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**Current trends in digital transformation
and their impact on the national economy**

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Abstract. In today's realities, digital transformation plays a very important role in the economic development of the country. This is due both to the high rate of scientific and technological progress and to the common within the economic relations, consumer preferences. Thus, it remains important to assess the impact of digitalization on the welfare of international and national economies. The research examines the current situation in Azerbaijan, one of the countries in which the principles of digital transformation are being actively implemented. The main research methods were analysis, induction, as well as methods of statistical data processing. The research assessed the main reason for the acceleration of the pace of digital transformation in the world and Azerbaijan, that being the beginning of the COVID-19 crisis. Although it was a problem for many companies at the initial stage, subsequently it allowed them to fit into the new economic realities. Thus, at the moment in Azerbaijan, there is a fairly well-developed system for managing the processes of digitalization. The national policy of the country is aimed at motivating enterprises to change the principles of their functioning into more innovative ones, which is quite well received by the institutions responsible for this. A particularly important role is played by financial and non-financial support for small and medium-sized enterprises, the provision of educational programs for citizens in terms of increasing literacy about the latest digital technologies, and the introduction of digital technologies in public administration processes, in which Azerbaijan has been able to achieve significant success. However, there are still various problems that require a solution from the authorities in the shortest possible time. Thus, this study brings new knowledge to the theory of modern digital transformation and allows us to consider the current state of the Azerbaijani economy in more detail

Keywords: digitalization; management; customer communication; public administration; innovation

Introduction

Globalization has had an increasing impact on business, forcing it to change (Kraus *et al.*, 2021a). Therefore, companies need to constantly look for opportunities to improve their competitive position in the market, and one of the tools to achieve this is digitalization. Digitalization is believed to cause increased productivity and lower costs through better information processing and communication, simplified customer communication capabilities (Nadkarni & Prugl, 2021). It is defined as the process of using digital technologies to create or improve existing business models and processes, and to support the transformation of organizational structures, internal resources, and processes of interaction with internal to external actors (Plekhanov *et al.*, 2022). At its core, it is the inclusion of business processes in the digital dimension: for example, introducing electronic payments, opening online venues to sell products, introducing document management through online services, etc. (Reis *et al.*, 2020; Bouncken *et al.*, 2021). However, this process is quite time-consuming, as it creates problems not only in terms of the innovation capabilities of the enterprise but also the company management (Aliyeva, 2023).

After the COVID-19 pandemic began, the problem of digitalization of business became even more urgent (Amankwah-Amoah *et al.*, 2021; Gahramanova, 2023). This is primarily due to all the restrictions that were imposed by the state, which did not allow citizens to move freely, visit public institutions, etc. (Spiliopoulos, 2022). An alternative to this, people sought technologies of remote interaction, which greatly influenced most processes in the world economy (Kim *et al.*, 2021). Thus, it remains relevant to consider how the rapid development of digital technology has affected the development of individual countries. The research prioritizes the national economy of Azerbaijan.

Many scholars have studied the development of digitalization in individual countries and the world. Thus, C.S. Pereira *et al.* (2022) considered general trends in digital transformation based on data from Portuguese companies. They propose a model to increase the efficiency of companies in this country in terms of their transition to the latest technology. However, this methodology cannot be applied to enterprises in other countries, which makes this study somewhat limited.

The process of digitalization in developing countries was considered by M. Matthes & S. Kunkel (2020). Scientists describe the positive impact of digital transformation on these states but pay little attention to the problems associated with this transition. In turn, A. Małkowska *et al.* (2021) described both the features of the process of digitalization in general and its trends in the European Union. However, although this study was published in 2021, it does not look at changes after the start of the COVID-19 pandemic. The study of digitalization trends in Azerbaijan was conducted by G. Mykhailiuk *et al.* (2021).

Thus, the research aims to describe the current state of digital transformation in various industries and sectors of the Azerbaijan. This will not only provide a better understanding of the peculiarities of the country's development in general but will also enable better implementation of the state policy in this area.

Materials and Methods

One of the sources that did provide some data on the level of digitalization development was the official website of the World Bank (2020). To estimate the average speed of the Internet in Azerbaijan and some other countries, the Speedtest Global Index (n.d.), developed by them, calculate the average speed per month, measured on the service by users, in different countries and cities was used. The study used

data for December 2022. Moreover, the authors used some characteristic, particularly legal, sources such as Order of the President of the Republic of Azerbaijan “State Program for the Development of Communications and Information Technologies in the Republic of Azerbaijan for 2010-2022 (Electronic Azerbaijan)” (2010), Law of the Republic of Azerbaijan No. 602-IIH “On Electronic Signature and Electronic Document” (2004), Order of the President of the Republic of Azerbaijan on Approval of “Azerbaijan 2030: National Priorities for Socio-Economic Development” (2021).

Another source worth mentioning is the Azerbaijan digital hub (2023) project, the data from which was used to describe the prospects and the essence of this project, which is probably one of the most ambitious of all those being implemented in the country. In addition, reports of some international organizations the report “Beyond COVID-19 advancing digital business transformation in the eastern partner countries” (2021) were used. The materials of the Azerbaijan small and medium business development agency (2023) and the Decree of the President of the Republic of Azerbaijan “Strategic Roadmap for the development of telecommunications and information technologies in the Republic of Azerbaijan” (2016) were also considered.

The approach used in the research is systematic, which allowed to show the process of digital transformation in Azerbaijan through its components (digitalization of enterprises, state organizations, the introduction of similar technologies in education, etc.) In turn, one of the main methods that were used during the study was analysis. With its help, a lot of information was processed, which was subsequently used to form the main research conclusions. In addition, the historical method was actively used, which allowed evaluating and describing the development of trends of digital transformation in the world and Azerbaijan. With the help of induction, a general vision of the state of digital transformation in the country was formed based on certain known indicators. The deduction, on the other hand, made it possible to find the reasons for the inefficiency of digitalization in the country. In turn, the statis-

tical method made it possible to evaluate some data on the processes of digital transformation in Azerbaijan, and the graphical method made it possible to depict the obtained data arrays in the form of graphs and tables for easier perception and analysis.

Results

The beginning of digital technology development dates to the 1960s when modern principles of this kind of management began to spread in some enterprises, in particular the International Business Machine (IBM): the company developed and provided the Sabre Global Distribution System, which allowed the automation of airline and hotel reservations (Abdullayev, 2022). The second stage in the development of digitalization counts from 1980-1990, when many researchers began to study the possibilities regarding the implementation of information technology in organizational structures, as well as to evaluate its impact on the subsequent performance of these subjects (Drucker, 1988). Stanford Federal Credit Union began using online banking in 1994; subsequently, with the commercialization of computer technology and the spread of the Internet, the topic of digital transformation began to gain momentum and became particularly relevant with the onset of the COVID-19 pandemic (Abidi *et al.*, 2022). The authors have already mentioned that the restrictions imposed during the crisis were one of the main reasons for the rapid development of digitalization processes after 2020. The reason for this was the restrictions imposed by states, which forced the population and its businesses to adapt to the new conditions primarily using digitalization tools (Patrucco *et al.*, 2022). Nevertheless, the trends in this process have differed from country to country. It is important to consider them since they have guided the main existing trends of this component of the economy for most states.

It is worth considering data that indirectly characterize the processes of digital transformation in Azerbaijan. Figure 1 shows data on the number of cellular subscriptions for every 100 people in some countries and the world.

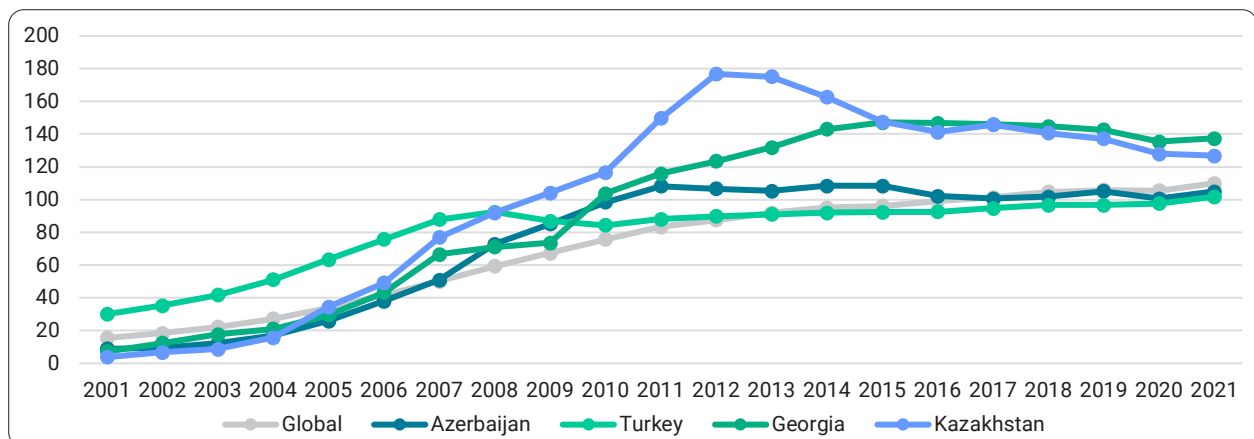


Figure 1. Data on the number of mobile subscriptions in some countries and the world in 2001-2021, the number of subscriptions per 100 people

Source: compiled by the authors based on Mobile cellular subscriptions (n.d.)

As seen in Figure 1, in Azerbaijan the number of mobile subscriptions (in fact, the level of cell phone usage) is close to

the global average. Figure 2 shows the number of subscriptions to fixed broadband Internet access per 100 people.

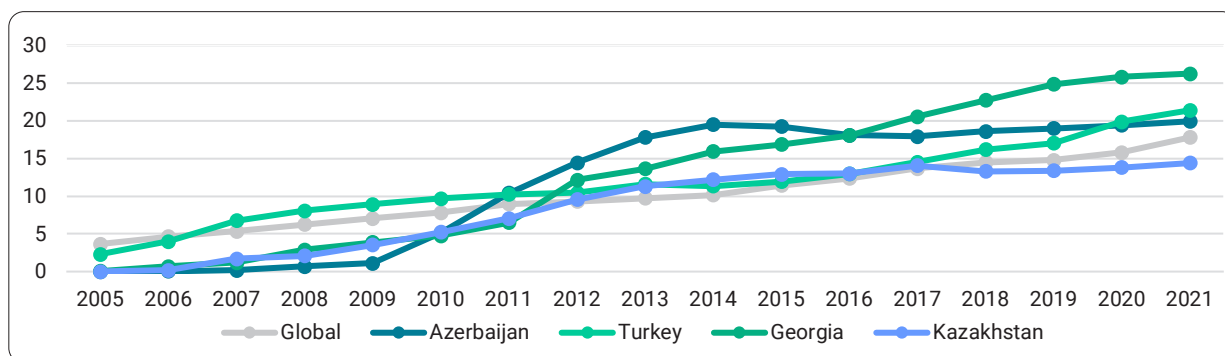


Figure 2. Number of subscriptions to fixed broadband Internet access in 2005-2021, number of subscriptions per 100 people

Source: compiled by the authors based on Fixed broadband subscriptions (n.d.)

As seen in Figure 2, the number of subscriptions to fixed broadband Internet access in Azerbaijan is at a high level, at least higher than the global average, which is also a good

indicator in terms of the level of development of digitalization. Based on Table 1 it is possible to also evaluate the Internet speed in Azerbaijan in comparison with some other countries.

Table 1. Data on mobile and broadband Internet speeds in Azerbaijan and other countries in 2023

Mobile internet			Fixed broadband internet		
Rating number	Country	Speed (MB/sec)	Rating number	Country	Speed (MB/sec)
1	Qatar	169.51	1	Singapore	225.71
2	United Arab Emirates	153.09	2	China	223.49
3	Norway	128.14	3	Chile	220.96
60	Spain	35.1	115	Antigua and Barbuda	27.3
61	Azerbaijan	34.93	116	Azerbaijan	27.15
62	Georgia	33.7	117	Iraq	27.1
139	Venezuela	5.95	176	Turkmenistan	2.4
140	Cuba	5.61	177	Afghanistan	2.29
141	Afghanistan	5.18	178	Cuba	1.91

Source: completed by the authors based on Speedtest Global Index (n.d.)

As can be seen from Table 1, the speed of data transmission and communication in Azerbaijan is quite close to the world average, which indicates a good level of development and distribution of these technologies. The main goals for Azerbaijan to ensure the digitalization of its industries are:

- create an information environment and ensure information security;
- improve existing information and communication technologies (ICT) structure management;
- increase the productivity and operational efficiency of the business environment;
- digitize the main processes that take place in the context of government regulation.

High-quality infrastructure plays the most important role in ensuring the availability of digital transformation development in the country. The main advantage of Azerbaijan in the digital transformation is the flexibility of the

country in terms of the ability to apply and use the latest digital technology at a relatively higher speed than other countries. In addition, the country has significant human capital. This is evidenced by the Human Capital Index (World Bank, 2020), which is 0.6 in 2020 for Azerbaijan (with a minimum of 0 and a maximum of 1). In addition, the number of informational technology (IT) professionals in the country is increasing every year, and there are significant preconditions for the further active development of this sphere (Lefebvre & Renard, 2016).

