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MASTER THESIS

**DIGITALIZATION IN ENSURING TRANSPARENCY AND EFFICIENCY
OF PUBLIC FINANCE POLICY**

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PREFACE

The topic of the thesis, despite its partial complexity, is interesting for research, because the future of our country to a certain extent depends on the financial sector, which is the basis of the budget of Ukraine. It is the digitalization of public finances that should ensure the transparency of the use of public funds and the prosperity of our country.

I want to thank Taras Shevchenko National University of Kyiv and Nord University for giving me the opportunity to explore and reveal this topic. I also want to thank my supervisors for help in writing my thesis, I did not do this on my own. The university provided me with practical and theoretical skills that I will certainly use in my future.

I want to say special thanks to the employees of the ministries who shared their knowledge and opinions on the implementation of technologies. In the end, I want to say that the years of study at Taras Shevchenko National University of Kyiv were among the best in my life, I was provided with colossal knowledge that will definitely come in handy in practice.

Dmytro Huk

16/05/2023

ABSTRACT

Today, the digitalization of the world economy is successfully developing in most countries of the world. Ukraine is still very slow, but the steps to introduce digital technologies into the economy and business are effective. Particularly acute is the problem of digitalization of the sphere of public finance and their management in the process of distribution between subjects. As you know, the public sector of finance in Ukraine needs to introduce new technologies in order for our country to be competitive in the international arena. It is the introduction of digital technologies that will help our country not only save public funds, but also simplify the processes of their provision.

Having studied the theoretical basis for the introduction of financial technologies in developed countries and developing countries, it has been determined that they help to simplify various processes; from granting a loan to receiving public funds. Financial technologies are an indicator of the level of development of a country and whether a developing country the more technologies it uses Today, in the 21st century, the future of countries is digital technologies, and their effective application is the key to success.

The purpose of the thesis is to study the level of implementation of digital technologies in the public finance of Ukraine and analyze their impact on the transparency of the use of public funds. When writing the thesis, the Prozzoro public procurement program, which is a direct consequence of the digitalization of public finances, was studied in detail. According to various sources, the implementation of this online platform has helped to save a considerable amount of public funds. When interviewing representatives of the Ministry of Finance and the Ministry of Digital Economy, key problems were identified in the implementation of digital technologies in the field of public finance and the results achieved were identified.

In the final section, it was proposed to create a more unified program for public procurement that controls the flow of public funds and their distribution among state economic entities. It has been established that Ukraine is moving in the right direction and is gradually introducing technology into the financial industry. Based on the experience of developed countries and on their own representatives of the Ministry of Digital Economy, they are effectively working on the total digitalization of public finances and are taking the right steps in this direction.

Keywords: public finance, digitalization, Prozzoro, financial technologies, theory of change, state budget

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LIST OF ACRONYMS

SSSU - State Statistics Service of Ukraine

NBU - National Bank of Ukraine

IMF - International Monetary Fund

MoF – Ministry of Finance

MoDToU - Ministry of Digital Transformation of Ukraine

FDI - Foreign direct investment

SPP - Solar power plants

WPP - Wind power plants

HPP - Hydroelectric power plants

ToC – Theory of Change

IO – International organisations

NGO - Non-governmental organizations

I. INTRODUCTION

1.1 Relevance of research and problem statement

There is a public need to ensure public access and information openness of the use of public funds - the funds of taxpayers of Ukraine, which are spent by managers of state and local budget funds, state and municipal property entities, compulsory state insurance funds and pension fund bodies.

Where do the taxpayers' funds go, what do they spend money from the budget on or how do they pay taxes in Ukraine — this and much more can be answered by open data. In addition, by checking publicly available information on budgets and public procurement, citizens can claim rights to free hospital services, make decisions about paying fees to educational institutions, and counter potential abuses, etc.

Until 2015, the norms of public access and information transparency on the use of public funds were fragmented, vague and non-systemic, which significantly narrowed the rights of citizens to public access to information about the use of their funds as taxpayers (Open Data Maturity Report, 2020).

In the absence of an effective organizational and legal system of public access and information openness of the use of public funds, there are significant risks of distorting the rights of citizens to information and the constitutional right to exercise power, concealing acts of corruption and avoiding responsibility for their commission, which generally reduces the efficiency of using limited public financial resources and does not contribute to citizens' trust in state institutions and local self-government (Durman et al, 2022).

Today, during the COVID-19 pandemic, the problems of transforming finance in the context of digitalization as a prerequisite for achieving a high degree of transparency are extremely relevant (Childress et al, 2020). After all, society is forced to move to a different level of communications and digitization of operations. In addition, the development of digital finance is a determinant of the development of the digital market of Ukraine and its integration into digital market of the EU (Curristine et al, 2020). It is the digitalization of public finances that will help Ukraine overcome the misuse of funds and take the path of transparent distribution of finances.

Particular attention is also paid to the issue of automatic generation of results and evaluation of the effectiveness of government programs. It is advisable to have flexible mechanisms for managing public finances based on transformation, which will quickly adapt to changes and ensure full transparency. The digital economy become one of the main strategy for the next decade (Ministry of Digital Transformation) Therefore, increasing trust in the authorities and the interaction between the population, the state and business in the middle of the country is possible thanks to the digitalization

of the native economy, which should first of all be launched on state finances. The desired results have not yet been achieved, but our country is moving in the right direction.

The effective implementation of the digitalization processes of public administration processes will allow continuing cooperation with European and other international partners in the direction of digitalization not only for managing the financial and budgetary sphere, but also for many other areas of the economy and management (Matushk, 2021).

In addition, the introduction of digital platforms for working with financial data at the state and local levels has shown its effectiveness in condition of the military aggression of Russia against our country and continues to serve as the basis for the functioning of the entire budgetary and financial system of our state. The process of introducing information technologies in the field of public finance is characterized by many problems, mainly because low level of funding for e-government projects by the state, the insufficient level of knowledge in the use of digital technologies and their capabilities by older citizens, the habit of paper documents, the disinterest of civil servants in transparency their activities and corruption schemes. To eliminate this number of problems, it is necessary not only to stimulate the use and development of new technologies in public administration, but also to change the system itself (Kutsenko, 2017).

The main prospects for the development of digitalization in the financial policy of Ukraine are (OECD, 2022):

- Reducing the level of corruption in government bodies, the transition to electronic work will allow auditors to trace all corruption schemes of civil servants, since paper can be recycled, but an electronic document that is in the public domain is almost impossible.
- Improving the image of our state in the field of information and technological development. Ukraine will be able to reach the level of economically developed states and be known in the world not only "country with high corruption", but also as one of the technologically savvy.
- Increasing computer literacy and culture of our citizens, employees and officials. Since more than half of the population is not computer savvy, the transition to digital control will be one of the key pushes to acquire these skills.
- Creation communication system that unites all the main public management services will simplify not only the work of employees, but also the life of citizens.
- Growth in the level of education, scientific, technical and cultural development of people and the country as a whole.

The implementation and use of digital technologies at the expense of public funds must be comprehensive and must take into account all external influencing factors, such as educational level, socio-cultural status, technology development, etc. Modern technologies contribute to the acceleration of globalization, open up new opportunities for the social and economic development of states and accelerate coordination between governments, companies and residents of countries. On my opinion, our state needs to do a colossal amount of work for the complete transition and implementation of information and communication technologies (IMF, 2018). First of all, our government should strengthen relevant policies and improve the legal and regulatory framework, which in turn would ensure economic and financial stability and promote cooperation in the field of optimizing global networks. And secondly, to conduct a constant fight against corruption, reduce the inequality in the level of digital technologies among the population and invest in the development of technologies at the state level.

Despite the fact that there are many works on digitization, the issues of increasing the level of transparency and efficiency in the use of public finance, as well as the impact of digitalization on the distribution of public finance, remain not fully understood. This justifies the choice of my Research questions:

1. What does the ensuring of transparency and efficiency through digitalization manifest itself in?
2. What changes in the distribution of public finance does digitalization bring about?

1.2 Structure of research

This master's work consists of seven chapters, an introduction, annotations, conclusions, a list of references and applications that complement the content of the work itself. In the introduction, the topic of the study is updated and the role of digitalization in ensuring the transparency of Ukraine's public finances is determined. Ukraine is on the verge of technological changes that immediately require implementation in the public finance system, which will allow our country to ensure a high degree of transparency in their use, reduce corruption and approach the level of EU countries.

In the first chapter, determine the relevance of the chosen topic and give the structure of the study. The second chapter explores the digitalization of public finances on the example of developed and developing countries. The experience of which can be implemented in our state. In the third section, determine the theoretical basis for the impact of digitalization on the public finances of Ukraine.

In the fourth section, define the research methodology and provide the main means and strategy for collecting information. In the fifth section, conduct a study of the chosen topic. In the sixth chapter,

identify the main ideas and reasons that led to the digitalization of the financial sector. In the seventh chapter, identify the main problematic issues and justify their solutions based on discussion analytics.

II. LITERATURE REVIEW

2.1 Introduction

It was the development of the digital economy, which is based on the use of innovative technologies and information processing, which caused a change in the principles of competition between countries. The world community has entered a new era of digital globalization. Developed countries that successfully digitalize their economies are rapidly developing innovative technologies. It is also possible that our state, which in an extremely difficult time, experiencing total aggression and significant crushing losses, is trying to improve its scientific and technological capabilities and introduce the digitalization of the economy and finance as a basic component in the future structural restoration of the state after the exit from martial law.

With greater digital access to financial services, we are even more convinced of the future of financial law. Ukraine must take full advantage of digital FinTech solutions in its recovery strategy to help reverse the social and economic losses caused by the war. The modern market of digital technologies has popularized the use of information in all spheres of the country's activities. This chapter proposes to explore the theoretical impact of digitalization on public finances and, based on research, analyze the practical aspect using the example of developed and developing countries.

2.2 Theories and approaches to digitalization of public finance

Technologies that allow the management of public funds are de facto generated by the inevitable and very rapid transition to new forms of financing public services. Along with the indicated manufacturability, the methods of medium-term budgeting and the program-target distribution of funds both from the budgets of modern states and consolidated forms too.

The role of digital technologies in the budget process is also relevant, which boils down to the use of information technologies, as they strengthen the integrity and increase the sustainability of the budget process. (Basiuk, 2022):

- 1) Coherence of interaction between the subjects of the executive vertical;
- 2) Constructiveness of interaction between different branches of power;
- 3) Crisis-free development and smoothing out fluctuations in gross product production are key to improving financial management and security of banking structures.

One of the most important elements of the budget process is state financial control, the main purpose of which is to ensure state stability and effective moderation of funds. It is from the choice of state

control over the verifiable distribution of state funds that the legality of the formation and execution of budgets at all levels is assessed. State control shows how effectively and purposefully state funds are used. (Dunaev and Kostennikov, 2021). It was determined that state control is impossible without highly effective management systems based on the use of digital technologies. It is the rapid development of technologies that has led to the fact that the amount of information is increasing, and for its processing, new efficient systems must be implemented. Therefore, it will be relevant for Ukraine to study the theoretical foundations of the use of information technologies in budgeting on the example of countries around the world.

Designation of information support and its use in the formation and distribution of the budget are implemented by creating automated information systems (hereinafter - AIS), such as processing and digital technologies (especially big data, artificial intelligence, cloud computing). Such systems are called financial management information systems (hereinafter referred to as financial management information systems). In fact, ISFM can significantly expand the range of financial control capabilities, significantly increase its effectiveness and objectivity, reduce the complexity of daily budget management through the introduction of digital technologies and various economic and mathematical methods for structuring information flows (Dunaev et al., 2022).

Introduction of MFIS for the implementation of financial control can provide the following advantages of automating management processes (Figure 2.1).

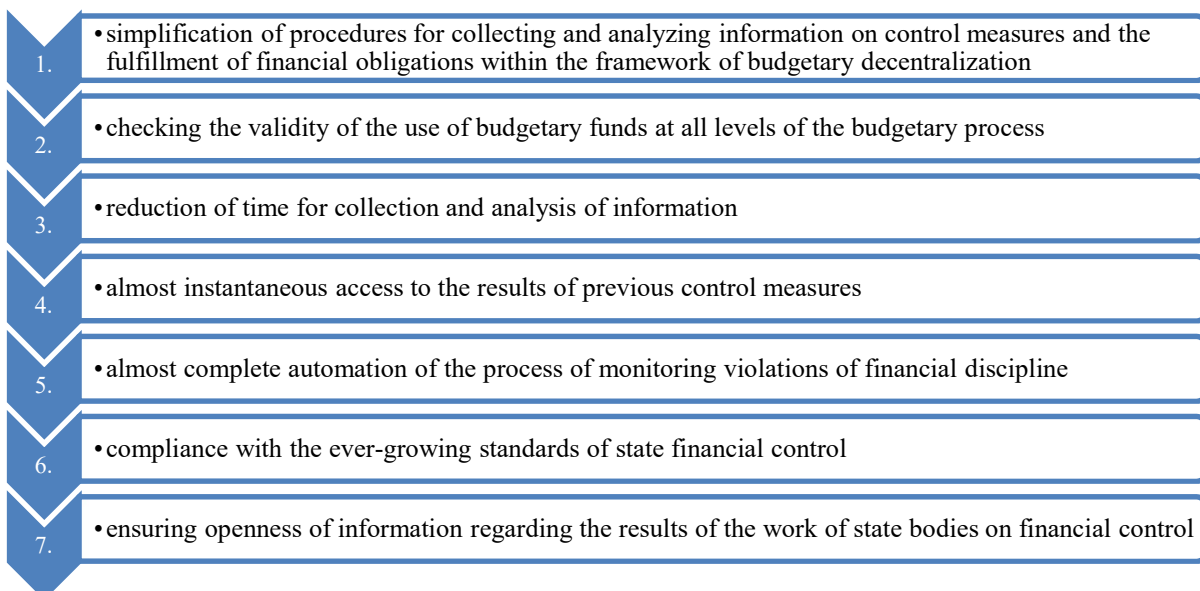


Figure 2.1 Main advantages of automating management processes

Source: (Madakam S. et al. (2019)

FMIS solutions can significantly improve the efficiency and fairness of government operations, as well as create great potential for increased transparency and accountability. In addition, it should be noted that the World Bank Group has a long history of cutting-edge knowledge and significant global experience in assisting in modernization of treasury systems and the creation of integrated public financial management structures (Figure 2.2). If we turn to the European experience, then the external financial control authorities of the European Union constantly pay great attention to monitoring the efficiency, productivity and economy of financial activities in the EU public sector and funds from Euro funds outside the EU. Spain occupies a special place in the procedures for controlling it's budget. Therefore, digital solutions aimed at supporting the Spanish budget process (European Commission, 2023). The introduction of digital on the example of Spain can serve as an example for the Ukrainian government on the way to the transformation of public finances.

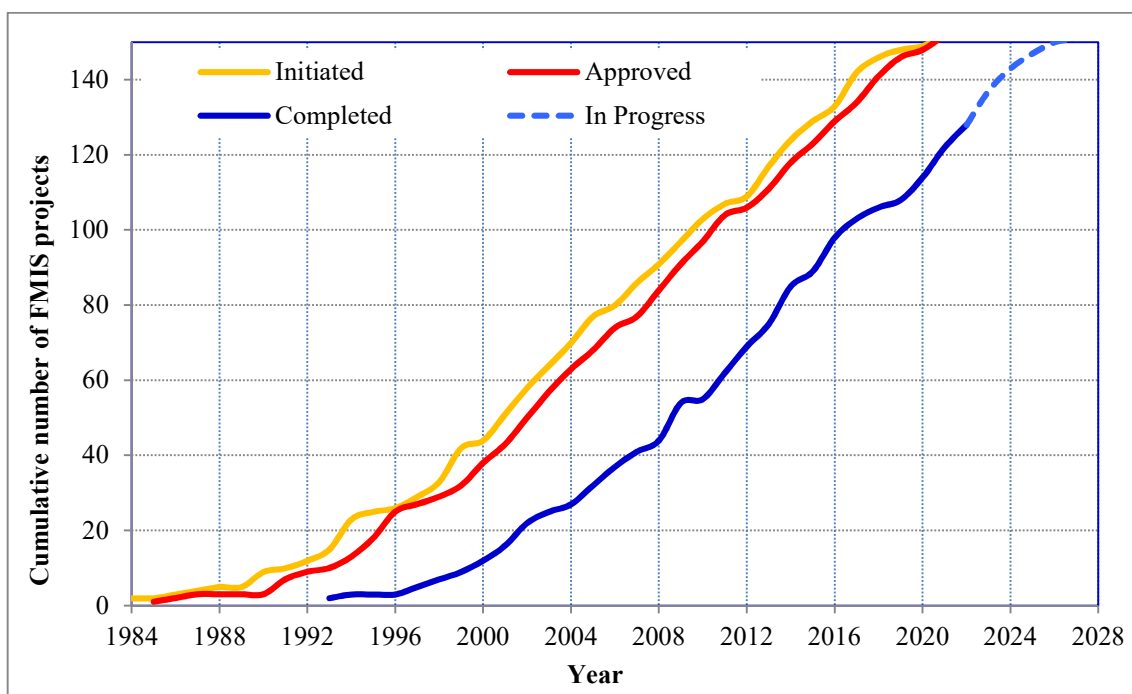


Figure 2.2 - Dynamics of financing by the World Bank of FMIS solutions in the world from 1984 till 2022

Source: FMIS (2023)

The first solution is the «Adenda» system designed to collect information on individual administrative sectors in the context of budget expenditures (FMIS, 2023):

- Financial statements of autonomous organizations according to the IFRS system; management of online processing of information flows for different agents of the budget process;
- Processing of information, sending it to the central repository and storing information;

- Budget reports of the Directorate-General for Budgets and Expenditures (Derzhavnyi informatsiyni portal).

The second is «ATENEAN» - program for electronic document management for drafting the budget (LB-Solution, 2023). The purpose of the program is to develop the final draft budget by the DG sector from the budgets of the Ministry of Finance for submission by the government to Parliament. The third solution is «CANoe», an information system for automating analytical accounting, which makes it possible to estimate the cost of work performed by departments (Vector, 2023). It provides the necessary information on the distribution of public resources and budget expenditures.

The fourth is the Spanish «BÁSICAL» software package. It was developed by the Auditing Establishment of the State Administration (IGAE) to provide technological support in the processing of information flows, in particular for the collection and processing of data, archiving and storage of information obtained as a result of the control activities of the administration of autonomies (ISSAI-100, 2019). The fifth solution is «CICEP red», a computer application developed by the Spanish State Audit Office (IGAE) to standardize the information of enterprises and public sector funds in accordance with current legislation (Administración Presupuestaria, 2023). Another interesting and useful example of the use of AIS is the French software package "Chorus" (Onken , 2017). It is used only at the state level, including in foreign territories, access to its data is strictly regulated and limited. Regional and local bodies work on their own software.

The Chorus project was developed by AIFE during 2007-2009 and affected the interests of all 16 ministries of the country, including the Ministry of Defense of France. The introduction of Chorus had many goals, but chief among them was compliance with the requirements of the LOLF law. It was thanks to Chorus that about 70 programs of ministries and their territorial bodies were replaced and 80 programs were cancelled. Almost a hundred departmental highly specialized programs have integrated with Chorus, and now each ministry has its own local computer network, which they have combined into a single state local network, which, logically, was connected to Chorus. To date, the software package "Chorus" is part of a large nationwide information system "SIFE", which, in addition to "Chorus", includes other unique information systems: OnP, "Copernic", "France Trezor" and others (Prokofev, et al., 2013)

In addition to the use of complex systems, attention should also be paid to the experience of using individual technologies, such as big data. Thus, a large German-American company SAS shared its successful experience in identifying fraudulent VAT schemes in Belgium on its website. The use of the hybrid model developed by the company allowed the Special Tax Inspectorate to reduce Belgium's financial losses by 98% (company SAS). At the same time, according to the calculations

of the British Policy Exchange think tank, data analysis can detect fraud and increase tax collection, which will save the country up to 33 billion pounds annually. In addition to fraud detection, Big Data analysis can improve the efficiency of public administration as a whole. For example, based on the analysis of information from databases, the German Employment Service Administration was able to identify which measures for the unemployed are effective and which in practice turned out to be in vain. This made it possible both to save the budget and to increase the overall efficiency of the employment service (Kud, 2021). Analyzing world experience in the implementation and use of digital technologies, it is determined that technologies will optimize the budget process, which will begin in 2022-2023. Ukraine was confidently moving along the global trend, but with some delay. This can be explained by significant resistance, inertia from changes in administrative leadership teams and corruption of the highest state authorities in the country, which greatly hinders the development of many processes in the public finance system, in particular.

