finally, in the interaction between the state and citizens.

ICTs are already widely used by government agencies; however, e-government is more than just a tool: it involves redesigning organizations and processes, as well as changing behaviors in order to deliver public services to people more efficiently. E-Government, when applied effectively, enables citizens, businesses and organizations to interact with the government more easily, quickly and cost-effectively. This can be achieved through the creation of electronic petitions, electronic journals and diaries for schools, public consultations, the development of an electronic service for authorities and residents of territorial communities in the format of collecting comments, surveys and discussions of draft legal acts, participatory budgeting, open platform, open city; a platform for interaction between citizens and authorities and municipal enterprises.

The feedback mechanism creates openness and the ability of citizens to govern, express their opinions, protect their civic interests and exchange information. The feedback mechanism is the cornerstone of a democratic state because the power of the people to express their thoughts is democracy's fundamental principle.

Theoretically, the feedback mechanism is considered as follows: for instance, the government influences the object of governance (citizens), that is, determines a particular decision. The object perceives this information and generates feedback; if this link is

missing, the communication does not take place. The main forms of feedback are usually as follows: electronic interaction of executive authorities, the system of automated e-document flow of executive authorities and interagency document flow, electronic petitions, electronic journals and public consultations, electronic service for authorities and community residents in the format of collecting comments, surveys and discussions of draft legal acts, public budget, an open platform, an open city; a platform for interaction between citizens and authorities and utilities; an integrated information system "Social Community".

Thus, the public administration of public finances should take this mechanism into account in order to make the relevant decisions. Feedback is monitored by citizens, public organizations and the media. The traditional form of feedback is transformed in the context of digitalization; it takes place on the Internet, creating an opportunity to discuss, disseminate a large amount of data and exchange information between society, the state and the media. Therefore, it is necessary to ensure the following steps: to establish information exchange between society and the state; to ensure openness and transparency of data; to ensure broad discussion of decisions made.

The concept of participatory budgeting, which is based on electronic voting by citizens, has spread rapidly since its introduction in 1989 in Porto Alegre, Brazil. Thousands of people in cities, villages, states, and countries are now involved in various decision-making processes regarding resource allocation. Some of these cases, which are often supported by various combinations of supporting factors, stand out as potentially replicable examples of best practices.

Even though the specific mechanism of participatory budgeting is most closely related to the budget formulation stage of the budget cycle, the concept has evolved and expanded over time, and the underlying principle of public participation has been applied to great effect, in various ways, throughout the budget process.

A similar initiative was launched in Estonia; although it was found that citizens had a high degree of digital literacy, and the municipality had a high level of technical capacity honed over

years of implementing technology programs. Here, participatory budgeting techniques have been merged with existing electronic government systems, enabling citizens to vote on budgets almost exclusively through digital platforms (Krenjova & Raudla 2017; Ardigó 2019).

France and the city of Paris are a particularly good example in the area of financial management, with a website that displays projects in progress and offers information on the implementation. In Malaga (Spain), citizens can register to receive updates via SMS on the implementation of the project (Miller & Matic 2017).

The popularity and attractiveness of attempts to introduce participatory budgeting is based on the recognition of the value it can provide. Meaningful public participation in the budget process through the digitalization of public finance can have a variety of positive effects for various stakeholders, including strengthening democracy, promoting transparency and accountability, enhancing inclusiveness, or improving fiscal efficiency.

According to the Participatory Budgeting World Atlas, with more than 4,500 projects, which is 39% of cases worldwide, Europe is the region with the largest number of such participatory activities. Despite certain regional variations, European cities generally follow a similar underlying step-by-step procedure. Residents develop and vote for the projects they want for their city, neighborhood or district. These initiatives are then funded from the city budget and implemented by the city council. For instance, Lisbon, one of the most active EU capitals in participatory processes, was the first city to introduce an online participatory budget in 2008. Recently, the Portuguese capital also introduced a green project that finances citizens' initiatives to mitigate climate change. In a resolution adopted in July 2021, the European Parliament proposed to introduce participatory budgets and other tools for pilot projects to allow citizens to have the right to vote on the expenditure of a share of the EU budget.