Another issue is the financial capacity of the country to implement such technologies (in other words, the availability of financial capital or capital funds (Cooper *et al.*, 1994). There are three sources of capital: investment (internal or external) and government funding. To begin with, it is important to consider the state support component: the country's 2023 planning budget is in deficit (State

budget of Azerbaijan..., n.d.), which suggests that it may be difficult to allocate funds for such initiatives. Nevertheless, if the authorities want to implement digital technologies in enterprises, they should increase the possibilities for funding projects in this area when drafting the 2024 budget, improving existing and forming new relevant support programs (Croce *et al.*, 2019). As for the country's innovation attractiveness, it is considered quite high despite the unfavourable external conditions (Diugowanets & Kurei, 2021). Thus, Azerbaijan is still able to attract foreign investment, while the domestic culture of investment among the population remains underdeveloped, the reason for which is primarily the socialist past. Therefore, it is important not only to maintain a high level of investment attractiveness of the country but also to develop a culture of investment among citizens. In general, the country has sufficient opportunities and capital for the development of digital technology.

One of the important components of modern digitalization in Azerbaijan is online learning. Together with other components of digitalization, this sphere developed quite actively during the COVID-19 pandemic: online platforms such as Coursera, Udemy, Khan Academy, and others gained popularity. The use of similar training methods will likely increase the financial literacy of the local population, which is especially relevant given the ongoing reforms in the field of economy and finance. There are also certain actions on the part of the state in the context of educational development. In particular, the Ministry of Digital Development and Transport established the "Information and Communication Technology Application and Training Center", which should allow the population and entrepreneurs to receive education services in information and communication technologies and their subsequent application in practice. In addition, under the "E-Government" project, citizens can improve their skills through certified, professional, and corporate training. Another promising program implemented by Azerbaijan is the Azerbaijan Digital Hub (2023). This project is also quite extensive, as it includes four smaller components, namely the Digital Silk Road project, the construction of regional data centers, the Internet traffic exchange center project, and the formation of a unified digital ecosystem. Azerbaijan Digital Hub (2023) should become a modern energy and transport center, as well as one of the important components of the transformation of the country into a regional digital center. In general, this program can significantly accelerate digitalization in Azerbaijan and build a new backbone infrastructure in the field of telecommunications.

The concept of "e-government" plays a major role in modern Azerbaijan. Its main objectives are to minimize the distance between citizens and civil servants through information technology solutions and reduce bureaucratic barriers in the relationship between them. Citizens can use the services of state bodies such as the Ministry of Transport, Communications and High Technologies, the Ministry of Labor and Social Protection, the Ministry of Health, the Ministry of Justice, and others (Abdullayev *et al.*, 2022).

This facilitates the process of providing social and economic services and makes it possible to provide them in real-time, eliminating time lags, which are relevant in any interaction between citizens and public institutions. Thus, to a large extent, the quality and pace of digitalization in the country depend on the capabilities of the state and the activities of its public authorities. Economic policy authorities should support the implementation of digitalization in the country and ensure the internal development of infrastructure (creation of incubators, high-tech parks, and support for educational institutions). In Azerbaijan, the basis of policy in terms of digital technology is the connection and development of e-government services, as well as ensuring quality improvements in information and communication technologies. Therefore, the state provides some measures for the development of digital culture among the population (especially students and entrepreneurs), as well as the application of innovative digital solutions by companies. The Ministry of Digital Development and Transport oversees the implementation and application of these principles: in general, its goal is to promote innovative and high-tech technologies in the country, as well as the "made in Azerbaijan" brand. Regarding legal framework, Azerbaijan, compared to other Eastern countries, has a high level of development: in particular, laws on electronic signature were adopted and the project "Information Security and Cybersecurity Strategies for 2021-2025", which should bring more clarity to the country's legislation, is being developed.

Decree of the President of the Republic of Azerbaijan "Strategic Roadmap for the Development of Telecommunications and Information Technologies in the Republic of Azerbaijan" (2016) was also an important document to guide the development of digital transformation in the country, although it expired in 2020, and a new similar document has not yet been adopted. Another important document is the Order of the President of the Republic of Azerbaijan on Approval of "Azerbaijan 2030: National Priorities for Socio-Economic Development" (2021), which should describe the tools for the development of digitalization in the country.

Particular attention should be paid to how the latest technologies of small and medium-sized enterprises (SMEs) are applied (Kraus *et al.*, 2021b). This is related primarily to the need to maintain a high level of competitiveness in the internal environment of the market because, without the development of SMEs, the market can turn into an oligopoly or monopoly. The Small and Medium Business Development Agency of Azerbaijan (Azerbaijan small and..., 2023) is responsible for the development of SMEs in Azerbaijan. It provides non-financial support through regional SMEs Development Centers that offer training and advice to entrepreneurs to improve and develop their skills. However, it is worth noting that the government also provides such businesses with financial support, in the form of grants and loans at preferential interest rates. In this case, it is important to note that many of their initiatives are in one way or another related to the development of innovativeness and

digital literacy. And although executive organizations in the country do not have a coherent program to ensure the development of SMEs, they are generally quite effective in supporting these enterprises. Another institution influencing the digitalization of companies is the "Centre for the Fourth Industrial Revolution in Azerbaijan" (2021). This center is responsible for coordinating initiatives in the field of economy and the fourth industrial revolution; one of its goals is to ensure the fastest possible digital transformation of companies and enterprises in Azerbaijan.

Financial services play a major role in the development of digital transformation, which makes them not only faster and quicker, but also cheaper (through lower transaction costs). The Central Bank Digital Currency (CBDC) concept, which can also be rightly considered one of the components of digital transformation, is becoming increasingly widespread in many countries. The introduction of such a means of payment will help increase the efficiency of the central bank's management of the economic system in several ways. Firstly, it will make it possible to more clearly track money flows in the country, determine the number of funds in circulation, and, in general, better understand the monetary components characteristic at a certain time in the economic environment of the state. Second, it will make it possible to instantly block or cancel any transactions, which is especially relevant to the fight against crime. It will also make money laundering processes much more difficult. Thirdly, it will improve the efficiency of the state's distribution of social services, since it will make it possible to prohibit citizens from using the funds issued to them for other purposes: for example, to buy funds that cannot be classified as necessities (Korsunskaya *et al.*, 2022).

Thus, this concept greatly increases the factor of manageability of the economic and financial system and should improve the decisions made by central banks in terms of monetary policy, although it deprives citizens of the factor of confidentiality, which also entails its risks, especially for non-democratic countries. Nevertheless, it is already clear that these methods of payment will be spread in many countries of the world. But this concept has not been developed in Azerbaijan yet because the Central Bank of the country announced only in 2022 about the development of the concept of digital manat with the use of foreign developments (which are not numerous in the world) (Central Bank preparing..., 2022). Thus, working prototypes of CBDC in Azerbaijan should be expected in a few years at the earliest.

Certain innovations occur in the transport industry as well, but they are not as noticeable as in other industries. The main problems that characterize this industry are the lack of qualified personnel, low productivity, lack of financial resources, high cost of equipment or its absence, shortcomings in the provision of certain types of services, and some others (Revak & Gren, 2022). All this requires a solution from the governing bodies, which is the Ministry of Transport, Communications, and High Technology. Although some work in the context of the

transition to digital logistics is taking place, the authorities must seek approaches to accelerate the transition to the latest technologies in the sector.

Discussion

It is worth noting that digital transformation is an important component of the development of not only individual enterprises but also the country. This is described by M. Ebbini (2022). It allows to increase the reduction of the costs of enterprises, increase their competitiveness in international markets, and thus leads to higher revenues (and tax revenues to the state budget). However, digitalization makes it possible to achieve some useful social effects as well. In particular, because of its high productivity, one created place in an industry (related to innovation or technology) can create 3-4 more in related industries. It also helps to reduce or prevent the "brain drain" effect, which remains very common in many developing countries.

The peculiarities of the development of digital transformation in the world during the COVID-19 crisis were considered by J. Amankwah-Amoah *et al.* (2021). They confirm the widespread view that the pandemic was the "great accelerator" in the context of changing global trends within the framework of digitalization. The crisis was a catalyst for the increased use of all sorts of technologies, among them video telephony, 5G digital networks, the Internet of Things, cloud computing, machine learning, and artificial intelligence. Scientists also argue that the "psychological dividend" of COVID-19 played a big role in this issue. Thus, those managers who previously were afraid to use the latest technology to manage companies have been forced to do so because of the prevailing circumstances. And although the pandemic has had a positive impact on the development of these processes, there are still some factors that continue to hold back its pace. Following the researcher, the most important among the described factors is the inflexibility of corporations, which remained quite strong, and their unwillingness to apply such technologies, including financial.

T. Guarda *et al.* (2021) described general trends related to digital transformation and technology development in the world. They point to the significant role of digital technologies and the impact they are shaping people and businesses. Researchers write that the development of such innovations significantly increases the level of competitiveness between companies in different countries and allows to improve the efficiency of internal processes in enterprises. Nevertheless, many managers are still probably not ready for such a drastic transition to new principles of interaction. Note that the research was conducted in 2021: many changes happened in recent years and digital technologies have become more and more common in companies and the general population. Thus, if the problem of managers' unpreparedness for such changes within enterprises is still relevant, it does not affect their development so much now. In addition, its relevance will rapidly decrease due to the increasing use of digital technology, as

well as the arrival of new young experts. The researchers prioritize 5G technology, which should reduce the delay in receiving or sending information to one millisecond, making possible the development of many other innovations. In addition, the scientists note the role of the development of artificial intelligence and mention many industries in which its application could be particularly useful, in particular medicine, marketing, finance, video games, advertising, and others (Zaki & Fernandez, 2023).

G. Mykhailiuk *et al.* (2021) in their study describe the features of digitalization in Azerbaijan during the COVID-19 crisis. They conclude with the role of digital transformation in the country and the benefits that can be achieved in the case of its proper implementation. In addition, the researcher describes those changes in the country in its various spheres related to digitalization. Scientists believe that they will give an opportunity to qualitatively transform the country and achieve many of its strategic objectives. K. Abdullayev (2022) also examines the current state and future trends in the development of digital transformation in Azerbaijan and indicates significant potential in this area. In other words, the scientist states that the process of digitalization in the country should go faster and with fewer problems than in other countries. A completely different position in the context of the digital transformation of Azerbaijan is taken by D. Plekhanov *et al.* (2022). Following them, the country lacks a clear initiative for digitalization on the part of both private entrepreneurs and the authorities. However, it is difficult to agree with this thesis, because, at least on the part of the state, there is an active activity in the field of digital transformation. As already described in the studies, it is observed in educational projects, the introduction of technology in public administration, and the implementation of the Azerbaijan Digital Hub (2023). At the same time, it is possible to agree with the thesis about the lack of distinct initiatives on the part of entrepreneurs. Nevertheless, the Azerbaijani authorities also implement some programs aimed at cooperation with them, for example, training programs aimed at developing entrepreneurs' understanding of the role of digital technology in modern business activities (Ismayil-zada, 2023). In addition, sooner or later, companies themselves will come to understand the role of innovation in business success, which will ensure their interest in this process in the future.

The study also describes the need for state authorities of Azerbaijan to pay more attention to education, creating all kinds of training programs, including those in institutes or universities. Particular attention is devoted to the digitalization of agriculture, as the latest technology is now critical to ensure the effective functioning of the agricultural sector and increase its productivity (Vdovenko *et al.*, 2023). For this purpose, the study recommends forming comprehensive support for the development of the industry, the essence of which is to create such conditions in which companies in the agricultural sector could more effectively use and apply digital technologies. At the

end of the research, the state of e-commerce in Azerbaijan is described, which, following the authors, is currently at a low level, and the economic environment is unfavourable for its development. Therefore, it is offered to develop infrastructure and create such an internal ecosystem that would form better conditions both for enterprises and consumers in terms of using e-commerce services. In general, such a study is indeed very qualitative and plausibly describes the existing realities of digital transformation in Azerbaijan. Nevertheless, it is worth noting that some of the above-mentioned components are already better developed than those described in the study of the Asian Development Bank: this concerns education, the provision of public electronic services, the state of small and medium businesses.

Conclusions

Thus, the study assessed the general features of digital transformation in the political and economic realities of Azerbaijan. It was shown that in Azerbaijan, as well as in the rest of the world, the rate of digitalization of all types of enterprises has increased very much. This is primarily caused by the beginning of the COVID-19 pandemic and the consequences in the form of restrictions that are associated with it. In addition, some indicators have been evaluated to indirectly assess the overall state of digital transformation in the country. They were largely equal to the global average, which may indicate that Azerbaijan is keeping pace with the times and holds a good bar in terms of the digitalization of the economy.

It is worth noting that even before the pandemic, the government was developing a large-scale plan for the digital transformation of Azerbaijan. As part of the management of the authorities, a large infrastructure of bodies was created, whose goal is to increase the effectiveness of digitalization in all kinds of spheres. In many areas, they have been able to achieve significant success. For example, local small and medium-sized enterprises have significant opportunities for staff training in the context of digital literacy, financial incentives for the introduction of innovative technologies, etc. It is also worth mentioning the successes in the application of digital transformation technologies in public administration and public services, as well as in the provision of educational services in the field. Thus, the subsequent implementation of such technologies in enterprises and other institutions will allow the country to achieve significantly greater efficiency of operation and improve its competitive ability in international markets.