2.3. Digitalization of public finance in developed countries

State finance system is the most important basis for stable and dynamic development of the economy. In economic theory, a stable connection between the financial and economic development of the country was established in the works of Schumpeter (1949), who substantiated the thesis that entrepreneurship and technological innovations can function effectively and generate economic growth only with the support of the credit or financial market. Later, the relationship between financial development and economic growth was studied in the works of Goldsmith (1969), Levin & Zervos (1996). We discovered, that in the study by Beck, Chen, Lin, Song (2016), financial innovations lead to a more fragile and vulnerable financial system, which, in turn, hinders economic growth.

McKinnon (1973) and Shaw (1963) identified the following reasons why underdeveloped financial systems can impede economic growth: limiting the amount of savings for investors to accumulate, as well as the lack of financial intermediaries themselves to redirect monetary resources to the most productive areas. In the digital economy, as noted in the studies of Bygrave & Timmons (1992), Freeman & Soet (1997), Pissarides (1999), access to finance is a critical factor that ensures economic growth. Innovations in the financial sector, as noted by Berner & Plow (2019), contribute to the optimization of financial intermediation and, in turn, stimulate economic growth. Financial innovations increase the efficiency of the distribution of savings capital into investment capital, as well as increase liquidity in the markets.

The digital transformation of the financial sector has led to the digitalization of business models and processes, and contributed to the creation of new products and services. Junger & Mitzner (2019)

note the growth trends of digital advisory and trading systems, the introduction of artificial intelligence, crowdfunding, peer-to-peer lending, mobile payment systems and new monetary opportunities with various digital forms of money (Scardovi, 2017) (Table 2.1).

Table 2.1 Main directions of digitalization of a number of elements of the financial sector

Financial instruments and mechanisms	Characteristics of the current state of the financial sector	Promising directions of development
Payments	Free exchange of goods and services and development of domestic and international trade by ensuring safe, efficient and effective transactions	New cryptocurrencies are becoming a widespread means of payment, potentially eliminating the intermediation of fiat currencies. Distributed ledger technology eliminates the need for traditional mechanisms and intermediation in the financial system
Savings and investments	Preservation, capitalization and transfer of value over time to optimize people's life consumption patterns and enable wealth distribution across generations	Investing becomes a social business; decisions are made based on feedback social networks. Use of machine artificial intelligence to manage assets performed by “robots”; super-intelligent machines potentially replacing human traders
Project finance and funds	Combining limited resources from a very large number of different sources and using them together to finance large and indivisible projects	Crowdfunding initiatives that mimic the process of raising seed/venture capital, and even IPO processes that reduce the need for investment banks, and regulated capital markets are the “democratization” of this funding segment
Deposits and loans	Transfer of funds between counterparties (lenders and borrowers) using a fully integrated traditional bank business model and security guarantee	Non-traditional players share activities and potentially replace traditional players as intermediaries. Digital technology for efficient multi-participant connectivity and real-time negotiation
Investment and corporate banking	Analysis, consolidation, division and/or transfer of financial risks through the intermediary of wholesale/investment banks. Financial risk management products traded on an OTC or regulated market	New risk management models that can process structured and unstructured data and create better predictive models using machine learning/artificial intelligence. Creation of new services and alternative fully digital infrastructure elements
Insurance and reinsurance	Pooling and transferring (or sharing) non-financial risks, as well as risks related to property value and other general losses	Implementation of IoT in the insurance sector, elimination of some risks and creation of more efficient underwriting and pricing mechanisms. More efficient and effective pooling, structuring and risk allocation
Management of risks	Valuing, pricing, transferring, holding, hedging and covering risks – financial or purely financial in nature	Becomes more dependent on new applied analytics, machine learning and other approaches

Source: Scardovi (2017)

One of the main areas of implementation digital technologies in financial system in developed countries is FinTech technology. The most important prerequisite for accelerating the development of FinTech, especially in developing countries, is financial inclusion. To identify the main centers of business activity associated with the use of financial technologies of various types, a geographical segmentation was carried out and three main regions were outlined, namely: Americas (countries of

North and South America), EBSA region (countries of Europe, Africa and Middle East) and Asia-Pacific region (India, China, Singapore, Australia, etc.) (Figure 2.3).

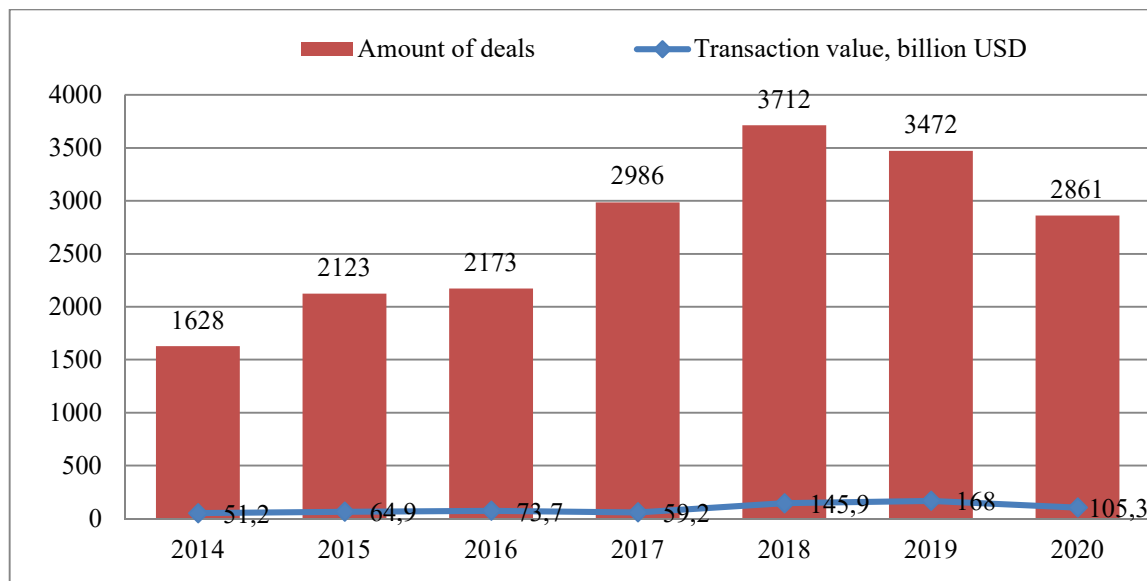


Figure 2.3 Cumulative investment activity in the FinTech sector for 2014-2020

Source: Compiled according to Global Competitiveness Report (2019), Global FinTech Index (2020), Global Innovation Index (2019)

Based on the widespread availability of data, transforming business models based on platform and ecosystem approaches, nonbanks and the convergence of financial services by other economic agents will further spread, which can increase disintermediation and weaken the limits of the financial industry. This, in turn, will require a proactive response from regulators through improved risk management, assessment of the impact of financial technologies on performance, and the acquisition of digital dividends by banks and their clients. The region of the Americas during the study period had the largest weight among the total investment activity and in 2020 provided approximately 75% of all investment flows of the global FinTech industry (Figure. 2.4).

Among the technologies with significant transformational potential, it is worth noting artificial intelligence, machine learning, blockchain, Big Data, biometrics, smart contracts, cloud computing, Internet of things, virtual reality. The convergence and integration of these digital technologies by banks, as tools for digital transformation, is changing the system of relationships, strengthening their focus on the fulfillment of their obligations by clients, ensuring their financial well-being, freedom and security to meet every day needs throughout life. For example, realizing the potential of Big Data technologies to transform a bank's client-oriented business model involves the development of financial analytics, digital marketing, a personalized product offer, and omniscient interaction.

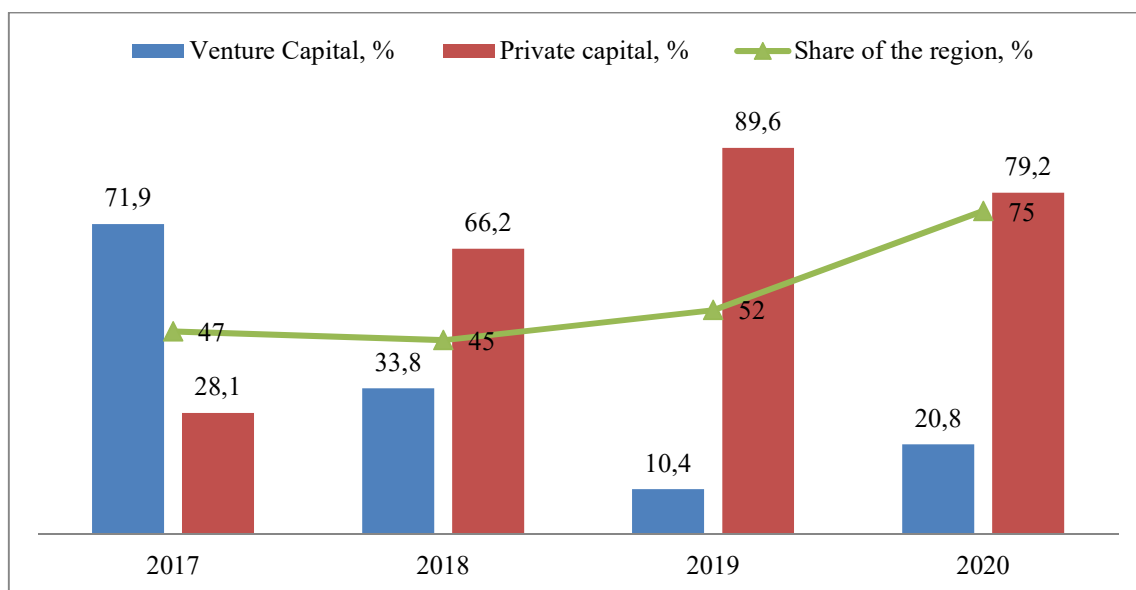


Figure 2.4 Cumulative FinTech investment activity in the Americas region 2017-2020 by main types of capital sources

Source: Compiled according to Global Competitiveness Report (2019), Global FinTech Index (2020), Global Innovation Index (2019)

In China (Dawei et al., 2018), the P2P lending model was initially based on loan guarantees, but some Internet financial companies have begun to move towards a credit risk reserve fund model. The P2P lending model is basically a hybrid model in which platforms analyze project or applicant information offline using traditional credit scoring methods to assess credit risk. Applications that meet the criteria are posted online for funding by investors. At the same time, most large P2P lenders have physical branch networks throughout the country. The FinTech online lending model involves funding primarily from retail investors. Platforms partner with third parties to attract new borrowers. Was discovered, that the major Chinese platforms have moved beyond lending to asset management, business insurance and financial services products covering all segments of clients' financial interests.

Three FinTech services currently dominate in China: P2P lending, mobile payments, and crowdfunding (Xu et al., 2019). In the UK, P2P platforms position themselves as retail investors, as an alternative to bank deposits, and not as a risky investment vehicle. The goal is to provide low, stable income for retail investors and to provide loans at low rates to individual borrowers and small businesses.

The digital determinants of the development of the domestic financial system do not fundamentally differ from the global ones. The question is only about the pace of digital transformation, which will depend on the adoption and implementation of a digital strategy with an emphasis on the creation of digital products, end-to-end interaction with customers, deepening opportunities for financial

partnerships and cooperation with FinTech companies. At the same time, the assessment of digital opportunities, the transformation of the operating business model and IT infrastructure and the transformation program are important.

2.4. Digitalization of public finance in developing countries

Currently, the processes of globalization are helping to reduce the gap between developed and developing countries by accelerating economic processes and, to some extent, changing the priorities of citizens of developing countries. The openness of the world's economies, the transfer of production capacities from the center to the periphery, where, unlike the rapidly aging countries of the first world, there are a large number of free workers, increase the growth dynamics of developing countries, which reduces their lag behind developed ones. In addition, the transfer of production entails an improvement in infrastructure (Cordella & Paletti, 2019). Thus, the infrastructure gap between countries is narrowing, which allows countries lagging behind in terms of technology to start digital transformation not from scratch.

The general trend in the digitalization of public administration is the “government as a platform” model. Model based on the assumption that databases and shared applications are provided by the government to civil society and business to address issues of public interest. On this basis, actors develop their own services, which reduces costs, increases the time of service provision, and allows them to attract end users — citizens (Eaves et al., 2020).

The design of a digital platform can vary depending on the values and attitudes that its creators adhere to: it can be either a focus on the provision of state-dominated services, or a focus on citizen-centric involvement in decision-making and policy development (Yogesh et al., 2021). The latter approach prioritizes the needs of the citizen, his interests and vision of public policy in a particular area. The state strives in every possible way to establish strong communication with citizens, often the latter are considered not as passive objects of control, but as full and equal partners with whom dialogue is carried out from equal positions, while the opinions and needs of citizens are also taken into account.

Digital transformation is not so much purely technical as environmentally changing the nature of public administration - cooperation between the state and citizens is changing under the influence of technology: if technology is inherently collaborative, then the interaction between actors (state - citizens - business) will be collaborative in nature (or will be it is more effective precisely with a cooperative-collaborative model of interaction, while, for example, directive management will be less effective) (Saleh et al., 2021). The techno-ecological system is formed by the principles, methods and norms of interaction "man - man" and "man - technology", ultimately resulting in the triad "man

- technology - man". The deep principles of Web 3.0 technology encourage participation, thus defining the collaborative nature of the "government as a platform" concept built on their basis.

In developing countries, the relevance of introducing a participatory digital government platform, in our opinion, is due to the task of including broad groups of citizens whose ability to effectively receive public services and influence decision-making was previously limited (Yarovoy et al., 2020). The policy of inclusiveness allows both the political socialization of excluded and frustrated groups of citizens, and the provision of public services to people from the groups that form the basis of the social pyramid. However, at the same time, there is a related problem: do representatives of these groups have access to the Internet? It is assumed that representatives of lower social groups have difficulties in acquiring personal computers and smartphones and accessing the Internet. Also, ethnic minorities living in hard-to-reach remote areas may experience problems using technology.

We propose to analyze the use of FinTech in developing countries, the advantage of which is financial inclusion. The International Finance Corporation estimates that financially excluded SMEs in developing countries face a significant credit gap in excess of \$2.1 trillion (Patwardhan, 2018). However, according to a study by CARE International and Accenture, adding unbanked SMEs to the banking sector's customer base could generate additional annual revenue for banks of about \$270 billion. The largest revenue potential is estimated in the Asia-Pacific region in \$95 billion

According to the World Bank (2018), approx1.7 billion people in our modern world did not have bank accounts. Most of this population lives in developing countries, and about half is concentrated in only seven countries: Bangladesh, China, India, Indonesia, Mexico, Nigeria and Pakistan. However, Africa is the region with the fewest banks in the world, with an estimated 80% of its population not having access to formal banking services. In Asia, the average percentage of bank account and debit card ownership is 53.2% and 32%, respectively: for Latin America - 46.7% and 31.2%; and for developing Europe – 58.1% and 43.2% (World Bank, 2018). The structure of investment types is similar to the models of North and South America, and there is also a similar trend of increasing venture investments (Figure 2.5). The Asia-Pacific region has historically had the smallest share of total global FinTech investment activity, peaking in 2018 when VC investment accounted for 61% of all global FinTech investment (Figure 2.6).

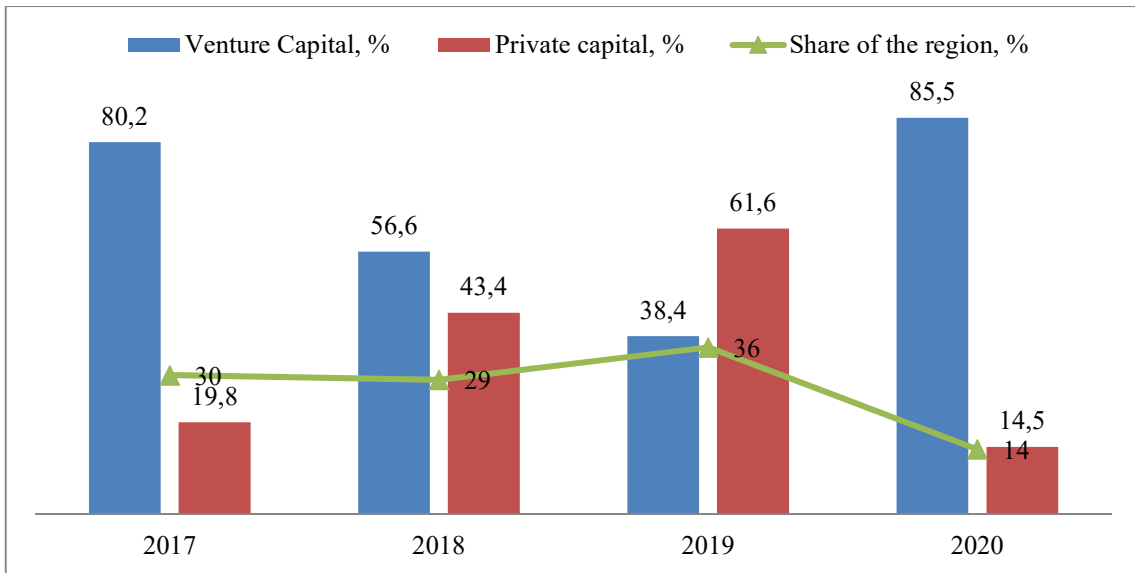


Figure 2.5 Cumulative investment activity in FinTech in the region of Europe, the Middle East and Africa in 2017-2020 by main types of capital sources

Source: Compiled according to Global Competitiveness Report (2019), Global FinTech Index (2020), Global Innovation Index (2019)

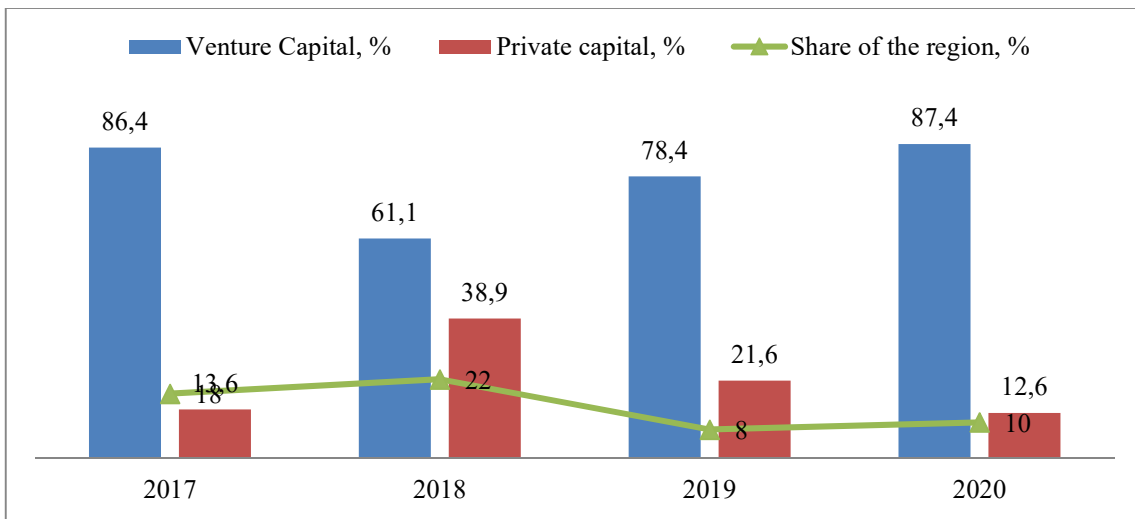


Figure 2.6 Cumulative FinTech investment activity in Asia Pacific 2017-2020 by main types of capital sources

Source: Compiled according to Global Competitiveness Report (2019), Global FinTech Index (2020), Global Innovation Index (2019)

Digitalization in developing countries has had a big impact on the growth of mobile payments. It is mobile payments that are an important part of developing countries. The following factors stimulating the growth of mobile payments in developing countries should be highlighted (Iman, 2018):

1. Socio-economic conditions. Mostly people do not have personal account, credit or debit card. Poorly developed infrastructure combined with high fees for money transfer services make mobile payments attractive (Evans D. & Pirchio A, 2015).
2. Economic efficiency. Most of the transactions carried out in developing countries combine the small size of each individual transaction, but the large aggregate (World Economic Forum, 2011). However, the creation of a payment infrastructure, including the opening of a bank branch, is not commercially viable, since it requires significant initial investment.
3. Distribution of mobile phones. With the falling cost of mobile phones, they are becoming more accessible to people in developing countries.
4. Ease of use and financial transactions. It becomes possible to make payments without being tied to specific payment terminals or branches of banking organizations.
5. Updated initiatives. A list of new initiatives of international organizations (IO) and non-governmental organizations (NGO) has been determined: International Finance Corporation, the World Bank, the Gates Foundation, GSMA, and others, that promote the introduction of mobile payment systems (Jenkins, 2008).