Denmark, Estonia, Finland, Iceland, Malta, the Netherlands, Sweden, and the EU are among the leaders in 2022 according to the UN e-Government Development Index; Estonia provides platform management and ranks the third place in the UN e-Participation Index. Estonians are among

the EU's pioneers in full digitalization, including public finance, and they have built a time- and money-saving environment that is effective, secure, and transparent. Estonia has the most advanced ID card system in the world. The mandatory national card offers digital access to all secure Estonian electronic services in addition to serving as an official photo ID. The so-called Smart ID was created in collaboration with SK ID Solutions and Cybernetica. A new generation of app-based electronic identification called Smart-ID was created for smart device convenience and high security. X-Road is the backbone of e-Estonia; it was initiated by the Estonian government to ensure secure data exchange between government organizations. The first version was developed by Cybernetica and launched in 2001. X-Road is a distributed information exchange platform that enables all the different systems to interact across the government sector.

The main objective of the Estonian budget management system (BMS) is to administer and supervise government and public sector expenditures. The BMS is a small banking system where the government and public sector institutions are clients. Accounts of public institutions are virtual accounts (electronic accounts) in the BMS system; real bank accounts where real money is deposited are owned and maintained only by the Estonian Ministry of Finance. This positioning ensures a central point of control and accountability for all public sector expenditures and reduces the cost of banking transactions.

Digitalization provides additional opportunities for tax administrations in simplifying the processes of interaction with taxpayers. In Europe, a single reporting standard has been introduced in particular countries. The unified reporting standard SAF-T (Standard Audit File for Tax) developed by the OECD is being actively implemented in various countries of the European Union. For instance, in 2020, Norway introduced this unified standard. This type of reporting is used to exchange tax information between tax authorities and organizations through an electronic document management system. In particular, it is used to verify the comprehensiveness of VAT payments and exchange accounting reports electronically. The unified standard helps tax authorities and external auditors conduct tax audits

and organization audits more swiftly and effectively while identifying a variety of infractions. SAF-T reduces the amount of paperwork required enabling communication with tax authorities quicker. The wide range of data presented in SAF-T allows tax authorities to conduct comprehensive tax audits without requiring additional information. The tax authorities should be aware that the implementation of a single standard enables cost savings because data access is made simpler. In addition, the integration association simplifies the interaction between tax administrations of countries, since a unified standard allows for more efficient processing of the received data on taxpayers. It should be noted that the introduction of a single reporting standard is beneficial for businesses in the framework of integration associations. In countries where SAF-T is also applied, administrative barriers to reporting to tax authorities are eliminated for selling goods, works, and services.

The experience of the Romanian tax administration can serve as an example of the effectiveness of implementing this unified standard. Romania is a leader in the EU in terms of tax gaps. The introduction of the unified reporting standard will allow the budget to receive an additional 1 billion EUR from VAT, which is equivalent to 0,5% of Romania's GDP. Implementation of SAF-T allows tax authorities to collect more data, leading to higher collections and fewer VAT tax gaps. The experience of the Romanian tax administration is the most objective in terms of SAF-T implementation since the overall level of developing information technology in tax control is quite low.

The practice of integrating cutting-edge blockchain technology is very relevant to solving the issues of public finance management and implementing priority areas of their reformation in the direction of current methods of managing the financial and accounting system of public finance. The Dash Budget System (DBS) is the first blockchain project management system with a built-in budgeting system, where the distribution of financial resources is decentralized. It is carried out based on the results of voting by its operators for projects supporting the development of the Dash network infrastructure.

The public procurement system is quite complex due to the large number of participants and the diversity of segments of the market for purchasing

goods, works and services at the expense of the budgetary funds. It is regulated by law and organized in accordance with standards and principles, including equal rights and opportunities, transparency and openness of the procurement process, etc. The global practice has confirmed the effectiveness of open competitive tenders as a reliable tool for optimizing public expenditures and combatting corruption. In the trend of the time, many countries have already had or are gaining experience in implementing blockchain technology for implementing public procurement procedures.