The construction of various kinds of mathematical econometric models, which could more accurately assess the future benefits or drawbacks of digital transformation in Azerbaijan, is promising for further research. In addition, it is worth considering opportunities to increase the rate of digitalization in the country and to ensure its greatest efficiency. It also remains relevant to consider the country's innovation sector, especially the activity of small and medium-sized enterprises in it.

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Conflict of Interest

None.

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Сучасні тенденції цифрової трансформації та їх вплив на національну економіку

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Анотація. У сучасних реаліях цифрова трансформація відіграє дуже важливу роль в економічному розвитку країни. Це пов'язано як з високими темпами науково-технічного прогресу, так і з поширеними в рамках економічних відносин споживчими уподобаннями. Таким чином, актуальною залишається оцінка впливу цифровізації на добробут міжнародної та національної економік. У дослідженні розглядається поточна ситуація в Азербайджані, одній з країн, в якій активно впроваджуються принципи цифрової трансформації. Основними методами дослідження були аналіз, індукція, а також методи статистичної обробки даних. У ході дослідження було оцінено основну причину прискорення темпів цифрової трансформації у світі та Азербайджані - початок кризи, спричиненої COVID-19. Хоча на початковому етапі вона стала проблемою для багатьох компаній, згодом це дозволило їм вписатися в нові економічні реалії. Таким чином, на даний момент в Азербайджані існує досить розвинена система управління процесами діджиталізації. Національна політика країни спрямована на мотивацію підприємств до зміни принципів свого функціонування на більш інноваційні, що досить добре сприймається відповідальними за це інституціями. Особливо важливу роль відіграє фінансова та нефінансова підтримка малих і середніх підприємств, забезпечення освітніх програм для громадян з точки зору підвищення грамотності щодо новітніх цифрових технологій, а також впровадження цифрових технологій у процеси державного управління, в яких Азербайджан зміг досягти значних успіхів. Однак все ще існують різні проблеми, які потребують вирішення з боку влади в найкоротші терміни. Таким чином, це дослідження вносить нові знання в теорію сучасної цифрової трансформації та дозволяє більш детально розглянути поточний стан азербайджанської економіки

Ключові слова: цифровізація; управління; комунікація з клієнтами; державне управління; інновації

**Circular economy as an imperative
for sustainable development**

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Abstract. The lack of resources in the modern world necessitates the reorganisation of the conventional linear economy into a new, circular model of economic development, and this requirement is even more urgent for a country at war. The purpose of this study was to prove the necessity and possibility of achieving sustainable development goals even in a crisis, using evidence from Ukraine. Using such methods as statistical analysis, comparison, and synthesis, the dynamics of sustainable development in the European Union and Ukraine were investigated. In addition, relevant experts were interviewed via an online survey. The study obtained and analysed statistics on the transition of European countries to clean energy sources, conducted a detailed investigation of the current legislative framework and state institutions of Ukraine related to recycling war waste, strengthening the digitalisation of Ukrainian society, and studied wartime circular recycling measures. Statistics on the factual destruction and pollution of the environment as a result of hostilities and the temporary occupation of some territories were also examined. Furthermore, information was collected and systematised from the management of Ukrainian manufacturing enterprises on the factual implementation of circular economy principles during the war. The analysis of the data obtained led to the conclusion that the crisis only increases the need to save resources. The practical significance of the study lies in proving that there is no alternative to the goals of sustainable development in the future and emphasising Ukraine's competitive advantages in this area during the post-war reconstruction. These proposals will be useful for private investors who can profitably finance Ukraine's future recovery in line with the principles of the circular economy

Keywords: clean energy; sustainable development goal; pollution of territories; waste of war; digitalization of society; post-war reconstruction

Introduction

In recent years, the impact of the agricultural sector on the global economy has increased substantially, as the threat of global hunger and climate change have increased the significance of the industry for sustainable development and its vulnerability. However, the greatest risks to the food market in the entire Eastern Hemisphere are associated with Ukraine – after the start of the full-scale military invasion in February 2022, a substantial part of arable land in the South was either temporarily occupied or under the negative technological impact of hostilities. Furthermore, maritime logistics routes for transporting grain also ended up at risk. Looking at the issue of sustainable development more broadly, it is worth mentioning other economic sectors as well – the lack of resources and the need to use them carefully makes humanity move faster to introduce the circular economy ideology and create additional value with new techniques and intelligent solutions. In Ukraine, the circular economy has been applied in a rather limited and gradual manner, but unprovoked military aggression and, consequently, additional restrictions on available resources have forced a review of the programmes for implementing circular economy solutions and stimulated the acceleration of these processes.

With the outbreak of a full-scale war, research on the specific features of applying the principles of a circular economy has increasingly been found in the studies of Ukrainian scientists. O. Dovgal (2022) supplemented the existing principles of the circular economy with her own findings, which more broadly revealed the possibilities of transition to a circular economy. These include the main stages of implementing a circular business model in practice, current obstacles to such a transition, and socio-economic benefits from it. In another study, O. Dovgal *et al.* (2022), returning to the topic of the circular economy concept, emphasised the negative impact on the modern

world of such factors as depletion of natural resources, environmental pollution, and climate change. Having analysed statistical data using evidence from the Black Sea region, the researchers prove that currently, when developing regulatory documents, due attention is not paid to industrial waste management, which hinders the further implementation of the principles of a circular economy (Sinyashchyk *et al.*, 2023).

Another essential aspect of the development of the modern economy that is consistent with the principles of sustainable development is the extrapolation of resource-saving technologies to such rather conservative areas as accounting and financial accounting. N. Potryvaieva & A. Palieiev (2023) covered the advantages and disadvantages of outsourcing accounting services compared to the conventional work of full-time employees. As a result, it was proved that outsourcing accounting saves the company's resources and is more in line with the principles of the circular economy. In another study on a similar topic, N. Potryvaieva *et al.* (2022) examined the specific features of digitalisation of accounting reports solely on the example of the agro-industrial complex (AIC) and concluded that the introduction of full-fledged modern accounting in rural areas requires considerable time and investment in the acquisition of relevant technologies. Therefore, such a programme can only be implemented with the full support of the state.

Thus, it has been repeatedly proved that the issues of the circular economy are fundamentally important for modern Ukrainian realities. However, the relationship between sustainable development goals and military action has not been investigated in detail. Therefore, the purpose of this study was to prove that there is no alternative to the circular economy as a critical requirement for sustainable development, even under martial law.

Materials and Methods

The study employed the comparison method to compare the indicators of annual factual clean energy production in the European Union (EU) and the forecast of their dynamics. This method was also used to assess trends in the use of fossil fuels in Europe. Considering them in dynamics made it possible to assess further development and understand trends more objectively. The analysis identified the challenges facing Ukraine's circular economy during the hostilities, including the amount of destroyed housing, the amount of contaminated arable land, and the additional burden on energy systems. Separately, the phenomenon of "war waste" was investigated using the synthesis method and its impact on the achievement of sustainable development indicators in Ukraine was considered.

An assessment was also made of the impact of the digitalisation of Ukrainian society and economy on the restoration of normal life and minimisation of the damage caused by the war. The analysis, based on data obtained from the portal of the Ministry of Environmental Protection and Natural Resources of Ukraine (n.d.; 2024), identified the country's key steps towards a circular economy, including the implementation of waste management reform, compliance with emission permits, digitalisation of metering, and other current trends.

The materials used for this study included, apart from the above, the Decree of the President of Ukraine No. 266 "Issues of the National Council for Restoration of Ukraine from the Consequences of War" (2022), Draft Law of Ukraine No. 2679-VIII "On the Basic Principles (Strategy) of the State Environmental Policy of Ukraine for the Period Up to 2030" (2019), and recovery plan by the National Council for the Reconstruction of Ukraine from the Consequences of War (2022), operational data of the Ministry of Digital Transformation of Ukraine (2023). The study was conducted in the format of an online survey using the Computer Assisted Web Interviewing method. A specially designed three-question questionnaire was sent to the heads of 100 Ukrainian manufacturing companies that continued to operate after the start of full-scale aggression:

1. Assess the impact of full-scale hostilities on the government's resource recovery policy on a 10-point scale, where "10" is continuation of existing measures to implement sustainable development policies, and "1" is complete abandonment of any programmes.

2. Assess the implementation of circular economy programmes at your company after February 2022 in a form convenient for you.

3. Assess the impact of digital technologies on the achievement of sustainability goals at your company on a 10-point scale, where "10" is a full connection between these phenomena, and "1" is a complete absence of such a connection.

The requests were sent by email to publicly available email addresses. Within the agreed timeframe, 87 completed questionnaires were returned, 82 of which contained answers in the required format. For security reasons, the authors of this study undertook to publish the responses based on personal anonymity. In addition, using the forecasting method, based on the data obtained, respondents' answers, and relevant conclusions, the further development of the circular economy in Ukraine was predicted and described, as well as the main trends that will bring the country closer to the full implementation of the principles of sustainable development and post-war recovery.

Results

In the past few years, the principles of sustainable development have become critical around the world, as awareness of the exhaustibility of available resources has forced humanity to use them more rationally and carefully. One such approach to resource management is the introduction of a circular economy, which, unlike the linear economy, operates on the concepts of reuse and recovery. Generally, the circular economy aims to solve such pressing problems of modern times as the loss of biodiversity, climate change, and environmental pollution caused by industrial and human waste through systemic solutions. Among the environmental issues, the demand for clean energy production stands out. The development of this trend in EU countries is well-illustrated in Figure 1, which shows the dynamics of resource saving processes in terms of clean energy use.

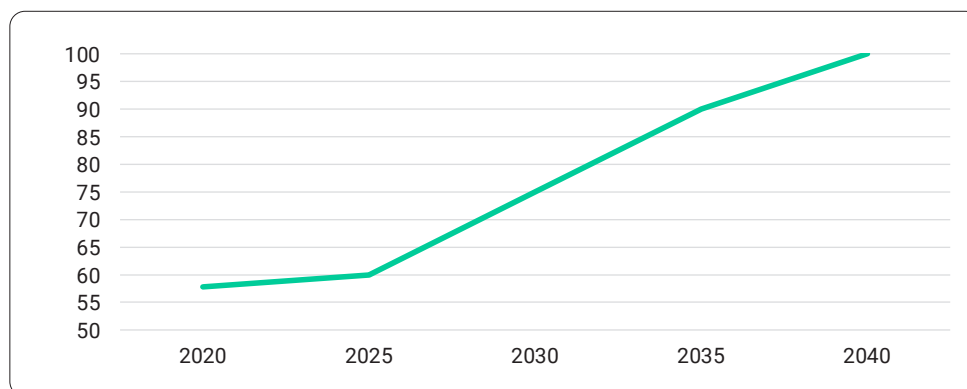


Figure 1. Clean energy production in the EU, fact and forecast, %

Source: compiled by the authors of the study based on Europe: Uneven progress towards clean electricity (2023)

According to the graph, at this stage, the share of clean energy in the EU energy system is about 60%, which is quite high. However, the EU leadership, within the framework of the general trend of sustainable development principles, plans to fully switch to clean energy sources by 2040 and provide 100% of demand

with it. At the same time, the share of outdated, carbon-intensive energy sources, on the contrary, should be constantly decreasing. Figure 2 shows the factual indicators for energy production from non-environmentally friendly fossil fuels and the EU's plans to reduce this dependence.

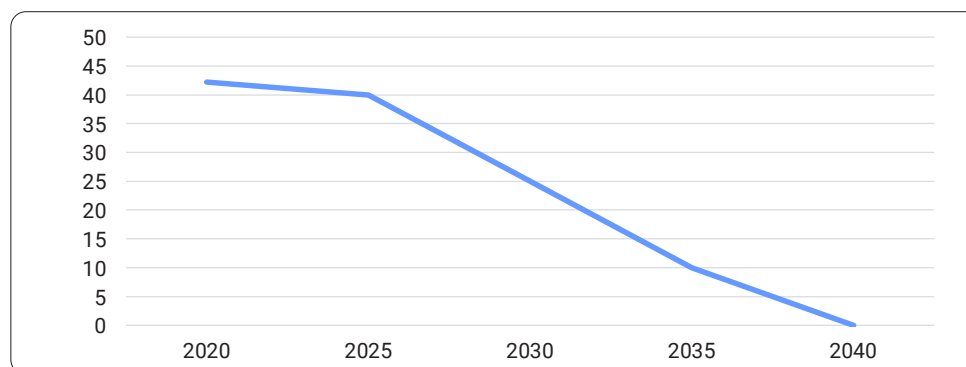


Figure 2. Energy production from fossil fuels in the EU, fact and forecast, %

Source: compiled by the authors of the study based on Europe: Uneven progress towards clean electricity (2023)

As Figure 2 shows, while at this stage the EU has to meet about 40% of its energy needs with outdated and harmful carbon sources, such as oil and coal, by 2040 the EU countries plan to completely abandon them in favour of renewable clean energy. Until February 2022, Ukraine also created linear schedules for the gradual transition of the power system to a circular basis, but with the outbreak of full-scale military aggression and the increase in the area of the temporarily occupied territories, other sustainable development tasks became more urgent. Specifically, completely destroyed houses and entire towns, contamination of arable land, and the forced relocation of hundreds of thousands of people have become an additional challenge to the circular economy in Ukraine. On the other hand, it is in the context of the country's upcoming post-war recovery that large-scale circular economy programmes will be in great demand and Ukrainian projects could become a centre of gravity for the entire European system of sustainable development (Subačienė *et al.*, 2023).