A number of studies have shown a positive correlation between the use of mobile money and trade credit. A survey of Kenyan enterprises showed that the availability of mobile money technology increases the macroeconomic productivity of the business sector by 0.33–0.47% (Beck et al., 2015). On the other hand, a number of factors should be noted that limit the further growth of mobile payments (Miao & Jayakar, 2016):

1. Rigid rules and restrictions from regulators.
2. Monopolistic aspirations of banks.
3. Limitations in the development of cooperation with traditional banking institutions.
4. Underdeveloped ecosystem as a weak infrastructure, lack of standards, congestion in the telecommunications network, lack of the necessary qualifications and skills to use.
5. Security issues. The population of developing countries more often becomes a victim of cybercriminals (Karnouskos & Fokus, 2004), because, firstly, developing countries do not have effective modern legal frameworks and mechanisms to combat cybercrime; secondly, users pay less attention to security issues; thirdly, there is no digital literacy. It was determined that mobile systems, in most cases, do not have any specific list of legal norms, especially in developing countries (Table 2.2).

Table 2.2 Modern mobile payment systems

Mobile payment system operator, payment system name, launch year	Territory of distribution	Direction of entrepreneurship development, indicators
Safaricom, M-PESA, 2007	Kenya, Tanzania, South Africa, Afghanistan	P2PT, get a loan to pay for a mobile phone, pay school fees, pay utility bills, save money. Implementation in sectors as diverse, agriculture, health, education and energy
Vodacom	Tanzania, Ghana	Conducting P2PT transactions
Easypaisa	Pakistan	Pay utility bills, conduct domestic and international P2PT transactions, use mobile wallet features
B-Kash, Grameen Phone, Rocket	Bangladesh	Carrying out P2PT transactions. B-Kash's shareholders are BRAC International Finance Corporation, Bank Limited, Money in Motion, etc
Uganda Telecom, Warid Telecom, Orange Uganda	Uganda	Conducting P2PT transactions
Voila, T-Cash	Haiti	Getting paid, conducting P2PT transactions, paying bills
Tigo	Ghana	Conducting P2PT transactions
Airtel Money	India, 16 African countries including Kenya, Tanzania, Uganda, Ghana	Conducting P2PT transactions, making purchases. Fidelity Bank Ghana Ltd. entered into partnership with Bharti Airtel Ltd. and Tiixa to launch a nano-lending platform that provides instant access to loans through the Airtel Money wallet
MTN Mobile Money	Africa: Uganda, Ghana, Cameroon, Ivory Coast, Rwanda, Benin	Conducting P2PT transactions, paying for goods/services, checking balances, paying utility bills, school payments and fees in Benin, tuition fees
Zoona, 2009	Zambia, Malawi and Mozambique	Conducting P2PT transactions
China Mobile and Union Pay Co. Ltd Union Mobile Pay E-commerce Co 2011	PRC	Integrated payment and financial information services
Telecoms (Singtel) and Standard Chartered Bank 2014 Dash	Singapore	Mobile banking services, online payments, money transfer, insurance purchase and loan approval via mobile phone
Central Bank, Bank Negara Malaysia, CIMB, Maybank and Public Bank, Maxis, Celcom, Digi 2013, "MyMobile"	Malaysia	Money transfer, bill payment and money transfer. My-Mobile provides interaction between banks and networks of mobile operators
AIS, True Money, 2014	Thailand	Providing mobile financial services. SIM cards are tied to bank accounts in K-bank. Clients
PLDT, Banco de Oro 2001, Smart Money, Globe Telecom 2004, Globe G-cash, Coins.ph	Philippines	Such a service gives its customers the opportunity to send various messages abroad and in the country using a mobile phone, as well as pay for goods using cards. G-cash service, based on SMS, offers mobile banking services via mobile phone Blockchain-based mobile platform to transfer funds at more affordable rates without the use of banking infrastructure
Wing 2009	Cambodia	Conducting money transfers within the country, paying bills and replenishing airtime. The company works with 1800 agents and has about 1 million users

Source: Casanova et al. (2018), Koh et al. (2018), Boamah & Murshid (2019)

It is important to note the positive dynamics in the development of this area of digitalization of financial services. So, if in 2006 there were only 10 organizations in the world offering mobile money services (Aker & Mbiti, 2010), in 2014 they became widespread in 89 countries (GSMA, 2014). According to the estimates of the SM Association, at the end of 2019, the number of organizations providing mobile payment services exceeded 280 (Schulte, 2018). At the same time, according to OMFIF estimates, by 2022 the number of mobile payment users will reach 1.5 billion people (Digital Monetary Institute, 2020).

With access to relatively less developed consumer banking and credit card systems, consumers in Japan and South Korea quickly adopted mobile payment technologies, resulting in more developed mobile payment markets in these countries (Okazaki, 2006). In 2017, mobile payments in China amounted to \$5 trillion (Hill, 2018). According to the Central Bank of Ghana as of September 2018, there were 12.5 million active mobile payment users in Ghana (about half of the country's population), which is five times more than in 2014 (Bank of Ghana, 2017). Quantities of registered mobile money accounts in Bangladesh more than doubled in 2018 compared to 2014, and the number of registered agents increased by 51% over the same period.

Analyzing the digitalization of the financial sector, it is necessary to consider the insurance sector of developing countries, in which the introduction of modern technologies aimed at increasing efficiency, risk pooling and claims management has become known as InsurTech. Digital technologies allow insurers to receive information about changing consumer behavior and offer personalized risk coverage. With the power of big data and artificial intelligence, new microinsurance models are emerging, especially in developing economies. It is noted that the digitalization of insurance activities can reduce non-operating costs of companies by 30–50%, reduce compensation costs by 1–3%, and increase collected premiums by 1–3%. Digitalization of operational processes, optimization of the IT platform and the introduction of more efficient computing systems allow companies to significantly improve commercial and organizational performance (Scardovi, 2017). According to the Morgan Stanley report on insurance and technology, the introduction of digital technologies allows insurance companies to have profitability 10% higher than the market average and be 20–30% more profitable (Insurance and Technology Evolution and Revolution, 2014).

2.5. Summary

Based on the study, such conclusions can be drawn. The global digital experience has been researched to optimize the budgeting process. In particular, the activity of the World Bank was analyzed to finance projects around the world, which is an increase in the transparency and openness of public

finances (Fedorov, 2021; Bergmann& Grossi, 2014). One such project related to Ukraine was the Public Finance Modernization Project for Ukraine (ended in 2014), but its result was rather unsatisfactory, so the project was not updated (Bannister et al., 2012). The experience of using digital solutions to optimize the budget process in Spain, France, and local solutions in Belgium, Germany and the UK was also studied.

It will be useful for Ukraine to apply the experience of Spain and France for the digitalization of public finances and their transparent distribution. The introduction of such programs into the Ukrainian financial system will allow our country to save money for their more efficient use (Byrd & Guimbert, 2009). Our country needs not only to modernize the entire financial system, but also to completely digitize it, which will allow our country to reach the international level of developed countries. The use of digital technologies in finance is the way to the future of our country, which must be implemented according to the experience of world leading countries.

III. THEORETICAL FRAMEWORK

3.1 Introduction

Discovering influence of digitalization on the public finances of Ukraine is manifested, first of all, in the study of financial management and the identification of key methods and means of applying technologies in public finances. Despite the great intellectual and resource potential of Ukraine, as well as numerous reforms carried out in various areas, over the 32 years of our independence, we have not been able to sufficiently improve the efficiency of public finance management, and this, of course, directly affects almost all spheres of Ukrainian life. One of the key problems that determine the low level of efficiency of public finances is the unpredictable influence of the human factor and the hierarchically centralized nature of the budget system itself, especially at the level of implementation of standard procedures.

Even taking into account certain successes in the digitalization of public services in past years, providing some transparency and publicity to public finances (state information portals "Budget for Citizens"), the introduction of the Prozzoro electronic public procurement system, etc., the level of non-transparent component in the public administration of public finances still remains unacceptably high. And this, in my opinion, is largely due to the unpredictable influence of the human factor. Perhaps the best way to solve this issue is not only partial automation, but also complete digitalization of standard executive procedures according to the logic of the budget process: from the budgetary parliamentary committee to the headman in a conditional rural community.

3.2 Theory of change

The decisive factor in the process of conducting successful monetary changes is the closest convergence of project goals and present results. The theory of change (ToC) is now seen as a powerful tool for improving the chances that a given government program will be successful. The author of the first publication on the theory of change, Carol Weiss (1995), gives the example of a training project for youth with physical disabilities. The program was built on the basis of interconnected assumptions, among which, for example, "training in popular professions should be organized in accessible locations, information about the enrollment of students should reach the target audience, and offers with adequate wages will be available to all project participants ..." (Weiss, 1995). However, the reality may be far from these assumptions - it is quite difficult to find a good instructor, the labor market is rapidly changing under the influence of economic factors, etc. The theory of change is the chain of assumptions of the project authors, and the method of their critical evaluation and research, it explains how and why a particular initiative should work. A detailed

description of the relationship between activities and expected results and an explanation of the reasons for using certain approaches should contribute to a more successful project activity.

Other authors have defined the theory of change as "the systematic study of the links between outcomes, activities, and the context of social initiative" (Connell & Kubisch, 1995). According to the researchers, it is important to observe certain principles in the process of developing a project program: the links between cause and effect should not be contrary to common sense and be realistic, the goals should be achievable, and the theory of change itself should be specific and complete so that it can be easily assessed and tracked progress. The approach to building a theory of change in each case can be deductive, inductive or stakeholder oriented (Valters, 2014). With a deductive approach, the theory of change is based on solid theoretical research, an inductive approach means referring to theoretical developments in the context of a specific social project. An effective method of avoiding mistakes is the inclusion of stakeholders in the process of discussing the theory of change, that is, all interested persons and persons to whom such changes are directly related (Stein & Valters, 2012).

Representatives of a public organization, government institutions, local governments, local residents, owners of small and medium-sized businesses, social activists, etc. can act as stakeholders. Involving stakeholders in the change planning process allows reaching a certain agreement of all participants on the goals and expected results. After analyzing the scientific literature and researching the theory of change, it is recommended to consider the following questions in the working process on the theory of change (Rogers, 2014) (Figure 3.1):

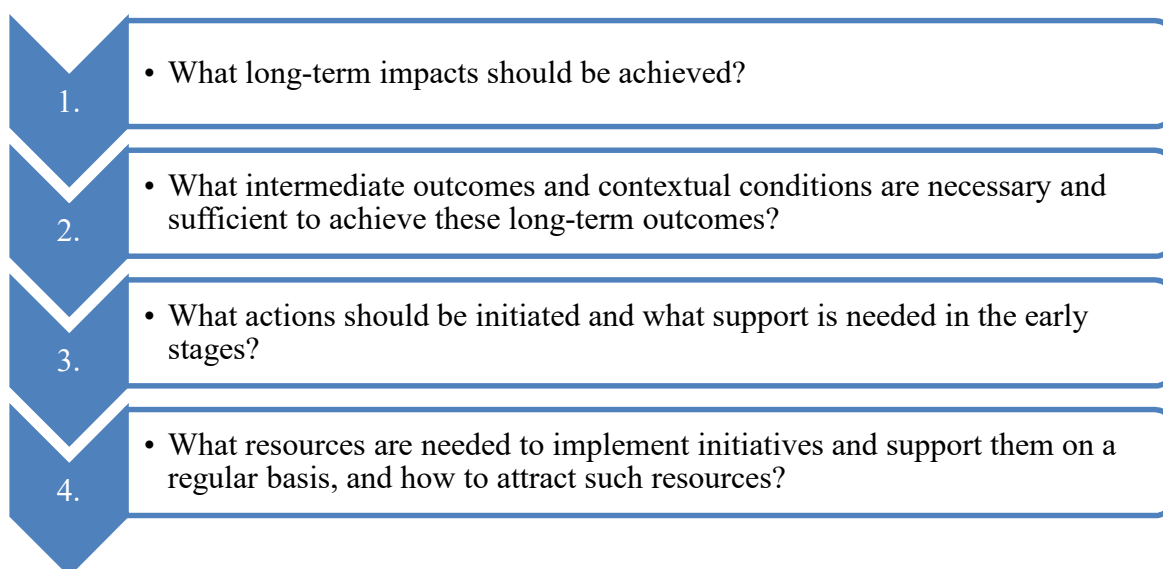


Figure 3.1 - The main questions that arise in the process of implementing the theory of change in practice

Source: Connell & Kubisch (1995)

Analyzing theory of change it becomes clear that there are not enough resources for the full implementation of the project, then it is at this stage that it is possible to choose among the available alternatives - either to attract the necessary resources, or to revise the expected consequences and results of the project activities in such a way that the implementation of social changes made possible with available resources. The generalization of developments in the theory of change at the level of finance, for example, can become the basis for the implementation of financial projects at the state level. However, simple copying cannot be carried out effectively, the theory of change proceeds from the fact that each initiative should be built from the context in which financial relations unfold.

The following are invited to explore the main stages of the theory of change (Figure 3.2). So, the main stages of the theory of change are to find a solution to a certain problem. That is, the theory of change is built in such a way that a specific decision is formed at each of its stages, which should give concrete results at the final stage (Coryn et al., 2011). For example, the creation of an online platform for distribution and obtaining concrete results in the form of savings.

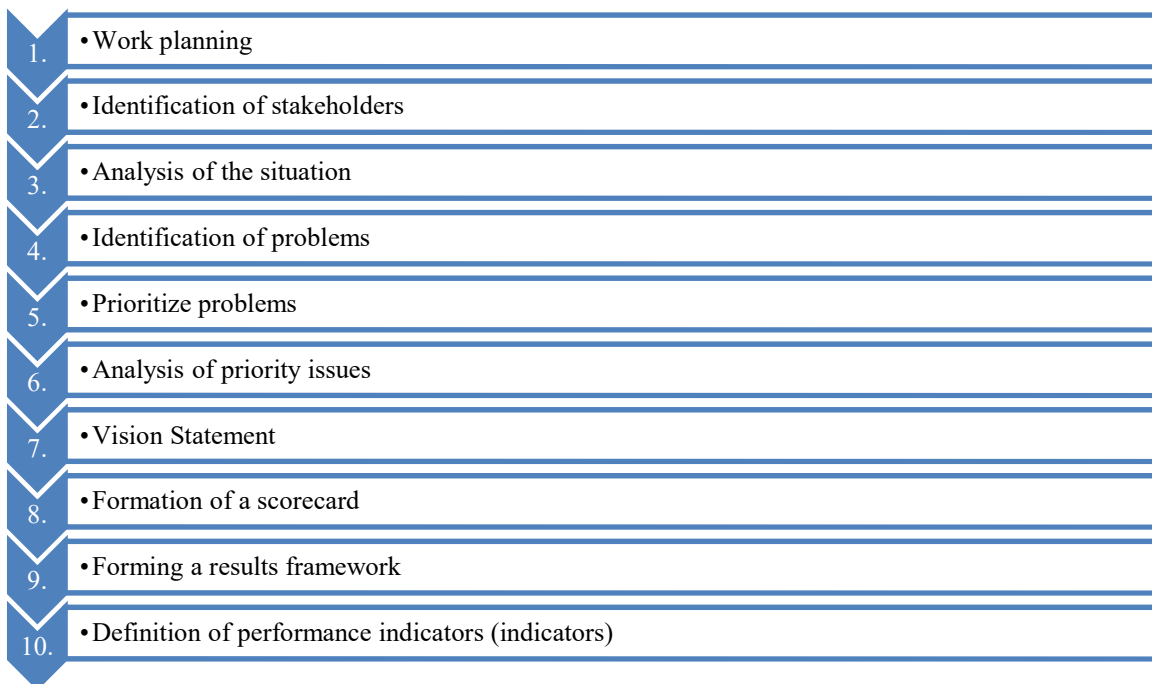


Figure 3.2 - The main stages of the theory of change

Source: Connolly & Seymour (2015)

The theory of change has already ceased to be a useful tool for building only government initiatives; today it is being actively implemented by entrepreneurs seeking not only to achieve business goals, but also to promote the efficient use of their financial resources. The theory of change helps to determine whether the result of digitalization is the effective use of public finances - whether there can be a more efficient way to achieve such an impact (Kezar & Holcombe, 2019). The theory of change not only helps to identify the link between digitalization and the use of public funds, but also

helps to avoid potential risks through careful planning and testing of theoretical assumptions at each stage.

Today, the linear theory of change in scientific publications is giving way to a more complex non-linear model. In general, the latter follows a linear one. However, in addition to the formula "Actions - Results - Consequences - Impact", the model focuses on the factors influencing the onset of the expected results. Instead of a linear sequence of actions, we are dealing with a loop that constantly returns us to the beginning if the expected consequences do not occur (University of Kansas Center, 2018). That is, such a model is more flexible and allows you to test approaches to solving the problem and rethink the overall vision of how to solve the problem, when necessary.

3.3 Public finance management and the need for its digitalization

In modern transformational conditions, the development of public relations is difficult to imagine without the use of information and digital technologies. Their application has facilitated and changed various areas of public finance for the implementation of management processes and activities in general. Today, there is a significant increase in digital technologies, which cannot but affect the need for integration changes in public financial management processes (Chod et al., 2020).

The active use of the Internet, mobile devices and digital technologies leads to the need for global modifications of certain processes and methods of managing public finances. In the context of rapidly growing information technologies, state structures are forced to introduce modern technologies in their activities. The use of computers and related equipment, the Internet, mobile communications in modern world within the framework of the activities of state structures is a completely natural and simply necessary condition for their functioning and development (Yesimov & Bondarenko, 2018). In addition, in the work of government agencies, there is a need to introduce cloud computing, neural networks and many other technologies. All this also leads to the need for highly qualified specialists in the field of digitalization of public finance management processes.

Digitalization is a factor that provides significant development benefits in this direction. Of course, economic growth and transformation processes are driven by use of digital technologies (Panteleeva, 2020). Thus, rapid changes for the development of the financial sector in the direction of digitalization are inevitable.

3.4 The influence of digitalization on the main components of public finance (public revenues, public expenditures, etc.)