In September 2019, the European Commission adopted the regulation (No. 2019/1978) establishing uniform mandatory electronic forms of documents in the field of public procurement. Starting from September 2023, all participants in the procurement process will be obliged to use the electronic forms specified in this legal act. Unified electronic forms (e-Forms) are being introduced in the EU for planning procurement activities for customers, under competitive procedures, procurement from a single supplier, the procedure for announcing the winner, as well as for amending procurement documentation or the concluded contract.

It should be noted that the digitalization of public procurement is impossible without unified regulation on other related issues. It is important to establish a legal framework for identifying users electronically. In 2014, the European Parliament and the Council adopted the regulation (No. 910/2014) introducing a unified regulation of electronic identification – eIDAS (electronic Identification, Authentication and trust Services). This regulation establishes strict requirements for ensuring the security of the personal data of the owners of a single digital signature, and uniform requirements for the authorities issuing a single digital signature.

The establishment of the unified classifier of procurement in the EU (UCP) was one of the crucial milestones toward the digitalization of procurement. Public procuring entities in the EU have faced the challenge of expressing the subject matter of procurement in a way that is understandable to all possible participants speaking different European languages during the course of their practical actions. The establishment of the unified classifier of procurement was the answer to this issue. The UCP is a detailed system for describing products

purchased by customers, with individual codes assigned to various goods, works and services.

The UCP was approved in 2002 when the Regulation (EC) No. 2195/2002 of the European Parliament and of the Council was adopted. Currently, the UCP operates in the wording of the new Regulation of the European Parliament and of the Council as of 2009 (No. 596/2009). According to the provisions of the Directive of the European Parliament and of the Council as of 2014 (No. 2014/24/EU), the use of UCP's codes is mandatory for procurement by European customers. Basically, the UCP is an electronic catalog of goods, works, and services that can be purchased by customers from the EU. Each item (goods, works, and services) in the UCP has its own unique numerical code.

The UCP can be found in the electronic public procurement system (SIMAP), and the classifier is available in all official EU languages. This makes it easier for potential suppliers, contractors, and executors to search for procurements of particular interest; moreover, it avoids mistakes when translating search keywords into other languages. In addition, there may be several words for the same object in some languages.

The European Commission supports the digital transformation of public procurement with several initiatives. These initiatives are aimed at digitizing the main stages of the public procurement life-cycle, such as e-Submission, e-Access or e-Invoicing. They also contribute to developing and implementing e-procurement tools in EU countries, such as updated standard notices in order to be in line with the digital age, or the Single European Procurement Document (ESPD) and the e-Certis tool, which simplify the participation of economic operators in public procurement.

Digital procurement is at the backbone of other wide-ranging initiatives of the European Commission, such as the Digital Single Market strategy or the e-Government Action Plan. This is one of the key factors in reducing the administrative burden and implementing the “only once” principle in public administrations (suppliers provide information only once).

The Digital Whistleblower Project (DIGIWHIST) combines the provision of data on public procurement expenditure with effective management indicators

and a monitoring procedure that facilitates citizens' feedback. The objective is to improve public administrations' accountability and transparency. This Horizon 2020EN project systematically collects, analyzes and widely disseminates information on public procurement at the tender level in 35 jurisdictions across Europe. This data is linked to information on the finances and ownership of businesses and NGOs, as well as information on systems strengthening the accountability of public authorities, in order to comprehensively investigate how public resources are allocated in Europe. OpenTender subpage visualizes procurement practices in the EU.

Open e-PRIOR is an open-source e-procurement platform that makes it possible to practically implement interoperable e-services in any public administration. It acts as an intermediary between back-office public administration programs and the interoperability initiative Pan-European Public Procurement Online (PEPPOL). For instance, public administrations and private organizations from two different countries can exchange electronic invoices using the e-PRIOR infrastructure.

For tenders under 130 000 EUR for most types of goods and services and tenders under 5 350 000 EUR for construction contracts, only national public procurement rules apply, subject to the general EU principles of transparency and equal treatment. Accordingly, the EU countries establish and apply their own platform solutions. For instance, the PLACE platform (Plateforme des achats de l'État) is applied in France, similar to Prozorro in Ukraine, procurement announcements and their results are published in a detailed format on the website of the Official Bulletin of Public Procurement Announcements BOAMP (Bulletin officiel des annonces des marchés publics); in Lithuania – on the website of the Central Public Procurement Portal. In case the contract price exceeds the above threshold, information on procurement in the EU member states is posted on the TED platform (Tenders electronic daily).