The introduction of digital technologies will play a significant role in optimising these processes. For instance, the Ministry of Digital Transformation, in coordination with the State Statistics Service, is creating a special analytical platform using artificial intelligence for quality management decisions (Ministry of Digital Transformation of Ukraine, 2023). The system, called Government BI, will be able to handle large amounts of data and enable government agencies to consider relevant information when making decisions. In the future, it is planned to create an integrated Big Data system where all information from government agencies will be integrated, which will prevent logical errors and substantially accelerate decision-making on Ukraine's reconstruction.

Within the framework of the activities of the special working group "Digitalisation", established under the

auspices of the National Council for the Reconstruction of Ukraine from the Consequences of War (2022). According to the analytical data provided in the document, before the start of the full-scale aggression, Ukraine was a leader in the development of open data in Europe and was ranked 6th in the European Open Data Maturity ranking in 2021. Furthermore, the level of 4G mobile internet coverage in the populated areas reached almost 90%, which also placed Ukraine among the world leaders in digital integration. However, in February 2022, with the outbreak of full-scale hostilities, the digital infrastructure faced severe challenges. As of 1 June 2022, 22% of optical networks and almost 11% of mobile phone towers were destroyed, and in 2023, several frontline cities were completely destroyed along with the entire infrastructure. Furthermore, the large number of IDPs has caused an increased demand for the services of administrative service centres, specifically, the restoration of documents, recording the circumstances and timing of displacement.

The restoration of all essential elements of the digital economy is a prerequisite for the country's post-war reconstruction and further implementation of sustainable development programmes. The aggressor's actions have demonstrated the system's vulnerabilities, which need to be strengthened within the framework of the creation of an updated cybersecurity structure. These key elements include the competencies of management and staff, metrics for measuring the level of cybersecurity of organisations, algorithms for behaviour in emergency situations, and protocols for data transmission, storage, and processing. Thus, the renewal, improvement, and relaunch of Ukraine's digital infrastructure will be an essential element in the further development of the country's circular economy. Apart from purely digital aspects, the war has a critical negative impact on the environmental situation. Waste generated by the

destruction of physical objects has reached a scale not seen in Europe since the Second World War. Blown up and burned buildings, communications, contaminated water bodies and agricultural land represent a major environmental problem that Ukraine will need to address in the future to return to the goals of sustainable development and the concept of a circular economy (Szaryszová *et al.*, 2023). The volume of war waste, including that from destroyed military equipment and burnt buildings, is so large that it is even causing certain climate changes.

The introduction of circular economy principles during martial law is not only appropriate, but also necessary, as the implementation of these processes will reduce the burden on the resources of the warring country and further stimulate the movement towards sustainable development goals. Another aspect of the impact of the aggressor country's attacks is the targeted destruction of Ukraine's energy system in 2022-2023. The lack of electricity and heat caused by missile and drone strikes forced citizens to buy petrol and diesel generators, flashlights with large batteries, and powerful batteries. As a result, air pollution in cities has increased substantially, and many new appliances with toxic content have not always been recycled or disposed of properly. Waste from the damage and destruction of urban and rural infrastructure, residential buildings, and enterprises is also a serious environmental problem (Reshetilov, 2022). In an interview with Ukrinform, Oleksii Chernyshov, Minister of Communities and Territories Development of Ukraine, said that as of June 2022 alone, about 120 thousand private households and more than 20 thousand multi-storey buildings had been damaged or destroyed, and this number is growing almost daily (120,000 private and..., 2022).

To effectively manage war waste, Ukraine has developed a range of regulations and, with the help of partners and donors, is taking steps to clean up the de-occupied territories from the consequences of the occupation, such as landmines and infrastructure destruction. The key stages of implementing a circular economy, considering the realities of war and post-war reconstruction, are declared in the Law of Ukraine No. 2320-IX "On Waste Management" (2023). The reform primarily involves the implementation of a model that favours the reuse of resources. The priority is to recycle, replace components, and increase the service life of goods. Most developed European countries started waste sorting processes several decades ago, and their experience is crucial for Ukrainian realities – cooperation and exchange of best practices with the UK, Sweden, and Germany will help avoid many mistakes and misconceptions on

the way towards a circular economy (Shubalyi *et al.*, 2023).

According to the Ministry of Environmental Protection and Natural Resources of Ukraine (2024), before the start of the full-scale war in Ukraine, only 5.6% of solid household waste was recycled, another 1.5% was incinerated, and the rest, i.e., almost 93% of waste, was taken to landfills, which caused substantial environmental damage. Following the legislative substantiation and launch of the waste management reform, the industry introduced a clear management hierarchy, decentralised key functions and established new, more environmentally friendly standards for landfill operations. The updated financing principles contained in the National Waste Management Plan should be emphasised separately – now there are transparent and attractive financial instruments for investors, which should attract additional funds for infrastructure development. In the future, it is planned to set up cluster-type waste recycling plants in the regions, which should finally bring the solid waste management sector to the circular economy.

A very telling example of waste recycling is directly related to the assistance provided to the Armed Forces of Ukraine: after the technology was mastered to turn the charging units of disposable e-cigarettes into systems for dropping ammunition from drones on the enemy, points were opened across the country, often by amateurs, to collect charges from disposables. K. Sergatskova (2022), in her interview with the co-founder of the sorted waste recycling station "No Waste Ukraine", provides several other examples of increased waste recycling during the war, including the procedure for creating temporary mobile waste shredding stations for waste from the destruction of buildings and promoting a culture of waste sorting among the population. Such promotion should cover all segments of the population, starting from childhood – even board games can act as a means of communication. The No Waste Ukraine project, for instance, offers its customers a game for the whole family called Sorting Against Garbage Trucks, which aims to introduce the principles of the circular economy to even the youngest Ukrainians.

However, to obtain up-to-date information on the implementation of circular economy principles at enterprises during the war, it is necessary to contact the management of Ukrainian production facilities directly. Within the framework of this survey, a questionnaire with three questions was sent to the managers of 100 large enterprises. In the first question, industry experts were asked to assess the impact of full-scale hostilities on the state policy on resource recovery on a 10-point scale. The answers were distributed as follows (Table 1).

Table 1. Assessing the impact of war on state policy towards the circular economy

Assessment	Number of such assessments
10	12
9	15
8	8
7	15
6	10

Table 1, Continued

Assessment	Number of such assessments
5	12
4	4
3	5
2	0
1	1

Source: compiled by the authors

Generally, there is a high average assessment of the state's actions to support the principles of sustainable development even during hostilities. The second question asked the managers of Ukrainian manufacturing enterprises to subjectively assess the implementation of circular economy programmes at their company after February 2022. More than half (55 respondents) said that recycling measures are integrated into existing production processes and, accordingly, continue to be carried out without changes. In 23

questionnaires, it was stated that the company was forced to relocate in one form or another and that circular economy programmes were temporarily suspended, in most cases along with production. However, it was noted that the status quo was eventually restored. Another 4 managers stated that they were forced to stop recycling activities. The scores on the 10-point system for the impact of digital technologies on production, which were included in the answer to the third question, were distributed as follows (Table 2).

Table 2. Assessing the relationship between modern digital technologies and manufacturing

Assessment	Number of such assessments
10	20
9	26
8	5
7	8
6	8
5	10
4	1
3	0
2	3
1	1

Source: compiled by the authors

As the table above shows, the representative group directly responsible for the production processes of the warring state is overwhelmingly convinced that Ukraine's further sustainable development depends on modern digital technologies. Thus, it can be summarised that despite the full-scale hostilities and the environmental problems caused by them, the circular economy continues to function in Ukraine. Moreover, paradoxically, the current critical situation in some areas stimulates further approximation to the principles of Ukraine's sustainable development and European integration.

Discussion

As the results above suggest, the issues of the circular economy and sustainable development goals are critical in the modern world, especially in countries whose economies are experiencing the impact of the crisis. However, even developed countries' industries require substantial resource savings, which will be needed in the coming decades as they phase into the next technological order.

The future of the circular economy, its prospects, the need for recycling and resource conservation have been the subject of research by researchers from around the world,

which once again underlines the global significance of these issues. V. Obrenovic *et al.* (2023) proved the ability of companies to maintain their operations and economic efficiency even during military conflict or political instability. In the face of resource constraints, organisations can improve their economic position by diversifying their sources and learning to manage environmental constraints, as discussed in the present study.

F. Treffers (2023) also discussed the scale of the destruction in Ukraine, the statistics of which were cited above. The researcher sees a certain potential for reconstruction in the current critical situation, primarily in the context of urbanisation principles. Carefully planned cities with modern residential complexes and comfortable public spaces should be built on the principles of sustainable development on the site of destroyed settlements and districts. B.S. Zellen (2022) considers the war in Ukraine and the related challenges to the circular economy as an obstacle to the work of the Arctic Council. The researcher believes that the actions of the aggressor country, which carried out an unprovoked attack on a neighbouring country and destroyed entire cities along with their inhabitants, cannot be ignored when it comes to climate change. At the

same time, considering the facts presented in this study, it is unacceptable to encourage a terrorist, and the boycott of the Arctic Council by seven democratic countries since March 2022 is justified and necessary.

G.E. Halkos & P.S.C. Aslanidis (2023) discussed difficulties with access to energy and the energy crisis caused by the war in Ukraine. As renewable energy prices are volatile in times of crisis and inflation adds to the uncertainty, solutions must be found to protect the population from energy poverty. Such instruments may include "green support" from the state, national projects, subsidies for renewable energy producers, and legislative initiatives. The present study provided examples of such laws regulating waste management. According to M.Z. Chishti *et al.* (2023), the full-scale brutal war in Ukraine has affected not only the energy market, as noted above, but also the agricultural sector and the metal market. Specifically, due to the war and the decline in metal production by Ukrainian producers, the global aluminium and copper markets are expected to experience noticeable losses in various quantities, and global grain prices could rise substantially due to the contamination of considerable area of arable land in southern Ukraine by war waste. These negative consequences of war also challenge the principles of sustainable development and require global mechanisms to address them (İsmayilov *et al.*, 2022).

Following S. Makdisi & R. Soto (2023), who investigated military conflicts in the Arab world, post-war reforms considered in the economic agenda should be based on several preconditions – reducing inequality, promising and transparent investment, and a significant reduction in unemployment, especially among young people. Furthermore, a post-war society that has experienced forced restrictions on rights and freedoms usually tends to seek a new form of social contract based on the principles of democracy. This experience will need to be considered during the post-war reconstruction of Ukraine. It is also important to be guided by the global principles of sustainable development (Urban *et al.*, 2023). Generally, 80 years have passed since the last military conflict that took place on Ukrainian soil. Since then, the economics and logic of war have undergone substantial changes, and it is therefore important to investigate the experience of countries that have undergone war in recent history – Israel, Croatia, and Iraq.

The history of the reconstruction of the state of Israel in the 20th century made the leadership of the Israel Defense Forces (IDF) a permanent consultant in most economic decisions – limited resources and the need to constantly maintain the country's defence capability at a high level gave the army a voice even in matters of the circular economy. Y. Fried (2023) notes that, given the mental and value differences between Israelis and their traditional enemies, the IDF creates civil-military planning units to assess the potential of such areas of the national economy as morale, education, civil defence, resource conservation, and the circular economy. Unlike Israel, Croatia's military experience is a thing of the past, and over the 30 years since the

war, the country has fully integrated into the community of developed European countries. However, according to M. Barić & M. Alić (2021), there are still difficulties at the level of society in the transition from a linear to a cyclical model of the economy, which are manifested, specifically, in the unwillingness of some citizens to sort waste. Analogous problems, as noted in the present study, are noticeable in Ukrainian society.

B. Neimark *et al.* (2023) addressed the problem of contamination of territories with war waste in Iraq. During 2003-2008, coalition troops conducted combat operations in the country and demonstrated all the negative environmental consequences of modern warfare. For instance, the carbon emissions from the construction, transport, and installation of 412 km of blast-resistant concrete walls in Baghdad were ten times higher than the permissible standards. Moreover, after the end of the acute phase of the war, the barriers themselves also turned into harmful construction waste. Ukraine should use this experience to plan further disposal of protective structures.

The negative impact of the war in Ukraine is being felt around the world. The pollution and mining of arable land discussed in this study puts some African countries at risk of famine. D. Mhlanga & E. Ndhlovu (2023) note that Africa is currently experiencing food and energy shortages and, consequently, rapid inflation. All this is moving the continent further away from achieving sustainable development goals. Climate initiatives are also under attack – F. Qureshi & M. Abdul Kamal (2023), describing the key factors of uncertainty, include hostilities as one of the most influential. Another dimension of the dependence of the circular economy and, consequently, the Sustainable Development Goals, on military operations is the resource dimension. S. Wang *et al.* (2023), having investigated the relationship between natural resource income and economic growth, proved that in the modern world these concepts may have an inverse relationship. Exploring a similar topic, M. Ali *et al.* (2023) also concluded that the surge in oil and gas prices that occurred at the beginning of the large-scale invasion led to an increase in coal consumption, which worsened the environmental situation and delayed the achievement of sustainable development goals.

Thus, the analysis of the global scientific literature shows that the war in Ukraine is a factor that affects the development of the entire global system, both economic and social.