The development of technologies and digitalization are increasingly influencing the process of spending and generating budget revenues, as they ensure its transparency, reduce the loss of budget funds, and contribute to the rational and efficient use of budget funds. The digitalization of public expenditures, in particular the creation of specialized online portals and platforms that publish information on the expenditures of budgetary institutions and the execution of budgets, provides an exceptional opportunity to achieve transparency in the process of spending by budget managers, optimize the use of budgetary funds, contribute to their savings, which ultimately increases the level of public confidence in budget expenditures (Konyeva, 2018). In Ukrainian state budget, share of revenues exceeds expenditures, which means that its implementation is not effective enough. It is digitalization that should reduce costs by saving money on the transparency of public spending.

Thanks to competitive bidding over the years of its existence, the Prozorro e-platform saved the state UAH 190 billion budgetary resources (Government Portal, 2021). The public procurement sector is growing dynamically and not only the number of organizers and bidders is increasing, but also the volume of agreements concluded, which indicates the effectiveness of the reform and public confidence. The amount of savings proportionally increases with the size of purchases due to economies of scale.

In the modern budget process, the digitalization of public revenues and expenditures creates conditions for the publication of the maximum amount of information on the use of budgetary funds, revealing all stages of their implementation, from planning to payment of payment orders at the expense of budgetary funds, which allows a wide range of stakeholders to carry out analysis and control. and prevent inefficient use of public funds (Latkovska & Hryb, 2022). The digital development of the public finance management system provides for the improvement and development of the IT component of the Ministry of Finance of Ukraine, namely, the unification of existing IT resources and the functions of its constituent institutions into a single public financial management system, providing access to online services provided in this system , automation of all processes, which makes it possible to quickly make management decisions, ensure openness and publicity in the use of budgetary funds.

3.5 Methods and instruments of implementation of digitalization of public finance in Ukraine

In July 2020, the implementation of the "Logica" analytical and information system was completed in Ukraine. Its developer is a state enterprise. The main design, service center and production of innovation finance technologies of the Ministry of Finance of Ukraine. The analytical and information system "Logica" can be easily integrated with the information and software complex "Local budget" and two analytical and information systems "Local budgets of the city, district level" and "Local

budgets of the level of budget funds managers" (Local Budget, 2020). According to the information on the GlavFinTech website, when using the "Logica" analytical and information system, the following is achieved:

- Fast, electronic exchange of information between all participants in the budget process;
- Information is exchanged not only between users of this program, but also between the Ministry of Finance of Ukraine and the State Treasury Service of Ukraine between the State Tax Service of Ukraine. You can quickly receive information from the State Treasury on the implementation of the local budget and information from the State Tax Service of Ukraine on tax revenues of the budget for payers - legal entities;
- Collection in one database of all information used in the budget process;
- The efficiency of making all management decisions and improving their quality and motivation, since all information can be obtained and analyzed on a certain date (GlavFinTech, 2020).

An analysis of experience of different country of the world in optimization of budget process shows that by the beginning of the war in 2022-2023. Ukraine was confidently moving along the global trend, but with some delay. This can be explained by significant resistance, inertia from changes in administrative leadership teams and corruption of the highest state authorities in the country, which greatly hinders the development of many processes in the public administration system and public finance, in particular, in the formation and implementation of budget policy. To implement this concept and taking into account the global experience of platform solutions (Kud, 2021), in all areas of our life, a decentralized information platform based on distributed registry technology with the ability to integrate with the state statistics platform should be developed, optimally using the already traditional technologies for processing large data.

The main idea of this is to technologically minimize any possibility of an individual executor - a formal and informal participant in the budget process - to use public funds for other purposes. And this, of course, is a colossal hidden potential for the public sector of Ukraine and the modernization of its public policy. The use of modern platform solutions will reduce time and simplify the process of government decision-making, as well as help to identify problems in a timely manner and quickly respond to them (Thorsten, 2020). Building a digital public finance management system focused on citizens, and not on the interests of those in power, will have a positive impact on socio-economic, public-political and state-legal relations and, as a result, will ensure sustainable economic and social development of Ukraine.

3.6 Summary

Ukraine has gone through a number of technological changes in the field of efficient use of public finances, and based on the introduction of world experience, a number of digital platforms have been created by the government of the country. Due to the creation of such platforms, the efficiency of public use has increased, especially in the expenditure side (Petheram et al., 2019). After all, a number of digital reforms have been carried out in a short period of time, primarily affecting the transparency of public procurement and the activities of state enterprises. The impact of digital technologies on the use of public funds has had a positive impact, resulting in savings on public procurement spending. The modern digital transformation of the public money management system is focused on ensuring the transparency of their use, the effective distribution of budgetary funds, and their savings, which ultimately increases public trust in the government.

IV METHODOLOGY

4.1 Introduction

In this section, a methodology for researching the topic of digitalization in ensuring the transparency of public finance management was carried out using the example of developed and developing countries and Ukraine. This section is built on the following sub-items: visualization of the research, characterization of the main methods of collecting information and analysis of the philosophy and ethics of the process. The general research methodology consists of the following steps: characteristics of the main methods of collecting information, analysis of the collected information, formation of the main results of the study, identification of the main problems and drawing up conclusions and proposals on your own vision of solving problems. Analysis of data on the use of public funds in the context of technological development will allow highlighting the main problems of public administration, which will allow them to be solved. After all, it was digitalization that became the impetus for creating transparency in the use of public funds and began to restore citizens' trust in the government.

4.2 Research design

The methodological basis of the study is the general provisions of the concept of financial security of the state (Decree, 2015), the Strategy for the development of the financial sector of Ukraine until 2025 (Strategy, 2021) and the report on the development of information technologies in Ukraine (Report, 2021), based on the analysis of which the main stages of this study. An important step in Ukrainian financial activity was the introduction of digital transformations that have been taking place in the economy and society since 2014. It has been established that the main consequence of these transformations was an increase in the openness and transparency of financial relations in our country at all levels of economy.

During research were used such methods as: economic, systematic and comparative analysis and synthesis (Russkaya & Ivashchuk, 2014). Also, when analyzing information on the impact of digitalization on the transparency of the country's financial system, calculation and analytical, statistical and graphical methods were used (Lukyanenko et al., 2000; Mocherny, 2001). So, next we will take a closer look at the use of these methods. Economic analysis and synthesis is necessary for the systematization of these volumes of financial receipts to the state budget of Ukraine and a clear understanding of their volume. It is financial receipts that are one of the key characteristics of the transparency of the financial system of Ukraine, since it is with funds that various corruption schemes can arise, which have gained particular popularity in the Ukrainian government.

Systematic analysis is used to process extensive information, the level of development of information systems and data from various sources, which first of all need to be systematized in specific directions and select only the information that is most relevant and necessary for my research. Information that is not systematized has no value, because it is a pile of various statements, theories, which are essentially an information dump..

We need the method of synthesis when conducting research in order to avoid mistakes in the analysis and, through the opposite action, to detect these polys and eliminate them. Statistical methods are also extremely important in the study, in fact, the basis of all master's work, because it is on the basis of the analysis of statistical data that one can obtain information about financial flows and the formation of the state budget, determine the key sources of financial income and explore the main items of expenditure. In my opinion, it is in the analysis of costs that one can see the connection with the violation of the transparency of the financial system, because the statistical figures are a symbol of where the taxpayers' money goes.

Calculation and analytical methods are necessary in order to see the dynamics of changes each year compared to the previous one and analyze whether these changes were positive or negative and determine their main causes. The interview method is one of the most common in the preparation of a survey and the formation of research results based on questionnaires. It is by the interview method that we propose to determine the impact of digitalization on the transparency of public finances. Equally important for a comprehensive study is a graphical method that demonstrates the results of previous methods and shows a holistic picture of the study using its graphical visualization. It is different drawings and graphs that help to better understand the data, problem or information, because they clearly demonstrate it. So, as a result of the analysis of the main methods necessary for my research, I propose to visualize them in Figure 4.1.

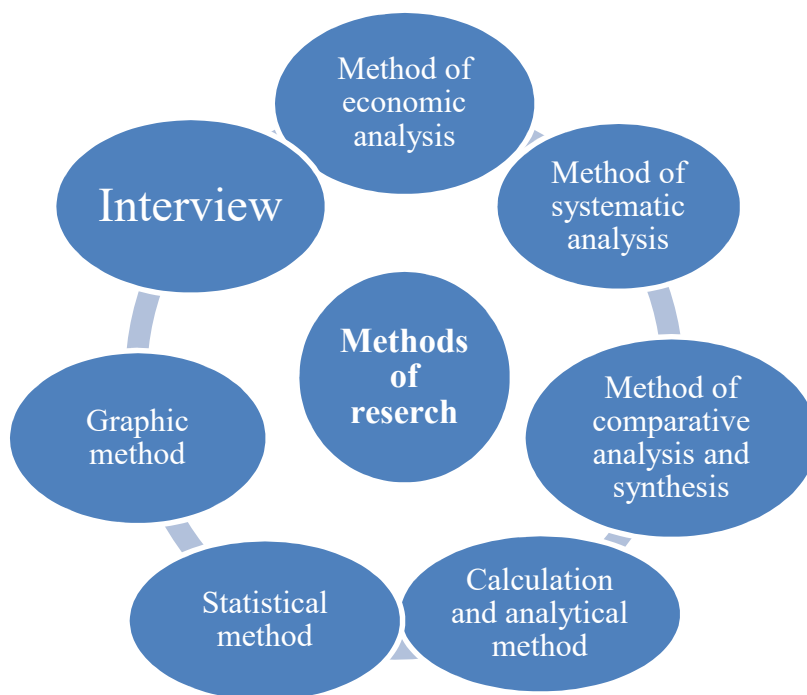


Figure 4.1 Characteristics of the main research methods

Source: made by the author

It is the use of the methods proposed in Figure 3.1 that will be required in the study and disclosure of the subject of the impact of digitalization on the transparency of the state financial policy of Ukraine.

4.3 Data collection strategy

All the information necessary for the full disclosure of the subject of my research was taken mainly from statistical sources, as data from the State Statistics Service of Ukraine (SSSU) and National Bank of Ukraine (NBU) data, it is on the websites of these institutions that data on financial flows to the budget of Ukraine, expenditures, main institutions and sources and main recipients. Then, before moving on to the main part of the analysis related to the study of financial flows, I worked out statistics on corruption schemes in public administration and research in our state. After all, it is the laundering of funds, concealment of their direction, unfair distribution is the main reason for the stability of the financial system.

Digitalization, which at first glance should bring the financial system of Ukraine to a new moat of transparency, may also further deepen its tinization. After all, information technology, on the one hand, makes it impossible for all sorts of financial fraud, and on the other hand, helps to hide them. Such a double impact of digitalization prizes for even deeper data analytics based on the research of various scientists in this field (Dmitrenko, 2022; Hall, 2021; Gritsenko, 2022), which I took as the basis of my research.

It was through the analysis of their articles that I came to the conclusion that digitalization has a very positive effect on transparency level of the financial system and its deeper implementation in Ukraine will make it impossible to steal the state budget and various corruption schemes of Ukrainian officials are impossible. Also, when writing this master's work, I relied on information obtained from unconfirmed sources, which can only be used as a secondary one and not be the main focus on it.

Basically, the data necessary for my analysis, I received from statistical sources, which are published annually and are freely available. Also, no less important was the information that I received from scientific articles and the Internet, and which I used when forming my own conclusions based on the data received. So, with the help of the following figure, I propose to depict the strategy of my research (Figure 4.2). It was when using the strategy I built that the search for the necessary information for the full disclosure of the subject matter of the master's work took place.

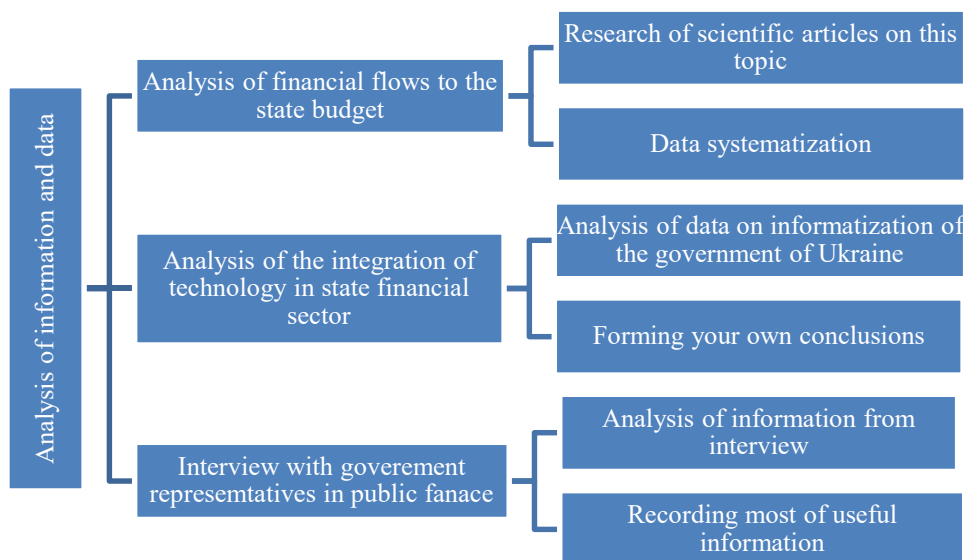


Figure 4.2 Strategy for researching the impact of digitalization on the transparency and effectiveness of financial policy

Source: made by the author

4.4 Data analysis

To begin with, I will analyze the data on financial injections into the state budget of Ukraine over the past few years and determine the budget items that have the most funding. The basis of the budgets of both Ukraine and the countries of the world is tax revenues, which are formed by the main source of budget revenues. The effectiveness of their use and attraction shows the level of development not only at the local level, but also the tax system of the state as a whole (Pasichnyy, 2017). It is on tax revenues that the size of transfers of local budgets for the development of infrastructure and social payments to low-income citizens, who are especially in dire need of improvement and adjustment in

Ukraine, depend. Next, I turn to the visualization influence of digital technologies on the transparency of government policy (Figure 4.3).

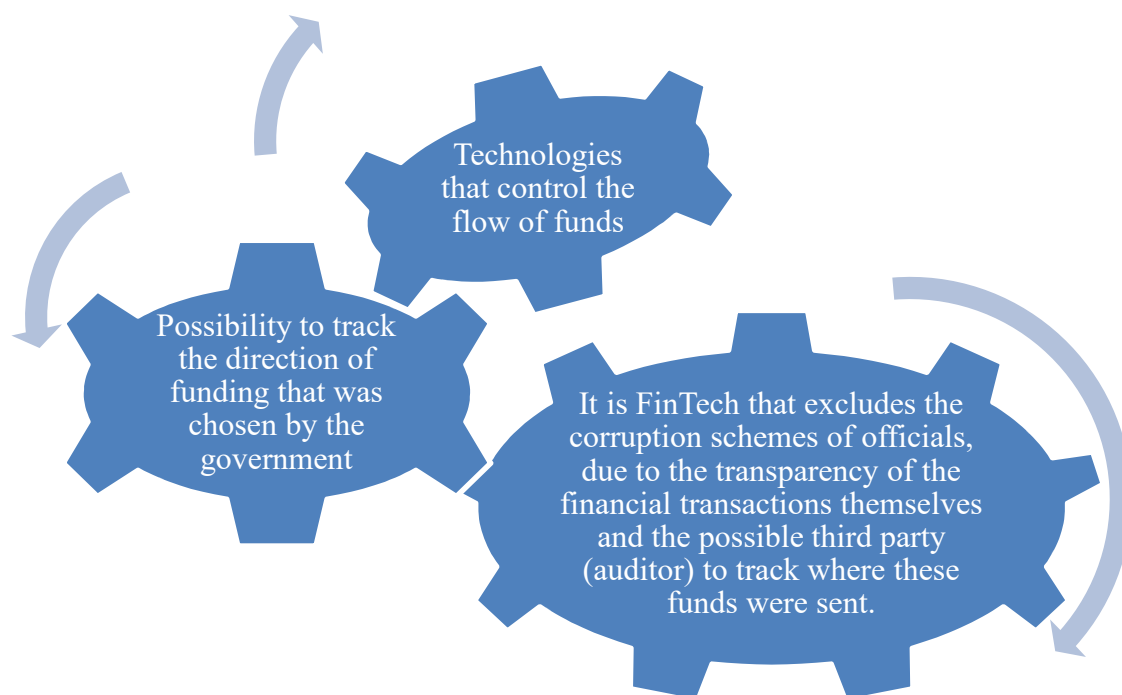


Figure 4.3 Characteristics of the impact of financial technologies on the transparency of government policy in Ukraine

Source: compiled by the author

Consider a simple diagram that proves the positive impact of financial technology on the transparency of government policy. When a certain amount was allocated to Ukraine for the development of the economy, it went to the account of the Ministry of Economy, which should divide these funds among the objects of financing and transfer them to the appropriate accounts. This is where the transparency of the government's actions appears, because in the case of misdirection of funds with the help of financial technologies, you can quickly find exactly where they were directed and determine the person or group of axes in whose name the account was created.

All the information I received was taken from official statistical sources, which once again confirm my position on the dishonesty of the Ukrainian government in managing public finances, because the fact that the Ukrainian army did not have proper funding until 2022 is a clear confirmation of this. I mainly used statistical data obtained from official sources and used scientific articles on this topic (Yessimov & Bondarenko, 2018). Transparency should be the main principles of the Ukrainian government, which, in a war, must not only make the right decisions, but also correctly allocate the funds provided to it.

Most of the information that was obtained in the process of writing the thesis was collected from a survey of representatives of the Ministry of Finance and the Ministry of Digital Economy. I did most

of the interviews on Zoom and over the phone because there was no way to meet in person. I spent an average of 30-40 minutes to conduct the interview, during which I received answers to all my questions. The survey itself is the basis of my research. The information obtained during the interview was used in the formation of the main part of my research.

Thus, financial technologies make various financial frauds impossible and thus make the actions of the government more transparent and clean and are one of the primary reasons for building an effective financial system in our state. If the Ukrainian government continues to introduce information technologies at all levels of the financial system, then very soon such words as “financial fraud”, “money laundering” and “corruption” will forever disappear into oblivion in Ukraine. However, unfortunately, today there are hundreds of different corruption schemes that are used to hide income, launder money and conduct various kinds of fraud. One of these is the flow of investments, the scheme of which I propose to study (Protsailo, 2022; Kondyukh, 2022).

4.5 Summary

The main 2 methods that I plan to use when revealing the subject of my research are statistical analysis and interviews. It is thanks to statistical information and data analysis that it is possible to determine the main changes in the country's financial system and determine the impact of digitalization. Based on the interview, I formed general conclusions about the impact of technology on the distribution of public finances. It has been researched that in order to ensure the transparency of the country's government, attention should be paid to the inflow and outflow of foreign investment and the use of information technology for tighter control. You can create a similar Prozzoro platform, where the flow of investments will be transparent, which will allow the government of the country to control exactly where and for what needs they were directed. Digitalization has led to significant changes in the use of public funds and has facilitated the creation of a number of digital platforms that aim to increase control over public funds.

V. RESEARCH CONTEXT

This chapter proposes to explore the main problems and obstacles that have arisen in Ukraine on the way to the transparency and efficiency of public finances. It is also proposed to determine the role of digitalization, which should solve the discovered problems. The final analysis of this section proposes to explore the main projects that have improved the performance in ensuring the transparency of public finances.

5.1 Problems and obstacles in ensuring transparency and efficiency of public finance in Ukraine

In recent years, the policy of openness and transparency in the use of budgetary funds has changed significantly in Ukraine. In Ukraine, there is a concept of a system that provides citizens of Ukraine with access to information about public funds at all stages of planning and use. Such a system ensures the relevance, reliability and uniqueness of information, ease of use of analytical data, simplicity and clarity of information, consistency and reasonableness, and also improves the quality of budget management and liquidity management. In Ukraine, such a system is the integrated information and analytical system "Transparent Budget" (IRM Report, 2021).