The decision of the European Council, adopted on June 23, 2022, to grant Ukraine the status of EU candidate was given without conditions; however, the implementation of the previous seven recommendations of the European Commission is necessary to start negotiations on full membership.

The EU has repeatedly supported the modernization of public finances in Ukraine through several programs. At the same time, digital transformation was actively pursued throughout all of Ukraine's economic sectors, despite Russia's full-scale war against Ukraine and the COVID-19 outbreak. Although these factors have reduced the possibilities of financing the increase in the digitalization level of Ukraine's economy, including its financial sector, digital transformation was ongoing and the main issue was the creation of a digital paradigm for Ukrainian society. Thus, the Diia digital platform has been established, on the basis of which standard digital solutions that can be applied, including in public finance, are being developed. Improving the company personnel's competence level in digital technologies and increasing the population's digital literacy level as a whole is the prerogative of the Public Finance Management Strategy for 2021-2025 and the Strategy for the Implementation of Digital Development, Digital Transformation and Digitalization of the Public Finance Management System for the Period up to 2025 and the approval of an action plan for its implementation. In Ukraine, the Open Budget (Transparent Budget: <https://edata.gov.ua> Open Budget Budget for Citizens (<https://Openbudget.gov.ua> and <https://openbudget.gov.ua/local-budget>)), Open Spending (Open Spending – Unified web portal for the use of public funds (<https://Spending.gov.ua>)), Open Contracting (in Prozorro and the Register of Projects of International Financial Institutions (<https://proifi.gov.ua>)) and Citizen Participation (public projects in local communities (<https://pb.org.ua/>)) have been implemented in order to improve digitalization at the local and regional level. By the way, a platform for the digital transformation of the community "Diia.Digital Community" was created in Ukraine. In general, it can be concluded that the mechanisms of digitalization in the EU and Ukraine are similar; however, their implementation requires not only partial improvement but also taking the following steps:

- ♦ full-fledged formation of e-government, which will effectively cover all public finance processes and avoid submitting the same information twice. The basic building blocks – digital identifiers, data exchange solutions and payment systems – are usually closely related to

public finance, especially payment systems. The EU-Ukraine data needs to be synchronized to avoid double taxation, control budget revenues, and prevent customs infringements;

- ◆ clear systematization of financial data from the community to the highest level, which supports the automatic exchange of information and improves the allocation, execution and control of public expenditures and will be of particular importance in the post-war period in the process of Ukraine's reconstruction;
- ◆ strengthening the institutional and technological capacities of the public sector in order to implement digital solutions, in particular, for such a key process as public procurement; it should be modernized to facilitate the participation of digital startups in the public sector. Along with this, it is necessary to consider the integration of the Prozorro EPS with the European TED tender system, as well as to resolve the issue of implementing platform solutions for financing public-private partnership projects and implementing the World Bank's recommendation to use the Prozorro system for all procurement with a budget threshold of up to 5 million EUR for the reconstruction of Ukraine;
- ◆ significant attention should be paid to data security since governments are faced with such new challenges as cyberattacks and data privacy violations, which have become especially active during the war and in general in the digital age;
- ◆ implementation of the institute of electronic contracts based on European experience, which should become a synergy of state systems: State Treasury Service, Ministry of Finance ("E-data" – "Spending"), the Ministry of Economy ("Prozorro"), the Ministry of Community, Territorial and Infrastructure Development in the context of public-private partnership and the reconstruction of Ukraine.

DISCUSSION

The transparent process of public finance management is an important prerequisite for meaningful public participation. An informed public will have access to the budgeting process, elements and components of the proposed budget

and will be able to comprehend it, as well as have access to information on expenditures and budget execution. In turn, an informed public will be able to get involved in meaningful discussions with other interested parties in the budget process. Nevertheless, increased public participation is not always the result of financial transparency or informed citizens. Public entities and civil society organizations also play a crucial role in proactively using budget transparency to ensure and promote participation.