Conclusions

This study proved that in the modern world, a circular economy is a basic condition for the entire system of sustainable development. Given the scarcity of resources, only those countries that have mastered the principles of recycling will be able to develop steadily. Despite a range of fundamental challenges related to full-scale aggression, Ukraine manages to combine military operations and the liberation of the temporarily occupied territories with the support of circular economy principles.

The most devastating war in the last eighty years has had a substantial impact on the environmental situation in Ukraine: carbon emissions from destroyed buildings and equipment, land and water poisoned by oils and combustion products, thousands of hectares of mined agricultural land, and the consequences of the occupiers' blowing up the dam of the Kakhovka Hydroelectric Power Plant. However, despite the extremely difficult situation, the country does not abandon the principles and goals of sustainable development, the necessary institutions are being formed at the state level, laws are being passed, waste recycling programmes are in place, and various segments of the population are involved in waste sorting. Managers and owners of Ukrainian manufacturing enterprises, acting as primary sources, also overwhelmingly confirm the sustainable state policy on the circular economy and the relevance of recycling measures.

Ukraine, which has faced military aggression, can paradoxically become a European leader in implementing the

principles of the circular economy, as many things will be rebuilt almost from scratch during the post-war recovery. For instance, towns and villages completely destroyed by the aggressor will be rebuilt immediately, considering all modern principles of urbanism, ecology, energy saving, restoration, and sustainable development. The competitive advantage of such new smart cities over other European analogues will be the construction from scratch, rather than the reorientation of existing infrastructure. The development of preliminary planning for such ecological settlements that fully comply with the principles of sustainable development may be the subject of further research.

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Conflict of Interest

None.

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Анотація. Дефіцит ресурсів у сучасному світі зумовлює необхідність реорганізації традиційної лінійної економіки в нову, циркулярну модель економічного розвитку, і ця вимога є ще більш актуальною для країни, що перебуває у стані війни. Метою цього дослідження було довести необхідність і можливість досягнення цілей сталого розвитку навіть в умовах кризи на прикладі України. За допомогою таких методів, як статистичний аналіз, порівняння та синтез, було досліджено динаміку сталого розвитку в Європейському Союзі та Україні. Крім того, за допомогою онлайн-опитування було проведено інтерв'ю з відповідними експертами. У ході дослідження було отримано та проаналізовано статистичні дані щодо переходу європейських країн на чисті джерела енергії, проведено детальне дослідження чинної законодавчої бази та державних інституцій України, пов'язаних з утилізацією відходів війни, посиленням діджиталізації українського суспільства, а також вивчено заходи з циркулярної утилізації відходів воєнного часу. Також було проаналізовано статистичні дані щодо фактичного руйнування та забруднення довкілля внаслідок воєнних дій та тимчасової окупації окремих територій. Крім того, було зібрано та систематизовано інформацію від керівництва українських виробничих підприємств щодо фактичного впровадження принципів циркулярної економіки під час війни. Аналіз отриманих даних дозволив зробити висновок, що криза лише посилює потребу в економії ресурсів. Практичне значення дослідження полягає у доведенні безальтернативності цілей сталого розвитку в майбутньому та підкресленні конкурентних переваг України у цій сфері під час післявоєнної відбудови. Ці пропозиції будуть корисними для приватних інвесторів, які можуть вигідно фінансувати майбутнє відновлення України відповідно до принципів циркулярної економіки

Ключові слова: чиста енергетика; цілі сталого розвитку; забруднення територій; відходи війни; діджиталізація суспільства; повоєнна відбудова

A meta-analysis on private equity technology-driven value creation

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Abstract. A meta-analysis on private equity technology-driven value creation acquires special relevance for understanding the most effective ways to increase earnings before interest, taxes, depreciation and amortization. The goal of this research is to evaluate the diverse technology value creations used to increase earnings before interest, taxes, depreciation and amortization. The research used the methods of analysis, systematic search procedure, coding, assessment of methodological quality, statistical analysis. As a result of the research, the impact of reducing IT costs, improving operations using technologies and implementing digital technologies on the growth of earnings before interest, taxes, depreciation and amortization was proven. In addition, it is established that the use of enterprise resource planning systems contributes to the improvement of the system, as well as to the increase of automation. In turn, this improves operations and process reengineering. Emphasized the vital importance of digital capabilities as a strategy used by most private equity firms in today's world. These opportunities involve the implementation of transformations that contribute to the growth of profits and income. It was established that the growth of income affects the increase of indicators of earnings before interest, taxes, depreciation and amortization by at least 10%, which in the context of divestiture ultimately increases the value of investments. The results of the conducted research can be useful for private equity firms in view of revealing opportunities to use technology to stimulate and create value

Keywords: investment; interest; cost reduction; digital capabilities; automation

Introduction

Private equity (PE) firms are the key participants in the process of managing and investing financial resources. The main goal of PE firms is to increase the value of the companies in which they invest. After achieving this goal, PE firms usually sell their investments. The operating performance is a vital cog in value creation and can be realized through

the use of technology-driven value creations. The introduction of technology has fundamentally altered the manner through which PE firms do businesses as it aligns them towards efficiency gains. K. Lee & T. Roh (2020) study the impact of proactive divestiture of investments on the process of the company's investment activity. The researchers

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highlight that firms often divest their business with the aim of reconfiguring their asset portfolio and reducing debt. D.P. Stowell & P. Stowell (2024), exploring the fundamentals of PE, reveal the essence of reactive divestiture, which means a situation when the company divests solely due to external and internal pressures. J. Scharfman (2020) discusses key terms related to direct investment. The work of the researcher contains an overview of specific PE operations. J. Verbouw *et al.* (2021) investigate the impact of PE on their portfolio companies. The study focuses on the impact on operational activities, as well as employment after the buyout. T.S. Lohwasser (2020) studies the relationship between the attraction of venture capital, on the one hand, and the efficiency of financial firms, on the other. Among other things, the study determined whether venture capital providers can provide additional value beyond the provision of financial resources.

Blackstone expatiates that the life cycle of a PE fund is usually ten years but it can stretch to a maximum of 15 years at most (Blackstone, 2020). The life cycle only starts after the PE has raised the substantial capital in fund level from its investors or limited partners. The raising capital and development of a team occurs in the first and second years. The overarching aim of PE is to lure in investors until it reaches its funding target. A team is then created and tasked with investing and managing the portfolio entities.

The goal of this research is to estimate the different technology value creations which are used to increase earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) namely IT cost reduction, tech-enabled improvement of operations, and digital enablement. The research objectives are to identify initiatives for reducing IT operating expenses, examine the role of the Chief Information Officer/Chief Financial Officer (CIO/CFO) organization in improving EBITDA, and explore the impact of IT cost reduction on business operations.

Materials and Methods

The meta-analysis helped in the identification of the range of studies that focus on a relevant topic. Through the use of analysis, the researcher was able to overcome the limitation of small sample sizes in the individual studies, to reduce the false-negative results, to bridge the existent dearth of knowledge prevalent in PE operations studies, to identify areas that lacked adequate evidence, to overcome problems and biases of conventional systematic and narrative reviews through the application of a subjective and transparent process.

The meta-analysis implemented the use of a systematic search procedure which helped in the identification of empirical studies, opinion papers, literature reviews, journal articles that explored the various ways through which value is created through technology. The first step in the search process was marked by the use of key terms and concepts which expressed similar index terms and

keywords. The second step in the search process focused on the analysis of the reference sections of the papers that were retrieved in order to identify other studies which fit the framework. The third step involved contacting researchers and authors who were yet to publish their seminal works which were related to the topic at hand. All through the search and refinement process, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement were used.

The studies derived from the refinement process were then read, analysed, and coded. An advanced coding scheme contained divergent bits of general information ranging from CIO and/or the Chief Operating Officer (COO) involvement, effect, and moderator size as well as PE and portfolio performance. In a bid to capture the differences between the studies, the researcher coded the Pearson product-momentum correlation coefficients and the bivariate factors. The methodological quality of the research was evaluated through the use of the JBI checklist for systematic reviews and meta-analyses. The tool was effective as it provided a new view on what articles count as evidence and the various methods that are used to synthesize the divergent types of evidence.

The analysis of operational value creation in the divestment context focused on three dimensions: IT cost reduction, tech-enabled improvement of operations, and digital enablement, all of which were commingled with the EBITDA dependent variable. For all three variables, the researcher measured the impact on EBITDA based on the application of technologies. The measurement of the independent variables helped in the mitigation of any potential biases. The researcher adopted a random-effects model for the meta-analysis of the differences between the sample studies. The random-effects method helps in determining the variations in the studies by checking whether there are any related intervention effects. For the moderators, the researcher utilized meta-regressions and subgroup analyses. The meta-regressions on the random-effects model permitted the researcher to avoid artificial dichotomization through the inclusion of all three moderator variables.

Results

Blackstone (2020) highlights that the raising capital stage is the most defining phase as it determines the resourcefulness, aptitude, and capability of the PE. The second stage in the lifecycle is the sourcing of deals which takes between two to five years at most. During this stage, the PE stages the time horizon through capital calls, investment periods, and the harvest period. The PE begins to incrementally call the capital after the limited partners have committed capital during the initial stage. The capital is then deployed through investment opportunities that are selected by the general partner from years three to five as highlighted in Figure 1. PEs are required to create records of the performance rates in order to determine how the investment returns can be accentuated as per the investor expectations.

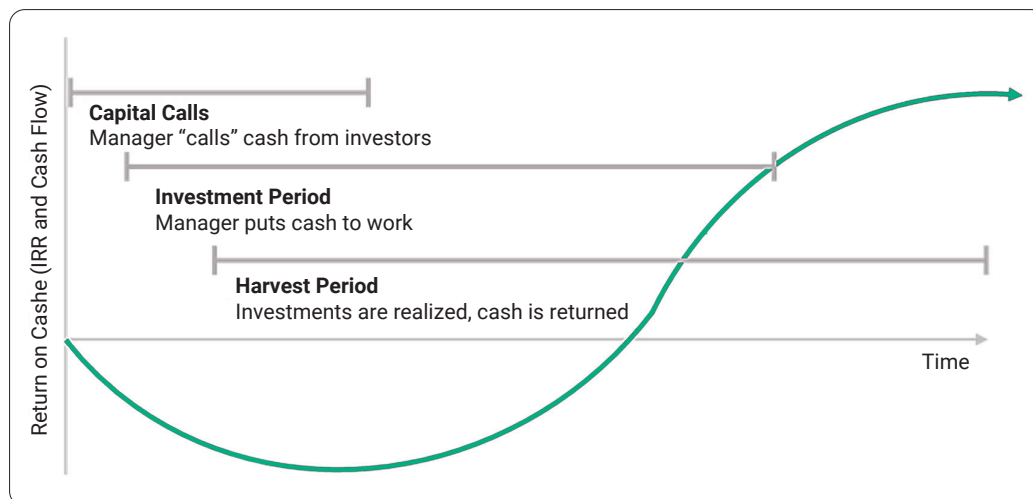


Figure 1. Private equity fund lifecycle

Source: compiled by the author based on Blackstone (2020)

The third stage is the harvesting period whereby the fund returns the cash to the investors after the investments have been realized. The harvesting period occurs between years five through eight or nine. During this period, PE has to analyse performance using the J-curve effect. The curve defines the potential performance experience of an investor all through the life cycle. Investors dole out capital

in the initial years while also paying management fees. The deployment of capital by the fund can lead to negative returns since the expected performance rates are not enough to settle the fees (Jules *et al.*, 2021). On the contrary, returns are bound to improve over time because the investments are inherently successful. Figure 2 shows the J-curve effect at work.

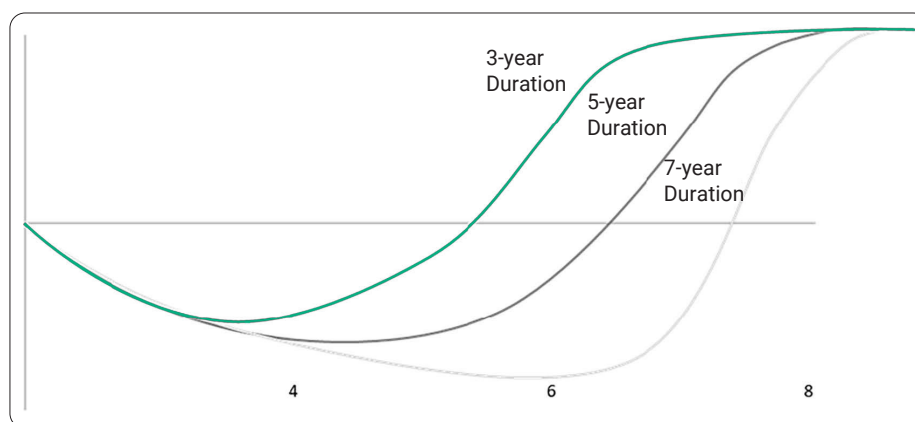


Figure 2. J-curve effect

Source: compiled by the author based on "The life cycle of private equity" (2020)

The final stage is exiting the market or investment with the time frames varying. The final phase is marked by divestment whereby the PE firm realizes profits and values in monetary terms. Researchers adumbrate that the exit can occur in six months after the investment in the case that the right economic conditions and strategic buyers are present. On the contrary, the exit can take up to ten to 15 years if the economy is not performing as expected (Wirtz, 2010; Møller & Sørensen, 2019). A good exit is one that contains a myriad of buyers who exhibit heightened demand for the portfolio. This minimizes situations whereby PE funds are forced to sell or hold fire sales.