The main task of the "Transparent Budget" system is to limit the unfair distribution of funds and reduce the level of corruption. This system ensures transparency in budget processes, taking into account the state and local levels. This system allows citizens to control the use of funds by administrators, recipients of budgetary funds, state enterprises, the Pension Fund and the Social Insurance Fund (Zakon Ukraine, 2019).

This system also takes into account the recommendations of the World Bank, the International Monetary Fund (IMF) and the International Budget Partnership on such international transparency standards as "Open Budget", "Open Spending", "Open Contracts" and "Public Participation". This system provides citizens with access to information on the use of public funds at all stages (International Budget Partnership; Open Budget; Ministry of Finance of Ukraine). A transparent budget helps to increase the investment attractiveness of the country and reduces the likelihood of various corruption schemes.

This system has three separate web portals, each of which is responsible for its own area of use of public funds. The first is the State Budget Web Portal for citizens - this is a form of presentation of the main budget indicators, aimed at informing the general public about the main goals, priorities and objectives of budget policy. The second form is the Unified Web Portal for the Use of Public Funds

- the most open database of public finances in Ukraine. The portal was created according to the Law of Ukraine about the openness of publicity reports" (Zakon Ukraine, 2015).

The main purpose of creating this portal is to provide free access to the activities of civil servants in the safe distribution of state and local budget funds, property of state and communal property entities, and mandatory state social insurance funds. The last form is implemented with the involvement of funds from international financial organizations. Information on projects is published on the portal in an accessible form, and there are also statistics to see real dynamics of funds use by year and the structure of financing projects for implementation, creditors and responsible executors (Lunina & Bondaruk, 2019).

The transparency of public finances and the budgetary system characterizes the state of financial relations and determines the effectiveness of public administration. Financial transparency makes it possible to exercise the public's right to accessible information on budget execution, and also contributes to the strengthening and stabilization of the social mechanism (Skoryk & Riabokon, 2020). Main direction - develop our own methodological approaches to assessing the level of transparency in the use of public finances, which should be based on the capabilities of modern digital information and also do not forget about needs of society (Skorik, 2018).

5.2. The role of digitalization in solving problems and shortcomings

Today, domestic practice requires government agencies to make decisive changes and use the latest digital technologies in the context of integration processes to ensure transparency in the management of public finances. Digitalization is a factor that provides significant development benefits in this direction. Of course, economic growth and transformation processes are driven by the expansion and more convenient use of digital technologies (Matuszk, 2021).

Thus, rapid changes for the development of public finance in the direction of digitalization are inevitable. One of the ways to ensure transparency in the management of public finances in the context of digitalization is e-governance, which should improve the efficiency of the work of authorities with citizens, businesses and other institutions and reduce the overall time and cost (Onofrei et al., 2021). On September 20, 2017, based on decree of the Cabinet of Ministers No. 649-r, the Concept for the Development of e-government in Ukraine until 2020 (Zakon Ukraine, 2019) was adopted, in which a definition of electronic governance was provided, which should contribute to increasing the efficiency and transparency of public servants in the process of managing funds (Zakon Ukraine, 2019).

Our state already uses information technologies in finance, it help to optimize and facilitate the processing of information and its systematization, but in order to obtain the status of an open public authority; our government needs to introduce information technologies more quickly. As practice shows, it is the use of information technology in the state financial system that is the most effective way to combat corruption (Shcherbak, 2020). Therefore, the most important role of digital technologies in public finance - increase the performance of management in terms of such key indicators as the level of citizens' trust in public authorities, the degree of openness and transparency of government activities, and the level of corruption of our bodies in the financial sector of Ukraine. We propose to make a SWOT analysis and describe use technologies in public administration and present the data in Table 5.1.

Table 5.1 - SWOT analysis use technologies in public administration in Ukraine

<i>Strengths</i>	<i>Weaknesses</i>
1. Democratization of the financial sphere openness and transparency of the activities of government entities and increase trust of citizens in the bodies and institutions of the Ukrainian financial system 2. Reducing corruption among civil servants and officials in the financial sector 3. Reducing the number of mistakes that employees can make in the course of their activities through the automation of certain management processes great savings in resources such as time, money and personnel	1. Appointment of especially personal data located in information and communication systems cybercrime, which may lead to the blocking of the work of the financial system of Ukraine 2. Possible disclosure of confidential information insufficient number of educated personnel and there should not be proper state provision of office equipment 3. Depending on one server, because in the event of a breakdown, the entire established database may disappear
<i>Opportunities</i>	<i>Threats</i>
1. Reducing the level of corruption in the financial system of Ukraine improving the image of our state in the field of information and technological development 2. Increasing computer literacy and culture of employees and officials 3. Creation of a unified information and communication system that integrates all major financial services.	1. There is no full-fledged legal framework for the smooth operation of public institutions with information in electronic form 2. Insufficient number of highly qualified civil servants in state institutions; 3. Low salaries of civil servants, which do not motivate knowledge to master computer technologies

Source: Yarovoy et al. (2020)

The process of introducing information technologies into the public finance system in our state is characterized by a number of problems, which are primarily related to the low level of financing of projects for the digitalization of the financial system by the state, the insufficient level of knowledge in the use of digital technologies and their capabilities, the habit of paper documents, disinterest civil servants in the transparency of their activities and their corruption schemes. To eliminate this number of problems, it is necessary not only to stimulate the use of information technologies in finance, but also to change the system itself (Yeganov, 2012).

The provision of information technologies should be carried out comprehensively and take into account all external factors of influence, such as personnel, educational, etc. Informatization of the financial system is not just the use of information technologies in financial transactions, but a change in the very philosophy of the financial system of Ukraine and its adaptation to the use of these information technologies (Slemrod, & Bakija, 2017). Modern technologies contribute to the acceleration of globalization, open up new opportunities for the social and economic development of states and accelerate coordination between governments, companies and residents of countries.

5.3. Key projects to increase the transparency and efficiency of public finances

It is the implementation of information projects in the financial sector of our country that testifies to its transparency. Funding for the digital transformation of Ukraine's public finances mainly takes place with international technical assistance and participation of the Ministry of Finance (MoF) of Ukraine. The main projects and their budgets are shown in Table 5.2

Table 5.2 Key international technical assistance programs to improve public financial management in Ukraine

Project name	Terms of realization	Project budget
EU project strengthening the public financial systems of local governments	November 27, 2017-July 26, 2020	3160500 EUR
Strengthening public resource management (in the part "Supporting the implementation of the Public Financial Management Strategy")	August 28, 2017 - July 31, 2020	1110618 EUR
Effective Public Finance Management III Supporting Public Finance Reforms (giz.de)	1 July 2019 - 30 June 2022	2950000 EUR
Public Financial Management Support Program for Ukraine Project (EU4PFM) Components 3 and 4	December 19, 2018 - December 18, 2022	29500000 EUR
Institutional Support under the Reform Support Architecture in Ukraine - Reform Support Teams	December 21, 2016 - March 1, 2020	5107500 EUR
E-Governance Support for Centralization in Ukraine (EGOV4UKRAINE)	November 1, 2016 - October 31, 2020	89880254 SEK
Public Financial Management Support Program for Ukraine Project (EU4PFM)	2019-2023	55500000 EUR

Source: GIZ, EU4PFM , Spending

A positive consequence of the implementation of these programs in Ukraine is the emergence of a platform for controlling public finances: E-data (E-data): Open Budget (open budget), Data.gov.ua (Open data portal), Clarity Project open data analytics (allows you to control and analyze information from the Prozzoro Platform) (Clarity Project). In addition, the following platforms are rapidly developing and in demand (Figure 5.1). Some positive developments can already be seen as the number of users on the Prozzoro platform has increased significantly, and the reach of government

agencies and households that use digital technologies has increased. Using Prozzoro during public procurement by the Ministry of Defense, it is estimated that over the past two years, 1.6 billion euros have saved the Ukrainian budget (Curristine et al., 2020). Moreover, in 2018, the Institute of International Finance, Ukraine was recognized as the country that has the most progress in data transparency and financial communication (Federal Ministry for Economic Cooperation and Development).

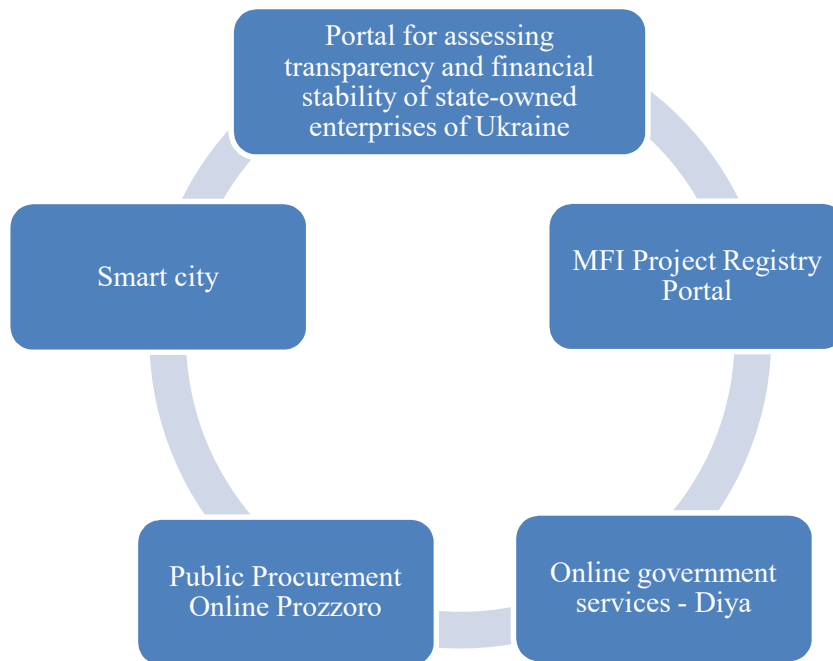


Figure 5.1 Popular platforms for the development of digital transformations of public finances in Ukraine

Source: made by author

The estimate of the number of IT companies in Ukraine differs significantly depending on the data source. It was 18600 at the end of 2021, according to the official. It should be noted that, in particular, liquidated companies are registered, so the number of actual works may be much less. In this case, one company may have several legal organizations, which also affect the official statistics, the latter reflecting the number of legal organizations. According to the official IT market of Ukraine, approx. 50% companies are registered in Kyiv, Kharkiv, Dnipro, Lvov and Odessa have a significant representation (Figure 5.2).

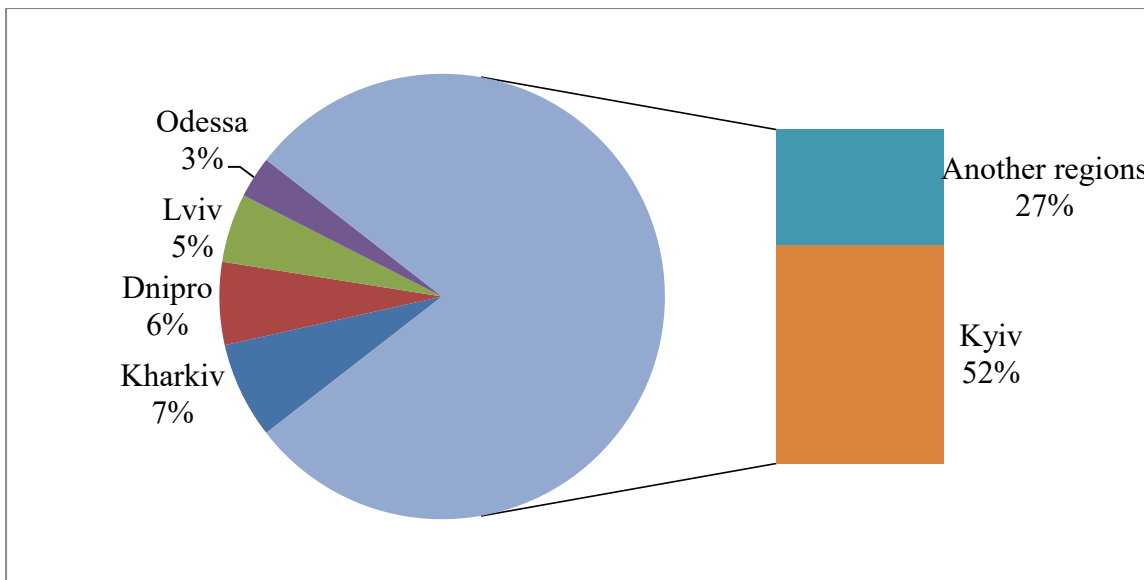


Figure 5.2 - Structure of the geography of registered IT companies as of 2021, in %

Source: IT report (2021)

According to unofficial data, there are about 4 thousand companies in Ukraine, most of which have up to 80 employees, (Society of Programmers) however, many specialists work in companies with more than 80 employees. Of these, the number of companies active in the labor market is 2,309. Based on the analysis of Figure 5.2, it can be seen that approximately 70% of companies provide their ambassadors to large customers, and 15% work in the domestic market, and the remaining 15% are engaged in the promotion of their own products. The Ministry of Digital Transformation has set a number of ambitious goals by 2024: ensuring 100% of the provision of public services for citizens and businesses online, 95% of settlements will have access to high-speed Internet; the share of IT in Ukraine's GDP should be 10% (Pyshchulina, 2020).

The digital transformation of public finance is a requirement of modern development and has a number of advantages:

1. Reducing administrative costs by up to 30% (for example, in Brazil, the transition from cash to electronic cards for the distribution of social expenses led to a seven-fold decrease in administrative costs from 14.7% to 2.6%)
2. Increase in tax revenues up to 7% (greater transparency in the use of funds through open budgets and open contracts increases the confidence of citizens).
3. Increase additional revenues by introducing taxes on digital goods and services
4. Growth of investment attractiveness of Ukraine and increase in investments
5. Increasing confidence in the government and increasing transparency in public use of funds.

I have determined that the Prozzoro online platform is one of the most effective projects in the field of public finance in Ukraine, the effectiveness of which is proposed to be studied in the next section.

It is through the introduction of various information projects that our crane can ensure the transparency of its financial system. The key advantage of information technologies in the financial sector is their positive impact on the transparency of the distribution of public funds.

VI. EMPIRICAL FINDINGS

This chapter proposes to conduct a study on the impact of digitalization on public funds transparency. To begin with, an analysis of the interviews was carried out and key theses on this issue were identified. Next, based on the analysis of the state program for tender purchases, the impact of technology on saving public funds is shown.

6.1 Analysis of interview results

To determine how digitalization is being introduced into public finance at the state level, I interviewed representatives of the Ministry of Finance and the Ministry of Digital Transformation and the management of the state enterprise Prozzoro, and based on their answers I drew my conclusions (Appendix I). Ten people who work or have worked in the aforementioned institutions were interviewed. WE discovered that digital technologies have affected public funds transparency and determine the main reasons for the digitalization of public finances. The main reason for the introduction of digitalization can be considered the desire of Ukraine to become EU member and get rid of the status of a corrupt country, which ranks 117th among 180 countries (Transparency International Ukraine, 2021). Such a high level of corruption in Ukraine was perhaps the main reason for the introduction of the digitalization process in the field of public finance.

In my opinion, the level of technological development in the world and the positive experience of the EU countries became the reason for the introduction of technologies in public finance. Digitization not only simplifies all data processing processes, but saves time and money for their implementation. In Ukraine, the use of technology in the financial sector is an opportunity for our country to be worthy of calling itself part of the EU (Interviewee 2).

The main reason for digitalization should be considered the positive experience of the EU countries in applying the latest technologies in the public finance system. EU countries have shown that it is technology that can ensure transparency in the use of public funds. Indeed, with the help of modern systems it is very easy to track where exactly the funds went (Interviewee 1).

As for the role of state management in the field of information development, it became widespread with the creation of the Ministry of Digital Transformation of Ukraine (MoDToU). It is the use of digital technologies in all spheres of activity that will ensure the successful development of Ukraine on the international arena. The main directions of state policy should be to promote the development of technologies starting from schools and ending with state institutions such as the Ministry of Finance of Ukraine. (K.I. Simakov, 2021).

In order to ensure the efficiency of the distribution of public funds, the Prozzoro public procurement program was created in Ukraine. It is this online platform that guarantees the transparent use of public funds. A feature of this program is openness and equal rights for all participants, and its goal is to save public funds (Interviewee 3).

In Ukraine, digitalization is a rather complicated process, because it requires maximum funding from the state. We are talking about the availability of appropriate equipment and staffing, which slows down the process of applying technologies at the state level. It is the lack of resources that is a kind of anchor holding back the digitalization processes in our country (Interviewee 5).

Consequently, new opportunities for the development of the economy, which form its digitalization, become challenges for its mechanisms and participants. Our country is not yet fully ready to use digital technologies, which at first glance are complicated. After all, full digitalization requires full control over public finances and does not allow their misuse, which to a certain extent creates reluctance on the part of some government officials regarding its full introduction into the public finance system.

In my opinion, the main challenge faced by the digitalization of public finances is the lack of qualified personnel, which slows down the process. This is especially acute at the local levels, when government officials have imperfect computer skills and spend a lot of time on simple operations. Equally important is the lack of appropriate software that would allow coordinating all government agencies and the flow of funds (Interviewee 4).

The main general laws, the subject of legal regulation of which currently includes digitalization issues, are the Law of Ukraine "On the Fundamentals of the Development of the Information Society in Ukraine for 2007-2015" dated 09.01.2007 No. 537-V (Zakon Ukraine), the Law of Ukraine "On the National Informatization Program" dated 04.02.1998 No. 74/98-BP (Zakon Ukraine), Law of Ukraine "On the Concept of the National Informatization Program" dated 04.02.1998 No. 75/98-BP (Zakon Ukraine), Law of Ukraine "On State Support for the Development of the Software Industry" dated October 16, 2012 No. 5450-VI (Zakon Ukraine), Law of Ukraine "On the Radio Frequency Resource of Ukraine" dated June 1, 2000 No. 1770-III (Zakon Ukraine), Law of Ukraine "On Telecommunications" dated November 18, 2003 No. 1280-IV (Zakon Ukraine) and others.

More specialized in the subject of legal regulation are the following laws: Law of Ukraine "On Electronic Documents and Electronic Document Management" dated May 22, 2003 No. 851-IV (Zakon Ukraine), Law of Ukraine "On Electronic Commerce" dated September 3, 2015 No. 675 - VIII (Zakon Ukraine), Law of Ukraine "On Amendments to Section XX "Transitional Provisions" of

the Tax Code of Ukraine on the Peculiarities of Taxation of Entities in the Software Industry" dated 05.07.2012 No. 5091-VI (Zakon Ukraine), Law of Ukraine "On access to public information" dated 13.01.2011 No. 2939-VI (Zakon Ukraine), Law of Ukraine "On administrative services" dated 06.09.2012 No. 5203-VI (Zakon Ukraine), Law of Ukraine "On protection of information in information - telecommunication systems" dated 05.07.1994 No. 80/94-BP and a number of others.

Among the by-laws, it is worth highlighting the Order of the Cabinet of Ministers of Ukraine "On approval of the Concept for the development of the digital economy and society of Ukraine for 2018-2020 and approval of the action plan for its implementation" dated January 17, 2018 No. 67-r (Zakon Ukraine) and Decree of the Cabinet of Ministers of Ukraine "Some issues of digital development" dated January 30, 2019 No. 56 (Rozporyadzhennya). An analysis of the content of the above legal acts indicates that today it is impossible to talk about creating a system of effective legal regulation of social relations in creating digital society, adequate to the modern needs of the country's development.

The main stakeholder of digitalization is the state as a whole, since it attracts all segments of the population to the economic system, which ultimately contributes to economic growth through the mobilization of savings from the population, investment in the development of the state economy, diversification of the financial system. Also, one of the main stakeholders is financial service providers, as they increase the number of consumers of financial services. But digitalization is equally important for consumers, as they can use modern financial services more efficiently and conveniently, thus increasing personal well-being.