Effective public participation through official or informal methods promotes enhanced openness and accountability at different stages throughout the budget cycle (Morgner & Chêne 2014). When opening up the budget process to public participation and monitoring, citizens have the right to hold governments accountable and ensure that duty-bearers are responsive and accountable for the decisions they take (Malena & Khallaf n.d.). As a result, effective public participation in the budget process reduces opportunities for corruption (OECD 2017) and supports the creation of a community of public observers to monitor corruption (Miller & Matic 2017). This critical outcome has been widely supported by cases that demonstrate a positive relationship between participation, responsiveness and accountability (Speer 2012).

In addition to ensuring that the budget reflects the citizens' needs and priorities, participatory processes also provide significant opportunities to allocate resources to underrepresented and underserved communities (Wampler & Touchton 2017). In particular, such processes as participatory budgeting can actively promote and provide inclusive space for underrepresented communities in order to identify their priorities. Therefore, public participation in the budget process can contribute to enhancing inclusiveness in decision-making, strengthening social harmony (Transparency International 2021) and contributing to efforts to ensure that no one is left behind.

The concept of a digital citizen, who may access both public and private services through a digital platform that allows the interaction of various and decentralized information systems, is at the core of Estonia's digital transformation. This is grounded on ideas that contradict the intuitive thinking of the free market and adhere to a principle

characterized as the “hiding hand” rather than the invisible hand. Two elements were significant: firstly, the adoption of a culture of risk-taking and bold ideas by politicians and policymakers; and secondly, the establishment of several small, overlapping networks to facilitate early success and increase momentum. These phenomena became complementary and made it possible to quickly make innovative decisions (Kattel, Mergel, 2019).

Obviously, the advantages of digital technology have their limits. This does not replace the proper execution of basic procedures and operations. For instance, pre-filling of tax returns can facilitate fraud if the information entered is inaccurate since taxpayers have little incentive to correct errors that reduce their tax bill. Political, institutional, and staffing constraints can slow government innovation and implementation of best practices. Past failures in implementing integrated information systems for financial management, especially in developing countries, illustrate some of these limitations (Diamond and Kemani 2005, USAID 2008). Corrupt bureaucrats and taxpayers can circumvent digital systems.

There are also serious concerns regarding cyber security, privacy and fraud. Data thefts from government agencies and ransomware attacks have emphasized their potential vulnerability. Some European countries face numerous fraudulent refund claims for VAT that are too small in individual cases to be detected, but significant when added together. It should be expected that the digitalization of public finance will lead to an arms race in which friendly governments may not always win.

CONCLUSION

The process of digitization will differ depending on each country’s circumstances. While most advanced economies have chosen incremental approaches, developing countries have the potential to leapfrog to newer and more sophisticated formulation, design, and implementation of policies. At the same time, all countries should take action if they want to take advantage of the benefits and avoid the pitfalls. Technologies increase the importance of strong fiscal, political and governance institutions. The global trend toward digitalization of the

administration space of the financial and accounting system of public funds, the rapid development of the IT sector, and the emergence of a networked communications society are resetting the existing public consensus on public needs and services, reformatting established budget procedures, while simultaneously imposing non-standard contradictions and risks. The priorities of the expenditure component of the administration space of the financial and accounting system of public funds are its digitalization, creation of communication platforms and intensification of the exchange of tender information between participants. As a result, society receives a decrease in the corruption level in the field of state and municipal expenditures and public procurement, increased efficiency and transparency of governance, improved use of public resources, budget savings, creative expansion of the range of tenderers through the incorporation of innovative digital methods and technologies.

Subsequent studies should analyze and evaluate the impact of digital business and the digital environment in general on the qualitative and quantitative features of public spending policy, and even public services and procurement. Analyzing the dangers and hazards brought on by the digitalization of risk is a further crucial direction.

Investments in digital information technology in the EU have led to digital transformation. Digital transformation of the government means the creation of new values for citizens through new “business models”. The modern functional approach to the acquisition of public finance management technologies in the EU (that is, budget, customs, taxes, e-procurement, etc.) means that European governments are constantly reviewing processes based on digital capabilities.

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