The divestment context serves as the crux for this paper. Traditionally, the context has been focused on serving as a financial tool and mechanism that improves the efficiency of a firm. By definition, divesting is the process through which an organization sells off its assets. Moreover, understanding the context is key in mitigating the impact of retreating errors that can influence the strategic purposeful action of a PE fund. During the divestiture process, PE funds often follow a series of steps. The first step is the monitoring of the portfolio with every business unit being evaluated based on its relevance to the long-term business strategy. This is followed by buyer identification after the

business unit has been flagged for divestiture (Haynes *et al.*, 2002; Wetzer, 2017). The success of the deal is reliant on the identification of a viable buyer. The identification process further comes in handy in the extraction of value from the divestiture which sets a price for the portfolio. The price should be equal to the opportunity cost that might be incurred if the PE firm decides to hold onto the business unit.

The divestiture is performed in the third step with a myriad of aspects being involved. The PE fund determines legal ownership of the business unit after which valuation is conducted. Thereafter, the PE fund manages the transition by evaluating the strategy and the costs incurred. All through the four steps, PE funds are allowed to either act proactively or reactively to divestiture (Fig. 3).

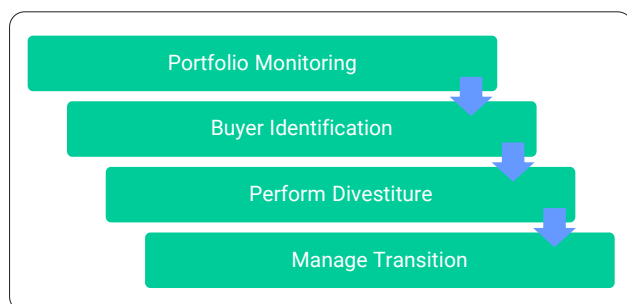


Figure 3. Divestment context steps

Source: compiled by the author

Reactive divestiture is defined as a situation where the company divests solely due to external and internal pressures like low profitability (Suciani & Setyawan, 2022). The reactive response is brought about by heightened reluctance on the portfolio on whether it can generate the requisite cash flow and also bring market advantages. Instead, firms are forced to divest in the last phase whenever there is an increase in financial pressure and a decrease in company performance.

There are numerous valuation models in existence that can be used to determine the profitability or performance of a company. The best fit method, however, is the Comparable Company Analysis which drives the notion that similar entities in the same industry have similar multiples. The valuation process requires researchers to search for similar companies to the target valuation and check the value using firm multiples. It is also marked by the identification of the operations, industry, and size of the organization. This helps in the establishment of a peer group of entities that share similar characteristics. The multiples of every company are collected and then the industry average is calculated. The EBITDA multiple is often used as it explores the net income of an organization adjusted for amortization, depreciation, taxes, and interests. F. Müller (2010) argues that the EBITDA serves as an approximate measure of the company cash flow with the preferred formula (1) being:

$$\begin{aligned} \text{Value of target firm} &= \\ &= \text{Multiple (M)} \times \text{EBITDA of the target firm}, \end{aligned} \quad (1)$$

where M – enterprise value average of comparable firms; EBITDA – for the target firm which is oft predicted for the next 12 months.

The EBITDA is important in PE as it aligns with the ameliorative mandate of funds which is to create value. The value creation process is conducted through the implementation of changes that help improve top-line revenue as well as operating efficiency. The EBITDA predictions allow PE funds to deviate from relying on clever deal structuring, multiple arbitrages, or even financial engineering. Even though the aforementioned strategies can generate returns, they expose the PE fund and portfolio companies to a myriad of risks such as declined ability to achieve the target return in the case that the pre-investment assumptions do not go according to plan.

IT cost reduction is at the core of value creation in the divestment context by most PE firms. IT cost reduction is termed as the process through which sources of waste, underutilization as well as low business values are identified and eliminated. The reduction process is geared towards yielding savings which can reduce the IT budget size while reinvesting resources into other areas in a bid to drive business growth after divestment. The technology-driven value creation allows PE firms to identify initiatives that can reduce information technology operating expenses such as sourcing optimization. Sourcing optimization involves the introduction of schemes that make the best use of a resource or situation (Dalal, 2022; Hammer *et al.*, 2022). The sourcing optimization allows companies to find the most effective resources, cost, and quality as well as time restrictions.

With sourcing optimization, PE firms will be able to increase savings potential, accentuate collaboration and transparency, increase adoption rates well as enhance strategic insight and control. The optimization evaluates drives of infrastructure costs across the fund and portfolio level with underutilized assets being retired (Kaplan & Strömberg, 2009; Lee, 2019). IT cost reduction processes focus solely on optimizing IT costs, rather than other costs or revenue. The focus allows the PE firm to create a nexus between the decreased IT costs and increased EBITDA. Furthermore, they are oft driven by the CFI/CIO with minimal impact on business operations being recorded. Instead of this, this type of value creation serves the following hypothesis: H1: reducing IT costs is crucial in creating value and enhancing EBITDA for Private Equities when evaluating for divestment.

PE firms can create value through information technology system enhancements that increase automation and drive operational improvement. For instance, the adoption of enterprise resource planning (ERP) systems improves business performance and operational efficiency during proactive divestment. Operating efficiency helps PE firms determine the ratio of the business output and input ergo gaining insight on the overall system performance (Leslie & Oyer, 2009). In light of this, PE firms are able to allocate set resources which optimize the portfolio outcome. They are also able to reduce the resources that are required in

a bid to execute proficient functions. Proactive divestment permits PE firms to conduct process re-engineering which aligns the entities with new system functionalities. The primary focus is to optimize the other costs which create a positive EBITDA for the organization. The CFO/CIO is at the helm of the reengineering process as they place a high standard that helps promote efficiency and functionality. Additionally, the management cross-examines operational costs with the peers in a bid to determine the position of the PE firm. Every system is assessed in terms of functionality and its role in increasing the other costs incurred. The guiding hypothesis therefore is: H2: Tech-driven enhancement of operations is used in value creation and rising EBITDA and reducing other costs for Private Equities when evaluating for divestment.

Digital enablement is a form of value creation that explores the divergent strategies that utilize technology in a bid to improve the reach, performance, and operational efficiency of an entity. The main aim of the technologies is to create flexibility and ease through the streamlining of processes. Furthermore, they improve data management and stakeholder communication all of which are connected to the organizational revenue (Schnellbacher & Weise, 2020). The value creation strategy requires PE firms to incorporate new digital capabilities and initiatives that improve top-line growth and accentuate customer engagement. PE firms are required to plan an onboarding process that modifies the structure of the portfolio and its operations. Furthermore, the plan has to communicate the core message with new interaction models and interfaces being introduced for the teams.

The organization has to be aligned around the new processes and goals prior to valuation. This can involve the use of a lean governance model that supports the increased pace of digital structures. Digital enablement takes into account source optimization and returns on investment. A good digital enablement program reduces the cost and time taken when adopting new technology (Jafari, 2014;

Hersh, 2018). Moreover, it minimizes reliance on information technology teams and improves the ability of a firm to attain high EBITDA. The lack of a digital enablement strategy means that a company will be unable to oversee the digital transformation. Digital enablement value creation is touted by practitioners as a holistic approach that enables entities to champion digital excellence and attain greater agility which ultimately scales the business faster (Dutta & Folt, 2016; Dent *et al.*, 2021). The adoption of new business models requires direct input from the Head of Strategy at the PE firm. Furthermore, the digital enablement process is marked by the introduction of initiatives that span multiple business functions and are transformative by nature. The focus of the digital enablement value creation scheme is on revenue which has to be optimized in a bid to increase the EBITDA: H3: Digital-driven initiatives are applied in value creation and rising EBITDA/revenue for Private Equities when evaluating for divestment.

The success and ingenuity of a meta-analysis are determined by its ability to determine the effects that moderate results. The guiding argument is that during the investment lifecycle, PEs aim to increase EBITDA to improve valuation in the divestment context. The PE entities often use three technology-driven value creations namely IT cost reduction, tech-enabled improvement of operations, and digital enablement. The three all act as moderators in the research collection process. The general structure of a PE firm contains a fund and company level as shown in Figure 4. At the fund level, general partners control the company operations through their investment fund. The general partners receive interest and a predefined fee for their role in managing the investment fund (Axelson *et al.*, 2013). The monies found in the investment fund are raised from limited partners. Figure 1 highlights that the PE firm commits capital to the investment fund which generates returns of the investors or limited partners. The investors then agree on a fee with the general partner for the management process.

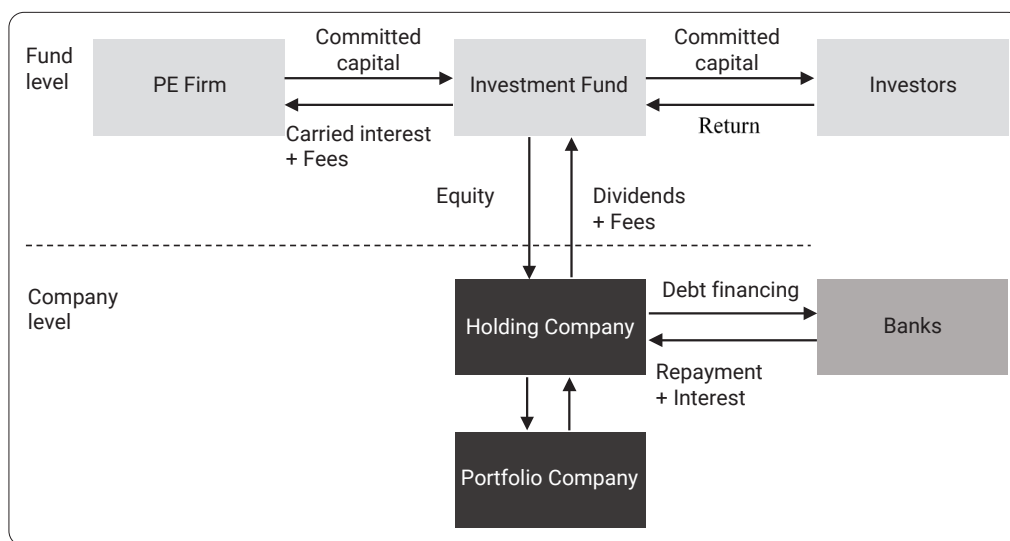


Figure 4. Structure of private equity firms

Source: compiled by the author based on D. Schlegel (2019)

The company level in the structure contains the holding and portfolio companies as well as the banks. D. Schlegel (2019) expatiates that PE firms often locate the portfolio companies at the company level after which a holding entity is created and funded with equity prior to acquisition. The funding process can also include the use of debt from banks in the form of debt financing. The holding company then acquires the portfolio company and uses

the revenue accrued to pay for the interest incurred in the form of debt. Moreover, PE firms have a tendency of outperforming the market through the creation of an alpha. The creation process relies on the firm's ability to tailor its processes based on market conditions. The tailoring process involves the use of a valuation model which takes into account three input factors namely the multiple, EBITDA, and net debt as shown in Figure 5.

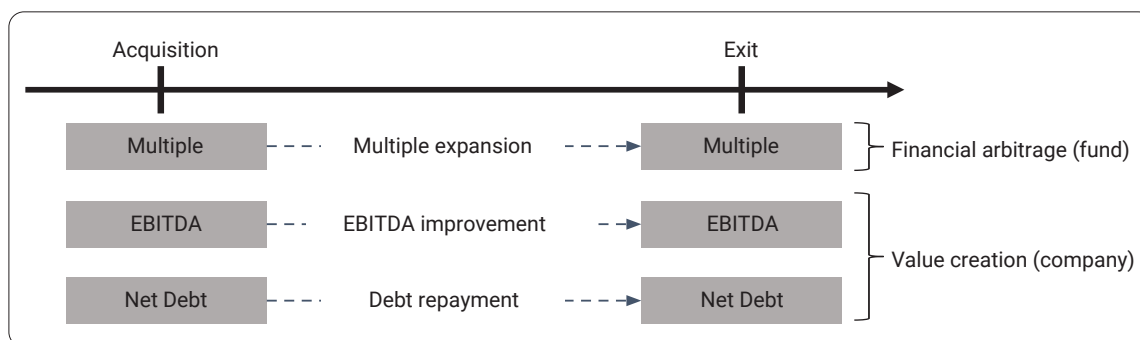


Figure 5. Value creation analysis

Source: compiled by the author based on D. Schlegel (2019)

D. Schlegel (2019) indicates that an influx in the multiple causes a multiple expansion. The expansion is marked by the purchasing of security at low levels of valuation multiples after which it is sold at a higher valuation multiple. The overarching aim of the multiple input is to accentuate the operational efficiency and cash flow generation during an investment lifecycle. Furthermore, it aids in monitoring the current valuation multiples and determining the best exit time for the PE firm (van Binsbergen *et al.*, 2011; Biesinger *et al.*, 2020). From an economic perspective, the multiple expansion occurs as a result of top-tier negotiation skills as well as positive market timing. Furthermore, it is an indicator that the PE fund has attained a high sales price per unit of profit for the entity compared to the original purchase price. In lieu of this, the value is derived at the fund level instead of the company level which is classified as a financial arbitrage.