We, as civil servants in the field of public finance, are primarily interested in introducing full digitalization through the distribution of public funds. First of all, digitalization simplifies our work and saves our time. Technology also makes it possible to work from home, the effectiveness of which has been proven during the Coronavirus Pandemic (Interviewee 2).

First of all, the state should be interested in digitalization in the field of finance, because the level of technology development determines its place in the international arena. With a high degree of application of technology, Ukraine can become a worthy member of the EU. Also equally important in digitalization is the saving of public funds, which should also be of interest to the state (Interviewee 8).

The main result of digitalization is the reduction of public spending from the budget and cost savings. As discussed in the previous section, public procurement spending has declined significantly. Since the launch of the Prozzoro online platform, the average savings in Ukraine range from 5 to 20% for

all product categories (Bigun, 2022). Such statistics show the positive impact of digital technologies on the use and distribution of public funds.

Analyzing procurement costs before and after the launch of the Prozzoro online platform, we saw positive developments in reducing the cost of purchasing the necessary materials. Since, firstly, offers from suppliers are competitive, and secondly, the choice of a supplier is based mainly on the lowest price (Interviewee 10).

We analyzed spending on office supplies up to 2016, which accounted for 25% of our department's government funding. As of the end of 2022, the share of spending on the purchase of stationery was 18%, which indicates significant savings. Also, the financiers of our department annually compile an analysis of cost savings due to the introduction of mandatory tender purchases for various goods or services (Interviewee 1).

Due to the high development of technology, electronic data storage resources have become very popular among Ukrainian citizen. The transition to electronic media has simplified the work of thousands of officials and civil servants who do not need to spend most of their time generating a cash flow report, but just press a few buttons in the appropriate program and the report will be generated. Thus, digitalization has streamlined certain processes and accelerated the processing of documentation.

Our employees work entirely on electronic media, and all information is stored in cloud storage and a common electronic archive. The transition to electronic documentation has greatly facilitated the work of our department, and the time spent on preparing reports is used to check prices on invoices. It was the introduction of digital technologies into the work of the department that made it possible to save the time of our employees by an average of 10-15% (Interviewee 7).

The use of electronic documentation has simplified our work, but for additional protection of information from cyberattacks, we store it in paper form. Of course, these are not all documents, but only those that are of particular importance for our department. It was the advent of electronic documentation that simplified the process of its processing and accelerated responses to the provision of funding from the state (Interviewee 4).

We consider the main result of the digitalization of public finances to be the savings in the state budget through the introduction of the program Prozzoro, results of which we have already studied. Another important achievement of digitalization is the transparency of the salaries of civil servants and the clear direction of public funds. State funds are directed primarily to pay salaries to civil servants, the share of which ranges from 60% to 80% (Onischuk, 2022). The allocation of such funds

is transparent, because the salaries of all officials can be seen on the website of the respective institutions where they work. But there is a part of the funds that is allocated for various needs, for example, for certain purchases, repairs of public catering, etc. It was important to find out exactly what part of these funds goes to tender purchases.

Part of the funds received from the state budget goes to pay salaries to officials, this is 75%. The remaining funds, and this is 25%, we use to purchase the necessary for the needs of our department. The share of funds for purchases may change accordingly due to changes in the share of wages and the feasibility of purchases (Interviewee 5).

We allocate 30% for public procurement, which includes the cost of food for administration workers. For the purpose of saving, we proposed to hold a tender among local cafes to provide food for workers. This has brought positive results both for the employees themselves and for the cafe, as it will receive a stable profit thanks to the regular visitors (Interviewee 9).

The digitalization of public finances has special prospects in the control of public procurement. After all, on the basis of the recent public procurement scandal for the military, you need to check the invoices and make sure that the prices for them are correct. It turned out that food prices were several times higher than market prices, which meant the slowness of the use of public funds and theft of state property (Kritskaya, 2023). In my opinion, such actions should create an appropriate mechanism to limit them in the future and prevent the recurrence of the scandal in any of the public spheres. It is in the creation of a more advanced state program that will automatically identify the inappropriateness of prices in documents, market prices and the prospects for digitalization in the public finances of Ukraine.

Each invoice received from the supplier company is checked by the financial department for compliance with the prices in the invoice with the prices published on the site. Such a check makes it impossible for various corruption schemes of employees of our department and representatives of the winning company. Our accounting department checks each invoice received from companies for making a payment. Before paying, the accountant checks the prices on the invoice and compares them with market prices to prevent financial manipulation (Interviewee 7).

Having studied the experience of developed and developing countries, it would be more optimal for our country to implement the experience of the EU countries, primarily Spain and France. The leadership of these countries has created universal state programs to control the distribution of funds. Such programs make it impossible for the misuse of public funds, which is now necessary for our country.

Before creating the Prozzoro platform, hundreds of similar government programs were developed by our analysts. In the course of the study, we formed a base based on the experience of the EU countries. The distribution of public funds on the example of public procurement is the basis for the creation of such platforms as Prozzoro platform.

Thus, having studied the answers of 10 interviewers, it was found that the introduction of digitalization in the public finance system is a positive phenomenon and is seen as a necessity in modern times. The main result that has been achieved precisely thanks to the digitalization in public finances is the proof that participation in tender purchases has reduced expenditures from the state budget by 5-20% over the past few years. Therefore, we can conclude that the process of digitalization in the system of distribution and use of public finances in Ukraine is not proceeding at a fast pace, as we would like, but it is effective. The reduction in budget spending is clear evidence that digitalization has a positive impact on the transparency of the use of public finances. Therefore, the basis for the next study will be the study of the Prozzoro program and the formation of a proposal for its improvement, which will help ensure a high result in the transparent use of public finances.

6.2 Analysis of sources of funds of the state budget of Ukraine and investment flows

Main changes Ukraine public finances system intensified with the start of the process of accession of our country to the European Union and continue to this day under the influence of digitalization processes, have become the key to the active development of our country in the direction of transparency in the use of public funds.

It is known that the “lion's share” of the income of the consolidated state budget is tax revenues, on average 80-85% of the total budget (see Table 6.1). It can be seen from the Table 6.1 that in 2020 the revenues of the consolidated budget of Ukraine increased by 459.74 billion (74.6%) compared to 2016, but taking into account the annual inflation rate in Ukraine, which only grew (in the middle 32%), especially in the period 2017-2019, this growth will be 50% less. We analyzed that largest share in the structure of Ukrainian budget revenues is occupied by tax revenues, which in 2016 amounted to 81.76%, and in 2020 79.1%. The reduction in their share was due to an increase in non-tax revenues by an average of 3% in 2020 compared to 2016. Earnings from trust funds and official transfers were the most volatile, with shares ranging from 0.5% to 8%, mainly due to their volatility.

Table 6.1 - Income of the Consolidated Budget of Ukraine, for the period 2017-2021, UAH billion

Items of income	2017 year	%	2018 year	%	2019 year	%	2020 year	%	2021 year	%	Change 2021-2017 (+\ -)
Total income	793,3	100	928,1	100	998,3	100	1076	100	1296	100	503
Tax revenues	627,2	79,06	753,8	81,22	799,8	80,12	851	79,1	1107	85,40	479,8
Non-tax revenues	128,4	16,19	164,7	17,74	186,7	18,7	213	19,79	173,3	13,37	44,9
Income from capital transactions	0,29	0,04	0,66	0,07	0,18	0,02	0,08	0,01	0,3	0,02	0,01
Official transfers from foreign governments and international organizations	1,61	0,2	1,46	0,16	1,14	0,11	1,03	0,1	12,89	0,99	11,28
Trust funds	29,85	3,76	0,19	0,02	1,77	0,18	0,19	0,02	0,21	0,02	-29,64
Official transfers	5,97	0,75	7,31	0,79	8,73	0,87	10,7	0,99	2,6	0,20	-3,37

Source: (Budget of Ukraine, 2021)

Next, I will move on to the analysis of the degree of digitalization of the Ukrainian financial system. After I will characterize the level of its digitalization and the use of technologies. To understand the level of digitalization of the Ukrainian financial system, it is important to understand the volume and dynamics of investments in financial technologies (see Table 6.2)

Table 6.2 - Dynamics of the volume of investments and the number of transactions in the main areas in the direction of financial technologies for 2019-2020

Direction	Investments, billions dollars		Change, %	Number of deals, units		Change, %
	2019	2020		2019	2020	
Payments and transfers	105,9	19,7	18,60	422	404	95,73
Insurtech	14,3	14,5	101,40	425	287	67,53
Regtech	3,5	10,6	302,86	203	191	94,09
Asset Management Technologies	0,4	0,3	75,00	37	29	78,38
Blockchain and cryptocurrencies	4,7	2,8	59,57	598	458	76,59
cyber security	0,5	2	400,00	53	26	49,06

Source: (NBU, 2021)

Investment in Cybersecurity quadrupled in 2020, from \$500M in 2019 to over \$2B in 2020, as companies around the world respond to the growing cybersecurity challenges associated with telecommuting and the increasing use of the Internet resources. The next thing you need to pay

attention to is the level of shadowing of the domestic economy, because the state budget loses millions or even billions of hryvnias due to concealment of income, money laundering through offshore companies and many other schemes that are in demand in Ukraine (Mosiychuk et al., 2020; Gomber et al., 2018).

At present, the amount of capital exported from Ukraine since 1995 is not exactly known, experts give different figures. Offshore is also the most efficient mechanism for making investments in Ukraine. One way to launder money and take it out of the country is to return it under the guise of foreign investment or fictitious investment. Each of the countries has its own so-called "safe haven", from where a significant part of the so-called foreign direct investment comes from, most often exceeding the GDP of the investor countries. In Ukraine, this is Cyprus (the share of investments in Cyprus reaches 87%, from Cyprus 21% (Statistics, 2021).

Starting from 2007, major investments made by domestic companies in Cyprus have been monitored, which has been growing rapidly since 2007-2008 and accounts for more than 85% of investments from Ukraine. Since 2007, the money withdrawn to Cyprus has not been fully, but partially returned to Ukraine. This is the redistribution of offshore flows among various jurisdictions, which were withdrawn not in the form of investments, but in the form of exports of goods at a reduced price level and imports of fictitious services, namely dividends, royalties, etc. (Kravchuk, 2015).

According to the State Fiscal Service of Ukraine, more than half of the goods that were exported from Ukraine worked through intermediaries, more than 10% through tax havens, creating significant holes in the budget. Due to the low level of revenues to the state budget, that is, in fact, no added value by Ukrainian enterprises, which has a very detrimental effect on both GDP and the economy as a whole. Since 2014, there has been an intensive process of reorientation of domestic exports and imports from traditional offshore states. After the Revolution of Dignity with the adoption and signing of a new tax minimization convention, Ukrainian companies continue to find safer and more profitable tax havens (Dyakova, 2014). A more detailed structure of the main investor countries of Ukraine and their share is shown in Figure 6.1.

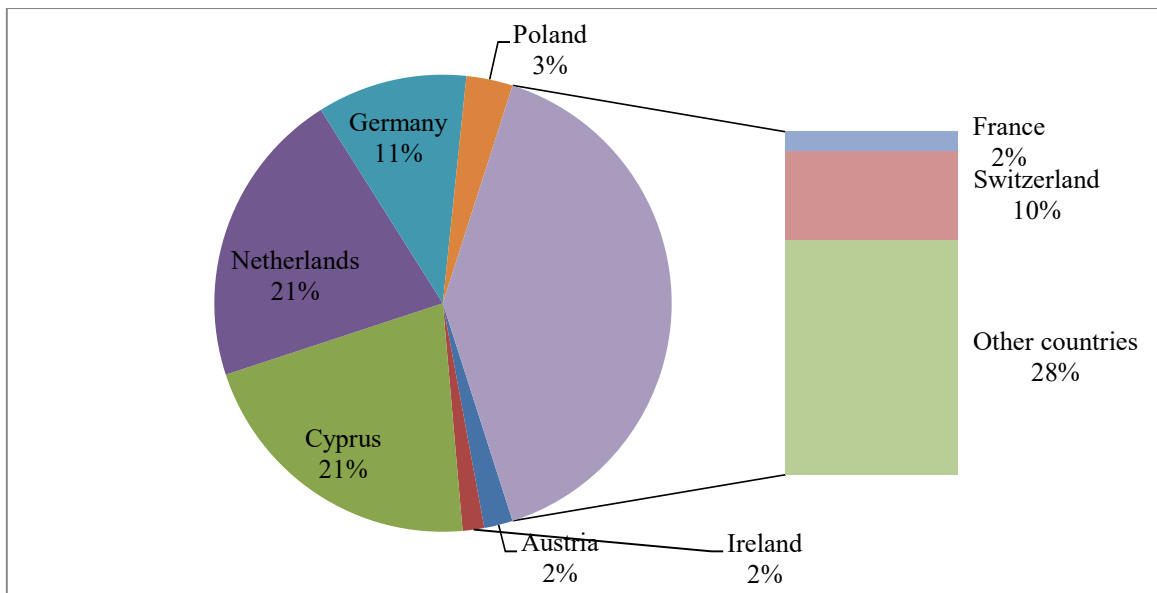


Figure 6.1 - Structure of foreign direct investment (FDI) in Ukraine by country as of 2021, %
 Source: Statistics (2021)

According to the analysis of the FDI structure, it can be seen that, as of 2021, the main investors of Ukraine are Cyprus and the Netherlands, whose share in the structure is 21% each. That is, almost half of all foreign investments come from these countries, which indicate a direct connection between money laundering by Ukrainian businesses and politicians in the offshore zone of Cyprus and the Netherlands. To study reverse investment flows, I propose to analyze FDI from Ukraine to the countries of the world and identify the countries in which our state injects funds the most (see Figure. 6.2).

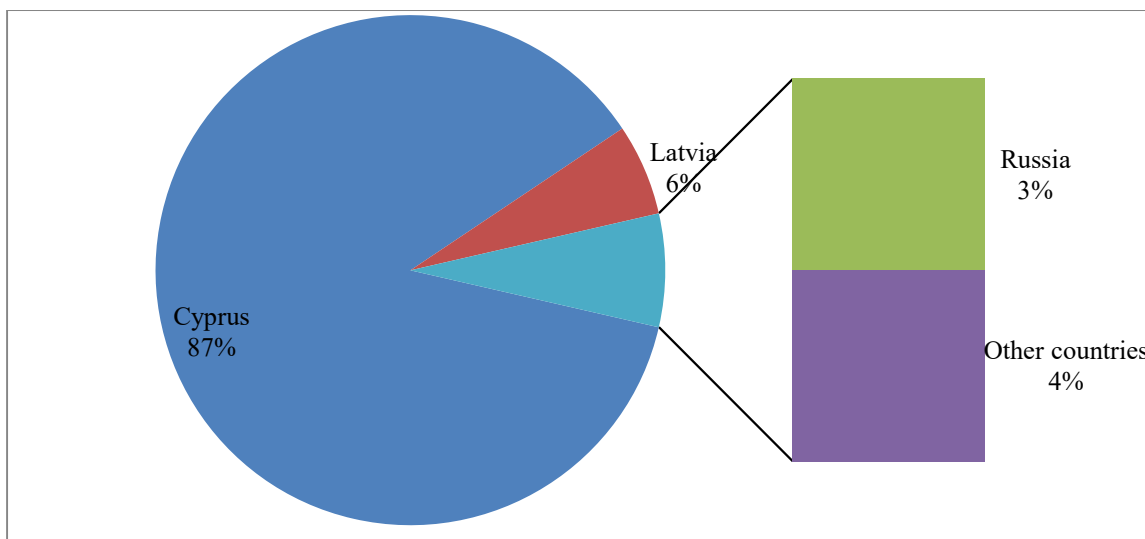


Figure 6.2 - The structure of foreign direct investment from Ukraine to the other countries in 2021, %
 Source: Statistics (2021)

According to an analysis of the outflow of investments from Ukraine, it can be seen that as of 2021, the share of investments in Cyprus amounted to 87%, which, despite the fall in total investment in 2020 compared to 2021, even increased by 0.4%. Such investment flows to Cyprus testify to the laundering of funds in offshore and tax evasion by Ukrainian businessmen and officials. This activity should be controlled by the government of Ukraine and monitored, because our state does not receive hundreds of thousands of taxes from such activities.

It is not surprising that 87% of all investments from Ukraine to Cyprus go to scientific activities. Since the establishment in Cyprus of an enterprise engaged in research activities is an excellent way to “launder money” for the creation of projects, since scientific activities are not taxed and no taxes need to be paid. And the return of funds from Cyprus is argued by the result of the activity of this enterprise, which, having created an innovative product, covered the funds and earned profits returned to Ukraine in the form of investments. As we studied earlier, 87% of all investments in Ukraine in 2021 went exactly to Cyprus, and 21% returned back to Ukraine. The main investors of our state as of 2021 were Cyprus and the Netherlands, whose share amounted to 42% of all foreign investments.

If we take a closer look at the activities of large Ukrainian companies and analyze their financial flows, we can be more than sure that the strings will lead to offshore zones, and it will turn out that our state does not receive billions in taxes. Shady activity in Ukraine is at one of the highest levels and various financial schemes are common for Ukrainian companies, as a result of which funds go outside Ukraine and return back in the form of foreign investments from the same Ukrainian investors who have a registered company in one of offshore zones. I believe that it is the development of the shadow economy that poses a serious problem for its financial security, and the Ukrainian government needs to think about introducing more stringent regulatory mechanisms to control both foreign investment and the flow of currency in general.

6.3 Analysis of the effectiveness of the influence of digital technologies on the transparency of the use of budget funds

In this study, we will define the history of the creation of tender purchases in Ukraine. It is because of the use of tender procurement that the savings in public funds, explored in the previous sections, have occurred. The Prozzoro online platform is by far the main tool for ensuring the transparent use of public funds.

Digitalization has increased the transparency of public procurement, created a competitive environment and created new business opportunities, simplified the procurement process and reduced bureaucracy and corruption. The adoption of the Law of Ukraine “On Public Procurement” in 2015

was a big step for Ukraine and meant the transfer of public procurement to a new level – the level of transparency and publicity (Pro publichni zakupivli, 2015). The purpose of the above-mentioned Law is to create and ensure transparent implementation of public procurement and create healthy competition among domestic companies.

Ukraine adopted the trend for digitalization public sector from the developed countries of the world. Most advanced economies have a significant amount of public procurement in relation to gross domestic product. According to OECD statistics, the share of public procurement in the gross domestic product of developed economies ranges from 8% (Switzerland) to 21% (Netherlands). In Ukraine, this figure is 13%, in Poland - 12% (Figure 6.3). Public procurement can create markets for goods and services, influencing costs and consumption, and stimulate the introduction of innovations and new technologies.