The meta-analysis synthesized at least 50 samples from 14 independent studies written in the past 30 years. The researcher noted that the aggregate sample size is set at 100 entities all of which are correlated to the three hypotheses mentioned area. Despite the apparent lack of knowledge about technology-driven value creation, most

of the studies do provide a sense of scale to the research topic. Many of them explain the link between technology and value creation as well as how it improves EBITDA and firm performance. The researcher conducted manual analyses into the studies with congruent denotations showing an apparent heterogeneity in the samples even among the ones measuring similar outcome variables. The elimination of outliers helped offer insight into the EBITDA and firm performance effects which varied between -0.53 to 0.80 ergo meaning that at least 50% of the samples were positive.

Generally speaking, the analyses of the hypotheses show statistically significant Cochran's Q data. This confirms that there is an absolute amount of heterogeneity in the studies as shown in Table 1. The I^2 test focuses on the relative level of heterogeneity in the studies with summations highlighting that the amounts are at 72%, 50%, and 80% respectively for the three hypotheses. Finally, the researcher noted that there were non-zero estimates in the between studies variation r^2 thereby confirming the assumption that there is a presence of the moderating effects. In light of this, the researcher alluded that the heterogeneity of studies is largely driven by underlying moderators.

Table 1. Mean effect sizes and heterogeneity strata

	Confidence intervals (95%)	Number of study samples	Aggregate number of firms	Cochrane's Q	I^2	T^2
IT cost reduction	[-0.016; 0.057]	6	25	220.32***	72%	0.0271
Tech-enabled improvement	[-0.02; 0.05]	5	30	87.763**	50%	0.018
Digital enablement initiatives	[-0.016; 0.057]	3	45	178.9**	80%	0.004

Note: I^2 – percentage variation caused by heterogeneity; T^2 – between-study variance

Source: compiled by the author

The results are interpreted in relation to the theoretical framework with the section being structured in line with the hypotheses. In the H1, the studies revealed that PE funds oft implement tech-driven methods like IT expense minimization in order to fuel operational value creation. As shown in Table 2, the results are for the most part support the

hypothesis. The primary focus of enhancing through implementing initiatives that decrease IT operating costs leads to an influx in the EBITDA rates from the current state to the desired one. By implementing initiatives that decrease IT operational costs, there is a rise in EBITDA rates, transitioning from the current state (As-Is) to the desired state (To-Be).

Table 2. Moderating effects

	Cohen's d		
	Hypothesis 1	Hypothesis 2	Hypothesis 3
Published	6	5	3
Measurement controls	Yes	Yes	Yes
Methodological controls	Yes	Yes	Yes
Number of samples	25	30	45
Adjusted R ²	0.219	0.183	0.239

Source: compiled by the author

A random-effects meta-regression was conducted for this hypothesis with the primal emphasis being drawn on the divestment context and the lifecycle of the PE. On the contrary, some of the studies do not even mention the use of sourcing optimization tools to reduce IT costs. In such situations, the researcher labelled the effects as being measured more than the EBITDA rates. There were however positive effect sizes for the EBITDA brought about by the source optimizing strategies and tools as well as CFO/CIO influence.

The tech-enabled improvement of operations is a vital variable for subsequent EBITDA gains (H2). The results from the meta-analysis revealed that there is support for the H2 as the coefficient for the proportion of value creation in the divestment context. Additionally, the studies specify that the sharp increases of EBITDA were set at a solid 20% which increased the expected effect size by 70% from the previous value. Additionally, using previous works of erudition, the researcher noted that there is a positive moderate relationship between the adoption of new tech-

nologies with the EBITDA rates and improved revenues (H3). The individualistic digital enablement initiatives positively moderate the nexus between PE and value creation levels. Even though the initiatives might be risky, one can note that they increase the revenue and overall operating performance. The inclusion of the Head of Strategy and Head of Department in the implementation process comes in handy in attributing success and performance.

Considering the impact of publication bias on seminal works of erudition, the researcher tackled it through a number of strategies. The first strategy involved controlling the publication status of the various samples in every article. This helped narrow down the best-fit articles that fit the mould. The second strategy included the identification of repeat or imitated articles although the results yielded nothing. A funnel plot was used in the analysis process which highlighted that there were some research asymmetries that were not related to the bias but rather the heterogeneity mentioned prior. Table 3 indicates the summary of empirical results for the three hypotheses.

Table 3. Summary of empirical results

No.	Hypothesis	Evidence
H1	Reducing IT costs is crucial in creating value and enhancing EBITDA for Private Equities when evaluating for divestment.	Available
H2	Tech-driven enhancement of operations is used in value creation and rising EBITDA and reducing other costs for Private Equities when evaluating for divestment.	Available
H3	Digital-driven initiatives are applied in value creation and rising EBITDA/Revenue for Private Equities when evaluating for divestment.	Available

Source: compiled by the author

The researcher additionally conducted robustness checks and publication bias analyses aimed at gauging the efficiency of the papers. J. Verbouw *et al.* (2021) indicate that publication bias is brought about by the author's failure to highlight or publish the results of a study based on the strength and direction. This inadvertently undermines the ability of other researchers to accurately synthesize and describe the evidence in the provided scope or area of focus.

Discussion

Using the coding scheme, the researcher narrowed down the results and connected them to the hypotheses and subgroups. The first coding scheme focused on IT cost reduction applied in the divestment context by PE firms. T. Meyer (2014) highlights that the investment environment can be quite challenging with PE firms being forced to implement initiatives that cut down the cost and improve the

value of their portfolio. Suffice to say that the application of sourcing optimization tools has signified a shift from the traditional tool kit for cutting costs and improving processes. The sourcing optimization tools are part and parcel of the digital business model which focuses on value proposition through EBITDA improvement.

W. Schnellbacher & D. Weise (2020) state that sourcing optimization is used in the digitalization agenda of organizations as it determines optimal award allocations through scenario-based analyses and mathematical modelling. In light of this, sourcing optimization helps PE firms analyse events through the provision of instant data. Moreover, it draws comparisons across suppliers, event phases as well as items with various feedback options being provided. PE firms apply sourcing optimization to build and analyses scenarios while being provided with better support for negotiation on the prices. In most cases, the CIO/CFO is included in determining which type or form of sourcing optimization is the best fit for the PE firm. G.H. Smart *et al.* (2000) show that the CFO/CIO enjoys a sustainable relationship that is determined by their abilities and capabilities to execute against their investment theses. The CFOs are required to use their “financial playbook” when conducting IT cost reduction processes (Jules *et al.*, 2021). The playbooks offer insight on how they can drive operating excellence on top of supporting their strategic decisions as the entity grows (Dalmácio & Nossa, 2004).

The PE CFO straddles the line between strategic and operational oversight. Furthermore, they serve as the thought partner across the divisional and functional aspects of the business. The multi-pronged nature of the CFO allows the CIO to glean information and undertake a singular role which is to recommend which areas require technologies that can reduce costs and improve overall EBITDA. The CIO appraises the CFO who acts as the link between the portfolio company and the investors. R.D. Banker *et al.* (2011) indicate that the CIO position has become significant in PE contexts owing to the role played by information technology in influencing the overall strategy of an entity. The CIO acts as a relationship builder as well as a business leader with their clout allowing them to influence the organizational budget. The CFO communicates financial results as well as manages the capital structure issues while interfacing with the company board on strategic issues or matters. In Layman's terms, the CFO has full financial accountability of an entity ergo they directly determine how an investment EBITDA rate can be improved.

The application of IT cost reduction rarely has a major impact on business operations although it tends to be surgical by nature. It allows the company to grow and evolve in new and divergent ways with CFOs and CIOs adopting a build. The mentality aligns the PE firm to appropriately drive major initiatives that are focused on change management. This in turn accentuates a willingness to facilitate continuous improvement that increases the EBITDA while challenging existing ideas. The second part of the coding scheme explored the tech-enabled improvement of operations.

V. Gupta *et al.* (2021) allude that the implementation of IT system enhancements increases automation and instantaneously drives operational improvement. In most cases, the enhancements serve as disruptive technologies which help manage other costs in the organizational context. The technologies merit the reengineering of processes in the PE firms with the aim of aligning them with new system functionalities. Spearheaded by the CFO/CIO, the improvement allows PE firms to carefully manage costs during strong and weak economic periods (Zhang *et al.*, 2021; Vdovenko *et al.*, 2023). Denote that most top PE firms are highly cost-conscious whenever the investment returns are soaring.

Even though the other costs rise during the strong economic periods, the influxes are approximately equal to the investment returns. The variable costs are treated as fixed expenses with the CFO avoiding any strategies or pushes for more spending. During weak economic periods, the cost reduction efforts are accelerated by changing or reengineering the processes. The fixed costs are treated like variable costs which allow for the reduction of other costs. The emergence of Disruption 2.0 has added urgency to the need of managing costs. The integration of technology-enabled processes is momentous in generating productivity gains. V. Gupta *et al.* (2021) cite that the automation of knowledge work addendum to the digitization of supply chains is key in improving EBITDA rates. What is more, the application of industrial internet of things improves predictive maintenance which minimizes both variable and fixed costs in the future. The improvement of core performance also requires measuring the absolute change in EBITDA not deltas in cost. The other costs have to be monitored with the focus being drawn on the unexpected headwinds (Lutz & Achleitner, 2009). The utilization of enterprise resource planning aids PE firms to manage and integrate their financials, supply chain, operations, commerce, manufacturing as well as reporting activities. Y. He (2009) indicates that ERPs have phased out the burden of manual processes through automation. The automated workflows greatly reduce administrative overhead so that the organization can drop more to the bottom line. During the implementation process, however, firms have to keep in mind that the internal processes evolve in an organic manner and are highly reflective of the people at the helm. This correlates with the assertion made prior that the influence of the CIO/COO influences the cost reduction and operational improvement process.

The third part of the coding scheme focused on digital enablement and the various strategies that be used to improve revenue. W. Schnellbacher & D. Weise (2020) introduces digital enablement as a process that helps in the realization of digital transformation through the use of digital tools. Firms that utilize digital enablement are granted the first adaptor advantage. This is because they are accorded a front-line view into how they can improve top-line growth by revamping their business models (Jules *et al.*, 2021). The Head of Strategy or Head of Department is required to undertake tech due diligence when evaluating a new deal opportunity. This means that they have to incorporate key

findings and apply critical thinking while creating a value creation plan that permits them to continue to refine once they have invested. Accelerated technology enablement or adoption is something that most PE firms have adopted in the divestment context. The initiatives have to be designed in a manner that augments existing services while developing new ones. Furthermore, digital enablement is transformative by nature as it prompts PE funds to shift from their fear of changing frontline sales organization, especially in the early periods of the lifecycle specifically the ownership period. The fear causes them to worry about disruptions to the revenue flows.

By applying digital enablement, portfolio companies are able to push the revenue growth past the industry average (Ross *et al.*, 2019). The digital enablement schemes help them determine whether the potential investment or portfolio entity has the right mix of field and virtual sales. The determination process allows them to recognize that virtual sales are becoming increasingly effective. Subsequently, digital enablement sharpens the execution of a strategy by allowing PE firms to adopt play-based selling techniques (Schnellbacher & Weise, 2020). The techniques assist in prescribing how resources will be orchestrated in an organization. At the end of the day, revenue influxes measure the sales of a firm which increases the profitability or EBITDA rates at a margin of 10% or more.

The study makes significant contributions to the current debate on the role of PEs in increasing EBITDA in a bid to improve divestment valuation. First, it quantitatively synthesizes the impact of PE on operating performance and how it can enhance the portfolio companies. Subsequently, it determines the mechanism for transferring value from investors to portfolio companies using information technology. Additionally, the paper contributes to current research by distinguishing the value creation process in terms of medium and long-term processes. Conclusive denotations highlight that while sourcing optimization reduces short-term IT operational costs, strategic reshaping at the start of the PE ownership should take hold in the medium-to-long term (Zeisberger *et al.*, 2016). The introduction of value creation or additional activities like enhanced governance, management assistance, and monitoring can help accentuate performance.

The third contribution made by the paper is the analysis of the divestment context. The context is useful in defining the operations of portfolio companies and how the CIO/CFO organization can help improve valuation and profitability. The paper highlights that the agency theory can be applied in both formal and informal institutional

contexts. The aggregation of extant empirical work, journals, articles, and opinion papers allows the researcher to differentiate among the three technology-driven value creations. The synthesis of empirical findings from research spanning over 25 years allows for the creation of a holistic view of the impact of PE.

Conclusions

The preceding research paper is a testament to how firms improve valuation for divestment towards tech-driven value creation. The study indicates that the application of IT expenses reduction, technology-enabled enhancement of operations, as well as digital enablement, accentuates EBITDA. The IT cost reduction schemes focus highly on the IT costs as the primary focus of optimization. Research denotations show that a decline in IT costs is commingled with an increase in the EBITDA.

The research further shows that the application of ERP systems improves systems and increases automation. This drives operational improvement as well as process reengineering. The reengineering is correlated with a growth mind-set which increases the EBITDA rates substantially. Furthermore, digital enablement is touted as a vital strategy that prompts transformative methodologies that improve growth and revenue. An increase in the revenue accentuates EBITDA rates by at least 10% which then improves the value of an investment in the divestment context. Based on the summary, the research notes that there is an existent dearth of knowledge with regards to the use of technologies in the divestment context by PE firms. This gap might be attributed to the wary nature of PE firms since most technologies are influenced by the economic environment. On the contrary, the research shows that using technology to drive and create value can help PE firms carve out a niche for themselves.