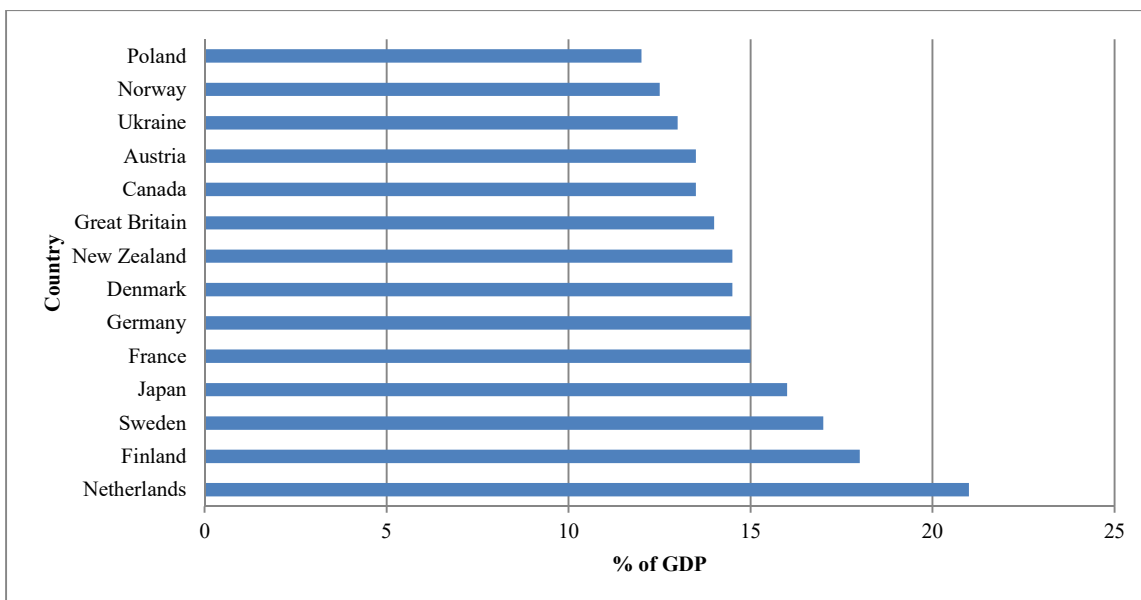


Figure 6.3 Share of Gross Domestic Product in Government Procurement of Advanced Economies

Source: World Bank Group (2020)

The digitalization of public and public procurement in Ukraine is ensured by the systemic reform of the Prozzoro tender process. Over the years of its existence, the Prozzoro system has saved the state 190 billion hryvnia (Government Portal, 2021). The public procurement sector has been dynamically growing during the analyzed period; the number of organizers and bidders is increasing, which indicates the effectiveness of the reform and public confidence.

Public auctions provide huge opportunities especial for small companies, support local companies and small private enterprises. Fair competition allows you to get additional income from participating in government tenders, which stimulates the development of domestic business (Shvabiy et al., 2020). The Prozzoro electronic public procurement system increases the level of public confidence due to

the clarity and transparency of procedures. The implementation of Prozzoro was one of the first steps towards the digitalization of the state fiscal policy in Ukraine. The Prozzoro financial accounting service is an effective tool for automating government public procurement. During its existence, the public auction system has created a field for communication between customers and suppliers. The introduction of an e-procurement system at the state level contributes to combating corruption and increases the competitive environment, reduces the loss of customers from insufficient competition.

Prozzoro optimizes the public procurement process by increasing the speed of transactions, reduces the administrative burden and increases the innovation component of the process. Despite this, the Prozzoro platform needs to be analyzed and improved. There are a number of problems in public procurement: lack of skills and experience in the implementation of the tender procedure by employees of ministries and departments, local governments: village councils and united territorial communities; a high proportion of non-competitive procedures (an average of only 2.7 proposals per purchase), a possible hidden conflict of interests of participants, unreasonable lengthening of individual procedures in time, the existence of a discriminatory nature in the competitive bidding documentation, the inefficiency of the complaints mechanism, etc. As a result, we analyze the effectiveness of public procurement based on the theory of change (Figure 6.4)

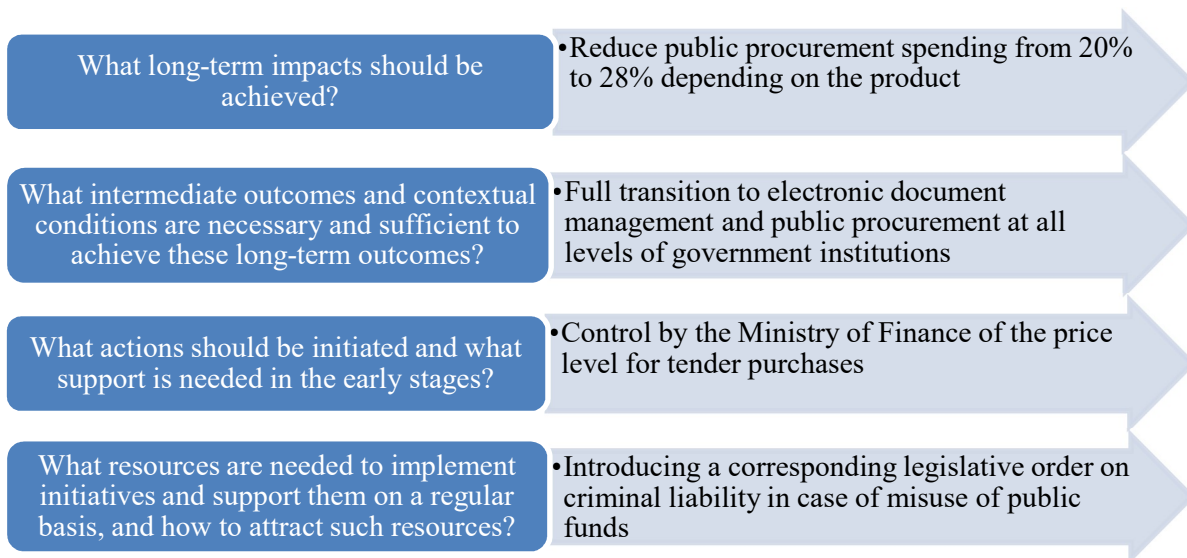


Figure 6.4 - The effectiveness of the implementation of digitalization in the field of public finance on the example of public procurement (based on Theory of change)

Made by the author

Digitalization of public procurement remains a priority for the development of the public sector of the Ukrainian economy. Important tasks are the creation of communication and platforms for the intensification of processes, the exchange of tender information between participants. The electronic public procurement system reduces corruption and bureaucracy in public procurement, increases the efficiency, predictability and transparency of management, improves the use of public resources,

saves budget funds and improves the access of bidders to the bidding process by incorporating innovative digital technologies.

The dynamics of state budget expenditures and revenues is shown in more detail in Figure 6.5. It is proposed to analyze the impact of digitalization on public funds on the example of cost savings through the introduction of the procurement system Prozzoro. The dynamics of the public procurement structure is shown in Table 6.3.

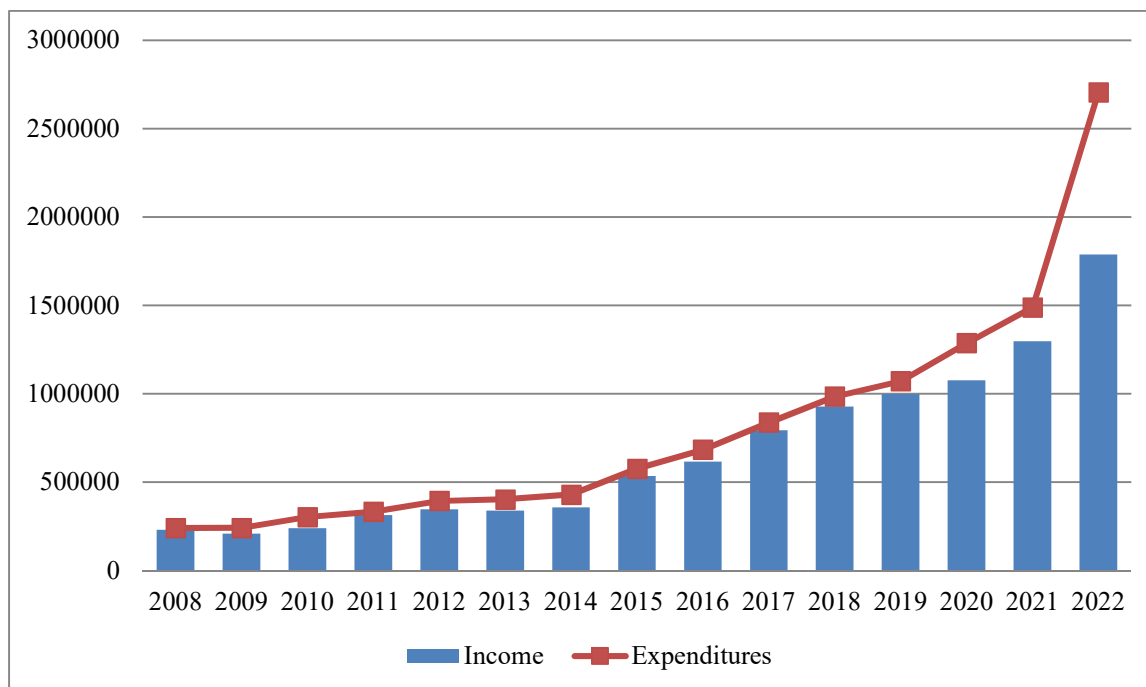


Figure 6.5 - Dynamics of revenues and expenditures of the state budget of Ukraine in 2008-2022, million UAH

Source: Minfin (2022)

The Prozzoro e-procurement system is actively growing, the number of procedures and the amount of contracts has a positive upward trend. Comparing the results obtained over 4 years of the system's existence, with 2016, the number of procedures increased by 9.2 times, and the amount of contracts increased by 4.35 times. A sharp increase in the number of tenders is observed in 2017 and 2020, which is associated with the mandatory inclusion of pre-threshold purchases in the electronic platform. The volume of the public procurement market has a steady growth trend. The structure of tenders is dominated by roads - their share ranges from 81.6% in 2018 to 87% in 2016. In 2020, the share of pre-threshold tenders peaks at 93%. In our opinion, this indirectly indicates that a huge number of tenders due to the organizers' intentional splitting into separate lots up to 50 thousand UAH still did not get into the Prozzoro e-system. If our hypothesis is confirmed, then in 2023-2024 the number of tenders should slightly decrease compared to 2020, because there is no longer any reason for the organizers of the auction to continue such unfair practices.

Table 6.3 - The structure of Prozzoro public procurement in Ukraine for the period 2016-2020

Indicators	Year				
	2016	2017	2018	2019	2020
number of organizers, subjects	20120	27070	28340	28850	37910
in % to the previous period	153	134,54	104,69	101,8	131,4
number of participants, units	65510	127610	148100	160010	246200
in % to the previous period	-	194,79	116,57	105,9	153,9
volumes of the public procurement market, UAH billions	273,31	777,9	1010	1030	1190
in % to the previous period	117	284,6	129,8	102	115,5
Number of tenders, thousand units	408,5	1030	1250	1380	3740
including sub-threshold, thousand units	355,5	852,6	1020	1144	3480
in % of the total number of tenders	87	82,8	81,6	82,6	93
including up-threshold, thousand units	52,95	177,4	230	235,9	259,3
in % of the total number of tenders	13	17,2	18,4	17,1	7

Source: (Prozzoro, 2020)

In the process of digital transformation of public finances, much attention should be paid to long-term transformations: improve public procurement procedures, analytical category management system and modernization of procurement capabilities, automate public services, which will make them more transparent and reduce maintenance costs. All these measures will allow our state to quickly adapt to a changing environment and effectively spend budget funds in times of crisis, especially during the war with the Russian Federation, when every hryvnia counts. Today, domestic practice requires government agencies to make decisive changes and use the latest digital technologies in the context of integration processes to ensure transparency in public financial management.

VII. DISCUSSION

7.1 Introduction

In the previous chapters, we have studied that in Ukraine digitalization had a great impact on public finances, because with the introduction of tender programs, significant savings in public funds were obtained. The importance of developing the subject of public procurement will sharply appear before Ukraine precisely in the process of restoring the infrastructure destroyed by the aggressor. After all, the funds that will come from the state will need to be effectively used precisely for the purpose of restoring the country, and not for the purposes of officials. That's why, we want to propose update current tender process itself, which, due to the intensive use of information technology, should become more transparent and efficient. We proposed to determine the mechanism for constructing tender purchases, and after discovering the theory we propose a project using public funds for the implementation of a program from alternative energy sources, funds for which will be provided from the state budget.

7.2 Theoretical contributions

So, having studied that there has been a decrease in public spending through the introduction of tender programs, it is proposed to create innovative tender platforms for companies wishing to take part in the development of the country and, in parallel, create a group of independent experts that will check the documentation and tender prices. The creation of such tender programs will help companies not only to resume their activities after the end of the war, but also to develop their business, since there will be plenty of work. In our opinion, the tender program for companies should be based on the following principles:

1. Virtues - all prices that companies will set for materials, finished products or services will be checked by a commission
2. Free participation - any company can take part in tenders, regardless of their size or status of the head
3. Result orientation - work will be completed as soon as possible
4. Quality - all delivered goods, materials or services must be at the highest level of quality
5. Faith in a better future - nothing sets you up for a positive result, as the belief that everything will change for the better

We offer an alternative algorithm for creating a tender program for the participation of domestic companies in the development of our country after the victory (Figure 7.1).

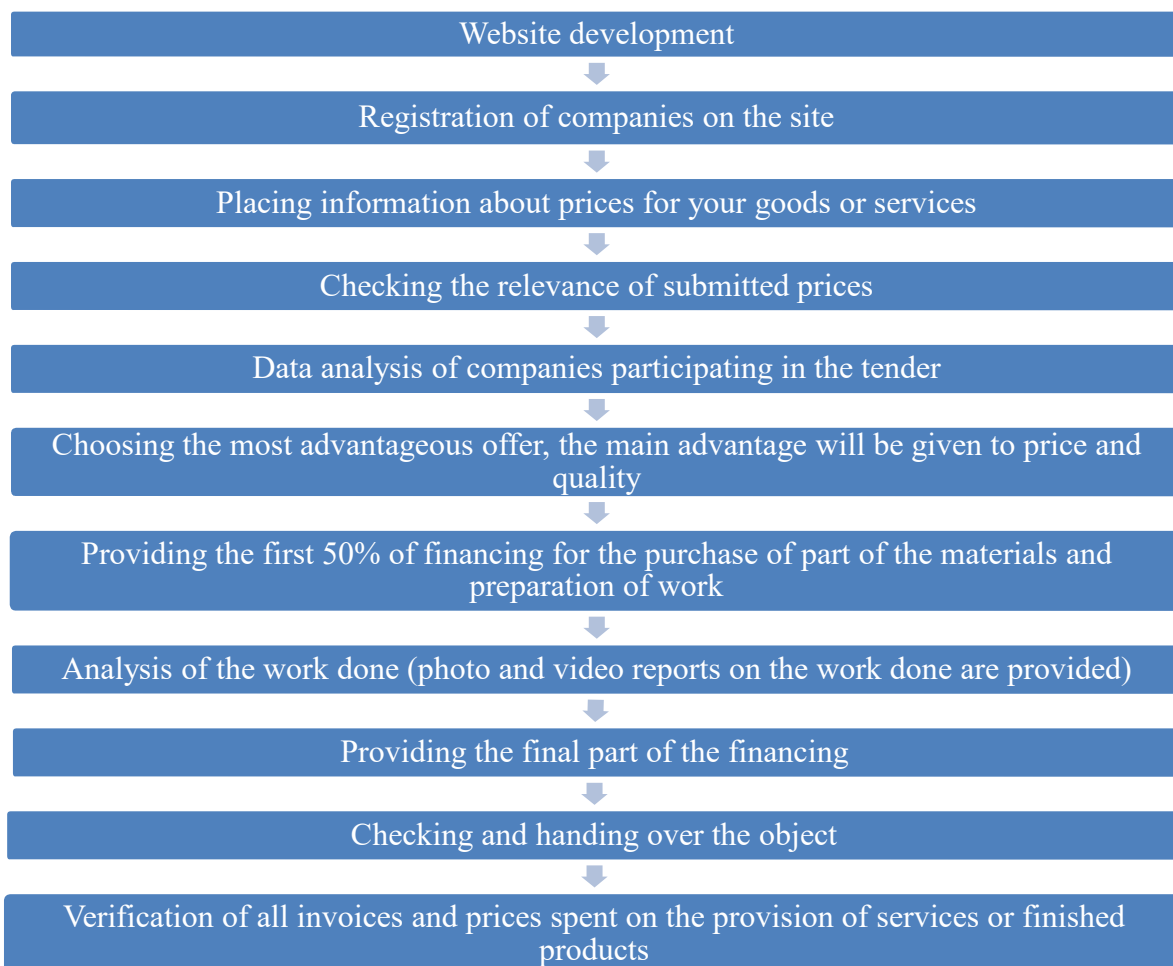


Figure 7.1 - Algorithm for constructing a tender program for the effective use of public funds

Source: Created by the author

Such an algorithm, in our opinion, should have every tender program, because it will avoid the use of various corruption schemes and agreements, which, unfortunately, still exist today. To create tender programs, you need to involve programmers who, based on Prozzoro, should create a simple and accessible website for companies wishing to take part in the tender. So, our vision for the development of small business after the victory of Ukraine is to develop its damaged infrastructure, because before we can restore the country, we need to return all our citizens who were forced to leave due to the destruction of their homes.

The theoretical basis of our proposal is to build an effective program for tender purchases and the use of public funds. The basis of this program will be the verification of all accounts and reconciliation at market prices. For a more transparent distribution of funds, information technology can also be used, with the help of which it is possible to quickly compare prices in documents and actual market prices.

It is this algorithm for constructing a scheme for tender purchases that will minimize the misuse of public funds. The proposed program can be used for testing at the local and state levels. The

effectiveness of its work can be seen with a decrease in budget expenditures for financing various government agencies.

7.3 Practical contributions

The aggressor caused damage not only to our economy, but also to the energy sector, which was especially affected in October 2022. A third of the power plants were completely destroyed and thousands of Ukrainians were beaten without electricity for several days. However, most of the destroyed power plants have already been restored by our power engineers and repair brigades, and the reconstruction of the rest is being successfully carried out. More detailed losses of the energy sector and the oil and gas sector are shown in Figure 7.2.

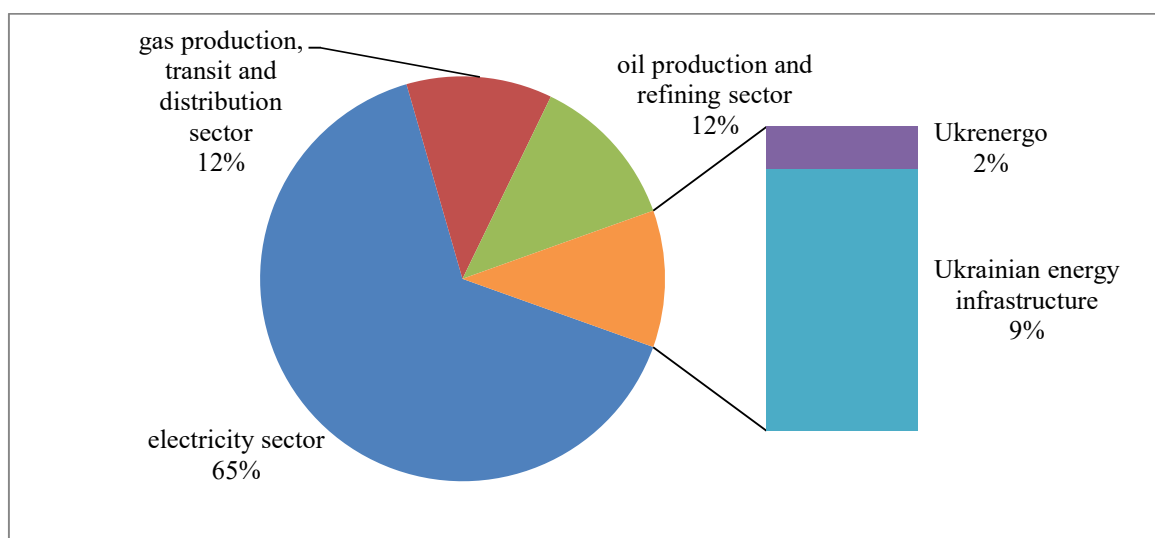


Figure 7.2 - The share of losses in the energy sector of Ukraine from February 2022 to October 2022, UAH billion

Source NRS (2022)

The total losses in energy complex of Ukraine was 523 billion hryvnia (NRS, 2022). Because of that, it is quite important to search an effective way of alternative lighting and heating. We would like to propose to the Ministry of Energy of Ukraine to cooperate with Ukragasbank and at the state level agree on a program for issuing loans to the population to establish alternative energy sources (Ukragasbank, 2020). This program should be implemented through tender purchases by local authorities for the population of a certain region. Therefore, we propose the following implementation of our proposed program, which will be called "Energy Support" and implemented as follows:

1. Those wishing to receive an interest-free loan for the establishment of alternative energy sources will apply to Ukragasbank
2. In turn, the bank will check the credit line of customers and the processed data will be transferred to the Ministry of Energy.

3. The Ministry of Energy, together with the Public Procurement Department, coordinates the issuance of loans and monitors their integrity
4. The purchase of alternative energy sources will be held under the leadership of the public procurement department and exclusively from national producers, which, so that, on the one hand, everything was transparent, and on the other hand, it was profitable for the Ukrainian manufacturer.
5. The Department of Energy will provide information on the payback of alternative sources, which we will present below.

JSB "Ukragasbank" was chosen to implement the program we proposed, as it operates on the basis of a strategy for providing banking services to customers and creates eco projects. The Bank mainly finances projects such as wind power plants (WPP), solar power plants (SPP), hydroelectric power plants (HPP), energy efficiency measures and equipment for biofuel thermal power plants, heat generation, etc. (Ukragasbank, 2020). Next, we propose to depict an estimate for citizens to establish alternative energy sources, proposing a variant of the cost of insulating a house and using alternative energy sources (see Figures 7.3 and 7.4).

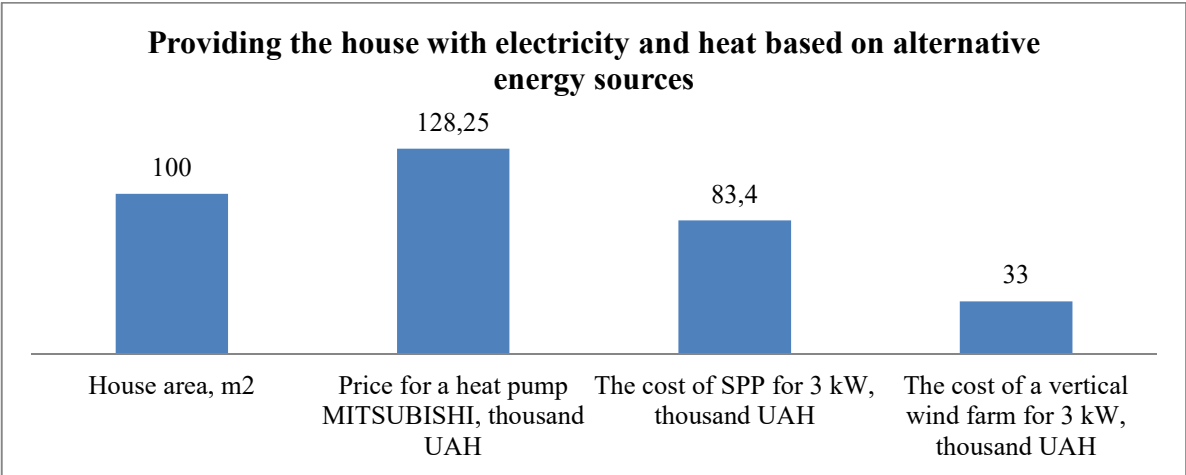


Figure 7.3 The cost of providing the house with electricity and heat based on alternative energy sources

Source: made by the author

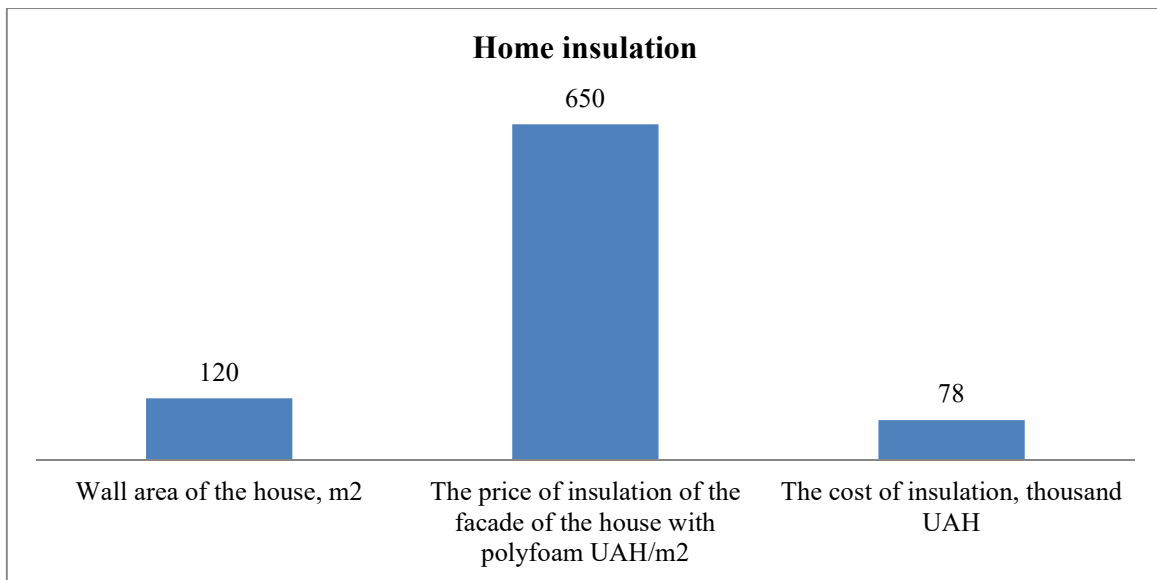


Figure 7.4 - House insulation costs

Source: made by the author

Analyzing costs of providing heat to our own home, we determined that the total cost of the project for a private residential building is UAH 322,674. For comparison, let's estimate the consumption of an average house with traditional energy supply (see Figure 7.5). So in just a year, about $17,995 + 5,340 = 23,335$ UAH are spent on maintaining a private house.

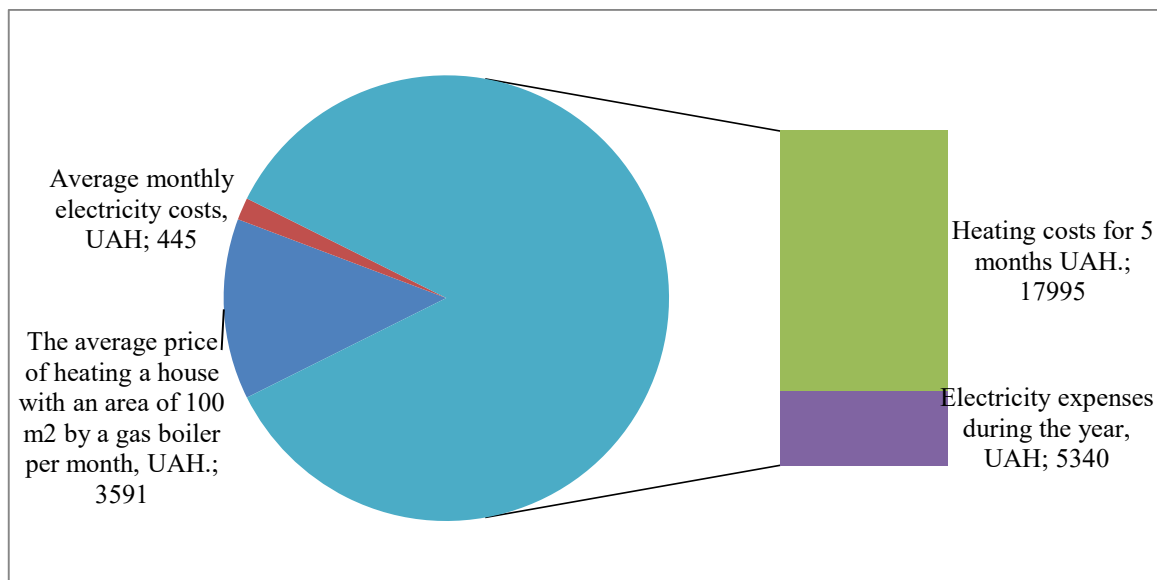


Figure 7.5 - Costs for an average building with traditional energy supply

Source: made by the author

As a result, we calculate the payback period for an alternative energy supply project at home compared to a gas boiler and electricity received from the network. The total generation of solar and wind power plants is 18.8 kWh. Subtract the consumption of the heat pump and get $18.8 - 5.5 = 13.3$

kWh. To obtain the net electricity produced, it is necessary to subtract the daily energy consumption of $13.3 - 3.3 = 10$ kWh/day - additionally generated electricity.

Next, we determine the annual profit from the sale of electricity at the feed-in tariff: $10 \text{ kWh} * 5.80$ (Price of feed-in tariff for 1 kWh) = UAH 58/day * 30 = UAH 1,740 / month * 12 = 20,880 - annual profit from sales of electricity at a green tariff. Having all the data, let's determine the payback period for this project: $\text{UAH } 322,674 / (23,335 + 20,880) \text{ UAH} = 7.3$ years - the payback period for the project with the connected feed-in tariff (see Figure 7.6). When calculating the socio-economic effect, batteries were not taken into account, because their price significantly increases the cost of the project and reduces its payback period. To solve the problem with the accumulation of electricity, a system for storing electricity in the general power grid has been developed. That is, a "green tariff" and a meter are connected to the house. On the day when energy generation is the highest, it is sold at a feed-in tariff to the power grid, and at night, when there is not enough energy to power the house, it is bought at the same tariff as it was sold. This method is by far the best solution to the problem with batteries.

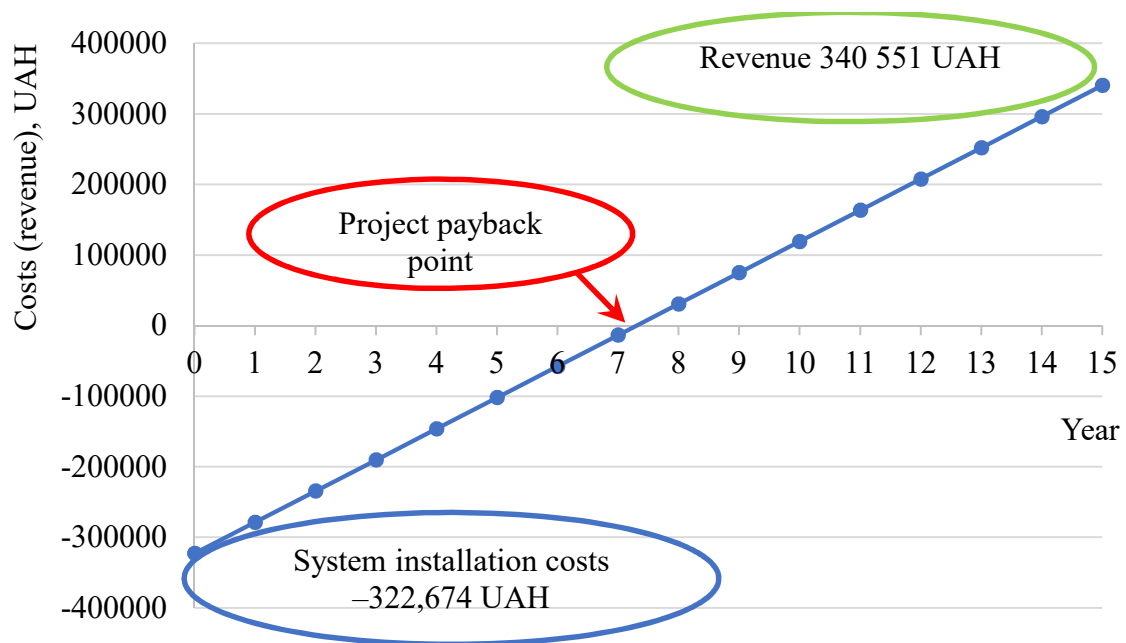


Figure 7.6 - Life cycle of an energy-saving system

Source: made by the author

From Figure 7.6 we can conclude that the project of alternative energy supply at home is beneficial in modern conditions. With the modern "green tariff" your house can be used as a way to earn extra money. Taking into account the benefits from the operation of an energy-saving system, it should be said about the positive impact on the environment. This building reduces the negative impact on the

environment by replacing and displacing electricity produced by TPPs and CHPs. Therefore, this project is proposed to be implemented based on the tender program that was proposed by us. The implementation of this project through tender purchases should entail the transition of a part of the population to alternative energy resources and contribute to a deeper introduction of information technologies into the system of using public funds.

So, based on the development of a program for conducting tender purchases, it was proposed to develop a program to promote alternative energy sources. The implementation of this program will be carried out by the state jointly with Ukragazbank. It is the use of modern technologies in the processing of applications and future financing of the population that will help to avoid various financial manipulations with public funds. The developed mechanism for financing the population can be implemented at the state level.

7.4 Summary

The policy proposed by us, unfortunately, cannot be fully implemented by the Ministry of Energy of Ukraine, since we are more than sure that there will be thousands who want to receive loans, and the Ministry will simply be physically unable to cope with the submitted applications. That is why we propose to create an auxiliary body under the Ministry of Energy, which controls the issuance of loans and their purpose in order to avoid corruption schemes, as is usually the case in our country. The processing of proposals and the issuance of loans will take place on the online public procurement platform and will be strictly verified by an independent commission. Our proposal still needs further development, but it is an excellent basis for further action.

VIII. CONCLUSIONS

8.1. Summary of the study

The purpose of this master's work was to determine the impact of digitalization on the transparency of public finances in Ukraine. In the process of our research and on the basis of the interviews, it was determined that digitalization had the greatest impact on public procurement and the efficiency of allocation of funds. Since the creation of state tender programs, there have been significant savings in the issuance of money for public purchases. Since the basis of the online tender platform is its openness, that is, any company can take part in it, and only the one with the lowest price offer will win. The implementation of foreign experience in introducing informatization in the public finance system contributed to the creation in our country of the Prozzoro online tender platform, which turned out to be effective and brought savings to the state budget in the amount of 5 to 20%, depending on the purchased goods (services).

It was technologies that served as a prerequisite for the creation of such a program, which partially made it impossible to implement various kinds of corruption schemes and contributed to the transition of all state institutions without exception to tender online purchases. The effectiveness of digitalization has already been proven by many domestic and foreign scientists, such as Shvabiy (2020), Latkovs'ka (2022), Konyeva (2018), Pishchulina (2020), Kud (2021), Prokofev (2013), Dunaiev (2021) and many others. Technology simplifies processes, modifies government oversight and, most importantly, prevents the misuse of public funds.

Having studied the specifics of Ukrainian public procurement, we have identified some shortcomings that we propose to turn into advantages. That is why we proposed a unified tender program, on the basis of which public procurement will be carried out in order to restore the Ukrainian economy due to the war with the Russia. The creation of a modernized online platform is designed to make various manipulations with prices and tenders impossible. After all, after the scandal with the procurement of the Armed Forces of Ukraine, the legitimacy of the Prozzoro program is in doubt.

The introduction of technologies into the Ukrainian financial system and the digitalization of government policy in this direction will not only ensure the transparency of the use of public finances, but also minimize the shadow sector by bringing it to a new information level, because technologies will be able to track all foreign exchange transactions and will not allow you to hide your income from the state. Some of the information I used to force conclusions about the impact of technology on the use of public finances came from my interviews with public finance officials.

Billions of dollars will come to Ukraine to restore the destroyed infrastructure, and they will be given through tender programs. That is why it is extremely important for our country to show the whole world that we are an honest and fair country, and not a corrupt one. On the basis of the proposed tender program, we developed a project for state financing of alternative energy sources for Ukrainians.

Investments are a great way to launder money that has been used in Ukraine for years, and the use of technologies (Cannizzaro & Weiner, 2018) that will track the final beneficiaries will provide an opportunity to see the real picture of investment processes in Ukraine. There are many shortcomings in the Ukrainian financial system that need to be immediately eliminated and the negative impact of predecessors on the distribution of public funds be minimized, and information technology is one of the important tools (Ali et al., 2020).

Today, more than ever, it is important for Ukraine to show the world community not only its military strength, but also financial honesty, which is tempting when receiving various kinds of financial assistance or investments from foreign countries. The Ukrainian financial system must move to the path of digitalization and digitalization, which should become the philosophy of the Ukrainian government (Niemand et al., 2021). The main goal that I am trying to convey primarily to the Ukrainian government is the recognition that the current financial system requires significant changes, primarily of an informational nature, which will help our country take the path of transparency and honesty.

After all, the fall of 2022 showed that the Ukrainians were not ready for a partial blackout, which was deliberately made by the Russian Federation. It is the support of the Ukrainian population in the field of alternative energy that should prepare our country for the next attacks of the enemy. We proposed the implementation of the project through a modernized program of tender purchases and the creation of a special Council to control the appropriateness of the use of public funds. Digitization in finance is a prime example of how technology can make corruption impossible and promote transparent use of public funds.

8.2 Limitations and suggestions for further research

This study has its limitations, because for lack of time, the survey was conducted only 10 people, information from which is not enough to form an overall picture. Due to lack of time, the interviews were short and did not provide an opportunity to ask more questions. It is better to interview at least 30 representatives of the Ministry of Finance and the Ministry of Digital Economy of Ukraine.

Although digitalization is a very popular area of research today, not enough research has been done in the context of its impact on ensuring the transparency and effectiveness of public finance policies. Most of the information is contained mainly in studies of international organizations. My research was carried out in war conditions, so some sites are not available, and accordingly in some cases it was impossible to find all the necessary information. Moreover, it made it difficult to assess the impact of digitalization on financial policy transparency. In addition, some statistics have not been updated, sometimes making it impossible to analyze trends in 2022. But I compensated for this by using the interview method.

An equally important limitation in the conduct of the study was obtaining advice from representatives of the Ministry of Finance. Due to their constant employment, the specialists of the Ministry postponed meetings, which affected the result. The number of specialists who were interviewed turned out to be ten times less than planned.

In the course of the interview, I came across the fact that some experts' views are contradictory not because they have different views and ideas, but because of political prejudices and criticism of the authorities, and, accordingly, such experts assessed the results too critically and biased the work of others. But in order to obtain more objective results, I tried to ask clarifying questions and understand the situation.

As for further research, our state needs to do a colossal amount of work for the complete transition and implementation technologies in the financial sector. First of all, our government needs to strengthen relevant policies and improve the regulatory framework, which in turn would ensure economic and financial stability and promote cooperation in the field of optimizing global networks. And secondly, to conduct a constant fight against corruption, which today is one of the reasons for the financial instability of Ukraine at the state level.

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APPENDICIES

APPENDIX I - Professional background of interviewees

№	Position (on the date of interview) or previous positions	Type of interview	Duration
1	Deputy Minister of Finance of Ukraine for digital development, digital transformations and digitalization	telephone communication	30 min
2	State Secretary of the Ministry of Digital Transformation	telephone communication	20 min
3	Deputy Minister of Digital Transformation for IT Development	communication in Zoom	25 min
4	Secretary of State at the Ministry of Finance	communication in Zoom	20 min
5	Director of the state enterprise "Prozorro"	communication in Zoom	20 min
6	Deputy Minister of Finance	telephone communication	20 min
7	Former director of the state enterprise "Prozorro"	telephone communication	40 min
8	Commissioner for Public Finance Management	telephone communication	20 min
9	Chief Specialist of the Department for Legal Support of Digital Expertise of the Department for Legal Support of Digital Transformation"	communication in Zoom	40 min
10	Chief Specialist of the Department for Development and Financial Monitoring of the Virtual Asset Market of the Digital Economy Department	communication in Zoom	1 hour

APPENDIX II - List of questions

1. What is the reason for the digitalization of public finance management
2. What are the peculiarities of digitalization of public finance management in Ukraine
3. What challenges does the digitalization of public finance face&
4. Is the process of digitalization regulated at the legislative level
5. Who are the main stakeholders influencing the digitalization process
6. What are the main results and achievement of digitalization?
7. What is the evidence that digitalization provides transparency in public finance policy?
8. How does you assess the prospects of digitalization?
9. Experience of which countries can be used in the development of digitalization of public police in Ukraine?