There is a need for future researchers to explore how technology-driven value creation can be applied in the raising capital stage, sourcing of deals, and harvesting periods of the PE lifecycle rather than the divestment context solely. This insight will help improve knowledge and awareness of technology and its role in value creation. Additionally, more seminal works and meta-analyses should be conducted on the research topic.

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None.

Conflict of Interest

None.

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Мета-аналіз створення вартості за допомогою технологій у приватному акціонерному капіталі

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Анотація. Мета-аналіз створення вартості за допомогою технологій у сфері прямих інвестицій набуває особливої актуальності для розуміння найефективніших способів збільшення прибутку до сплати відсотків, податків та амортизації. Метою цього дослідження є оцінка різноманітних технологій створення вартості, що використовуються для збільшення прибутку до сплати відсотків, податків, зносу та амортизації. У дослідженні використано методи аналізу, систематичного пошуку, кодування, оцінки методологічної якості, статистичного аналізу. В результаті дослідження доведено вплив скорочення витрат на ІТ, вдосконалення операцій з використанням технологій та впровадження цифрових технологій на зростання прибутку до сплати відсотків, податків, зносу та амортизації. Крім того, встановлено, що використання систем планування ресурсів підприємства сприяє вдосконаленню системи, а також підвищенню рівня автоматизації. У свою чергу, це покращує операційну діяльність та реінжиніринг процесів. Підкреслено життєво важливе значення цифрових можливостей як стратегії, що використовується більшістю фірм прямих інвестицій у сучасному світі. Ці можливості передбачають здійснення трансформацій, які сприяють зростанню прибутків та доходів. Встановлено, що зростання доходу впливає на збільшення показників прибутку до вирахування відсотків, податків, зносу та амортизації щонайменше на 10%, що в умовах дивестування в кінцевому підсумку збільшує вартість інвестицій. Результати проведеного дослідження можуть бути корисними для фірм прямих інвестицій з огляду на виявлення можливостей використання технологій для стимулювання та створення вартості

Ключові слова: інвестиції; інтерес; зниження витрат; цифрові можливості; автоматизація

Harmonization of capital accounting in Azerbaijan commercial enterprises in accordance with IFRS requirements

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Abstract. The topic of the research related to capital accounting in commercial enterprises is relevant, as the harmonization of this process in accordance with the requirements of International Financial Reporting Standards (IFRS) becomes an integral component for attracting investment, increasing the transparency of financial reporting, and maintaining competitiveness in the global market. The purpose of the study is to develop and implement the methodology of capital accounting in the accounting activities of commercial enterprises of the Republic of Azerbaijan. Among the methods used, analytical method, statistical method, functional method, method of system analysis, method of deduction, method of synthesis and method of comparison were applied. The research was aimed at in-depth analysis of the essence of capital accounting in Azerbaijani commercial enterprises in the context of modern conditions of market economy. The main attention was paid to the study of the legal and regulatory framework, peculiarities of the authorized capital of limited and joint stock organizations. Within the framework of the research, the key elements of development of financial accounting of capitals complying with IFRS requirements were identified. In addition, specific examples of synthetic accounting of business transactions for capital formation at commercial enterprises are provided, as well as the rules of their reflection in the financial statements are outlined. Special attention is paid to the fundamentals of new accounting rules developed to meet IFRS requirements. As a result of the study, solutions have been proposed to eliminate problems related to capital accounting in accordance with IFRS requirements in the activities of Azerbaijani commercial enterprises. These solutions are oriented to harmonize accounting practices with international standards, improve transparency of financial statements and increase attractiveness for potential investors. The results can be used for Azerbaijani commercial enterprises, contributing to the improvement of financial transparency, attractiveness for investors and harmonization of accounting practices with global standards

Keywords: financial reporting; regulatory framework; accounting correspondence; transparency; civil code

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Introduction

In the field of accounting, the concept of capital is of great importance, since it is not only related to the internal processes of an enterprise, but is also a fundamental source of formation of its assets and productive potential. Capital, at the level of the individual enterprise, becomes concrete: it can be described in detail, accounted for and its efficiency analysed. Among the many functions of capital, one of the most important is its role in protecting the business from the various risks that surround it from all sides. Competent capital accounting is the basis for the formation of the potential of a commercial enterprise, its financial stability and competitiveness. The Republic of Azerbaijan has stable economic ties with many foreign countries, and in the future, plans to expand foreign contacts, as this direction of development provides an inflow of capital into the country's economy. Capital management implies, among other things, the organization of its accounting in such a way as to meet the requirements of legislation and ensure the principle of efficient use.

Competent capital accounting allows forming the basis for analysing and making managerial decisions related to capital management. The modern period of economic development of the Republic of Azerbaijan is associated with the transition to a market economy and the functioning of the country as an independent state. Currently, Azerbaijan is fully oriented on International Financial Reporting Standards (IFRS). However, it should be noted that the country faces an important task of harmonizing accounting in accordance with international standards. For countries with economies in transition, this is an important strategic direction for the development of accounting, which can ensure more effective cooperation with foreign partners.

In his study, R.M. Allahyarov (2021) analysed the impact of the process of harmonization of capital accounting in Azerbaijani enterprises with IFRS requirements. His conclusions indicate the critical importance of this process for increasing the degree of transparency and comparability of financial reporting. N. Tanklevska *et al.* (2023) analysed the impact of IFRS application on capital accounting in Azerbaijani enterprises. Her study revealed that this approach contributes to more accurate and comparable accounting of financial data. Moreover, the author points to the increased attractiveness for foreign investors due to the standardization of financial reporting. In their work, I.M. Abbasov & E.R. Babayev (2021) deeply studied the peculiarities of IFRS application in capital accounting at Azerbaijani enterprises. The study emphasizes that harmonization of accounting with IFRS requires additional efforts for successful adaptation to local peculiarities and effective integration into accounting practice. V.M. Guliyev (2021) argues that the effective application of IFRS in capital accounting provides an increased degree of transparency of Azerbaijani companies' activities to investors and market participants. His study also revealed that this approach contributes to the creation of a more attractive environment for investment. Deeply focused on the problems and prospects of

harmonization of capital accounting in accordance with IFRS study by A. Valiyev *et al.* (2021). Their work emphasizes the importance of this process for strengthening the positions of Azerbaijani enterprises in the world arena and identifies the prospects for its successful implementation.

In general, the authors highlighted the importance of this process for increasing the transparency of financial reporting, improving the comparability of data, and attractiveness of companies to investors. However, solutions to address the problems associated with capital accounting have not been highlighted. The purpose of this study is to identify existing problems and develop specific practical solutions aimed at improving capital accounting in Azerbaijani commercial enterprises in accordance with IFRS requirements.

Materials and Methods

This study relies on an extensive background, which includes a thorough study of regulatory documentation and scientific publications in the field of harmonization of capital accounting under IFRS. For this purpose, both national laws and regulations (The Civil Code of the Azerbaijan Republic, 1999; The Tax Code..., 2000; Conceptual bases of..., 2007; Law of Azerbaijan No. 716-IIQ, 2021) related to capital accounting in enterprises in Azerbaijan and guidelines governing the application of IFRS in global practice (IFRS Accounting Standards..., 2019) were used. The study also included a review and analysis of recent academic research published in this area to provide an extensive and up-to-date understanding of the issues related to the harmonization of capital accounting with IFRS requirements.

The conduct of the research study to investigate the current issues of capital accounting in business enterprises was carried out using methods that reveal the content of the subject. The analytical method was used to study the structure of capital accounting in enterprises of Azerbaijan, to identify the main components of capital, to identify problem areas in accounting and to study the legislative norms regulating capital accounting. Application of statistical method allowed collecting, systematizing, and studying the volumes of data on financial activity of enterprises, their capital, financial indicators, and changes in accordance with IFRS requirements. The functional method made it possible to study the role that capital fulfils in the economic activity of enterprises, to identify the impact of capital on various aspects of companies' activities and its role in ensuring their sustainability and development. The application of the system analysis method made it possible to examine capital accounting in enterprises as a complex system, considering the relationship between its components, processes, and external environment, to understand the impact of accounting harmonization on the broader context of enterprises' functioning. The method of deduction allowed the study of the basic principles and norms of IFRS to apply them to the specific context of enterprises in Azerbaijan. The method of synthesis helped to combine

disparate data and results of studying different aspects of capital accounting to form a holistic understanding of the problem. The comparison method was used to compare capital accounting practices in Azerbaijani enterprises with IFRS global standards, to identify differences, advantages, and disadvantages, and to consider harmonization strategies to achieve comparability and improve capital accounting.

The study covered a versatile analysis not only of concepts, principles, and standards related to capital accounting under IFRS, but also included extensive research on general accounting principles and various interpretations of the concept of capital in economic theory. The assessment of compliance of IFRS requirements with the principles of capital accounting in the world practice involved analysing not only regulatory acts and standards, but also real financial statements of Azerbaijani commercial enterprises. This range of analyses allowed understanding specific problems in capital accounting, which can have a significant impact on the efficiency of commercial enterprises in Azerbaijan. The study of these problems in the context of IFRS requirements was aimed at taking appropriate decisions to eliminate them and improve capital accounting in these enterprises. As a result, these actions were aimed at assessing the feasibility of harmonizing capital accounting processes with IFRS requirements to achieve the development of commercial enterprises in Azerbaijan in the global economic environment.

Results

The peculiarities of capital accounting in Azerbaijan are related to the general structure of accounting applied in the course of business activities of enterprises. The structure of capital accounts of a particular company, including commercial accounting, is based primarily on the legal principles enshrined in the regulations in force in the country (Namazova, 2020). The first law defining accounting principles and

rules was adopted in 1995 and this document did not mention IFRS. After its introduction, this document was seriously revised and implemented in 2004, and in 2018 it was significantly supplemented and amended. In the Republic of Azerbaijan, the main issues of formation, accounting, development, and management of capital of commercial enterprises are regulated by such normative acts as The Civil Code of the Republic of Azerbaijan (1999), The Tax Code of the Republic of Azerbaijan (2000) and Law of the Republic of Azerbaijan No. 716-IIQ "On Accounting" (2021).

The capital of commercial enterprises is formed on the basis of the type of enterprise defined pursuant to The Civil Code of the Azerbaijan Republic (1999). The most widespread forms of commercial enterprises in the Azerbaijan Republic are the following:

1. Limited Liability Company (LLC) – Articles 87-90.
2. Joint-stock company (JSC) – Articles 98-106.
3. Cooperatives – Articles 109-110.

The legislation reflects the main regulatory and legal issues of the charters of these commercial enterprises and establishes the procedure for the formation and existence of the authorized capital on this basis. According to The Civil Code of the Azerbaijan Republic (1999), a joint stock company has the right to increase the amount of its authorized capital. Two instruments may be used for this purpose: increase of the nominal value of a share; redemption of additional number of shares. In any case, the application of these instruments requires the adoption of a relevant decision at the general meeting of shareholders. Under Article 105, a joint-stock company may also take the opposite action, i.e. reduce the value of the authorized capital on the basis of a resolution of the general meeting of shareholders. In this case, the nominal value of the share is reduced or the total number of shares is reduced by buyback. Table 1 proposes to use the following accounting entries for the recognition of share capital.

Table 1. Accounting for authorized capital

Contents of business transactions	Correspondence	
	Debit	Credit
The amount of recognized authorized capital	302	301
The amount of the paid part of the authorized capital	221, 223	302

Source: compiled by the author

In this situation, the part of the authorized capital unpaid by the founders is reflected in the debit balance of account 302 "Unpaid part of nominal (authorized) capital". It should be noted that the process of payment and rules of late payment of the sums of the authorized capital are legally regulated by The Civil Code of the Azerbaijan Republic (1999). Paragraph 2 of Article 90 states that if the charter of a limited liability company does not provide for payment of the charter capital within a certain period of time, the founders are obliged to pay all amounts of the charter capital before the state registration of the business company. If the charter provides for deferred payment

terms, a specific payment period must be specified, which must not exceed three months. Such rules do not apply to joint-stock companies, since Article 103 (3) states that the founders of a joint-stock company must pay the entire amount of the authorized capital before state registration. The main regulatory requirements regarding the formation of the authorized capital for commercial enterprises that have chosen the form of a limited liability company are discussed in the article, which clearly states that some important information on the formation of the authorized capital must be reflected in the charter of this type of commercial enterprise.

The charter of a limited liability company also specifies: the amount of the authorized capital of the company; the number of units invested by each participant; the composition and rules of investment of units; the liability of participants for non-fulfilment of obligations to invest units. As can be seen from the content of Article 89, the charter of a limited liability company should legislatively establish certain guiding requirements for the formation of the authorized capital of the relevant type of commercial enterprise. The relevant requirements for the authorized capital of a joint stock company are set out in Article 102(1): "The charter of a joint stock company shall also specify: the categories, nominal value and number of shares issued by the company; the amount of the company's authorized capital; the rights of shareholders" (The Civil Code of the Azerbaijan Republic, 1999). Article 90 defines the composition of the charter capital of a LLC as a set of individual shares of participants of a commercial organization of this type, the value of which shares are summed up and form the total charter capital. In accordance with Article 90, the amount of the authorized capital of LLC determines the minimum value of the company's property necessary to secure the claims of its creditors. The amount of the company's authorized capital cannot be lower than the value that ensures the property interests of creditors.

Equity capital under IFRS, as already mentioned, is the share of the company's assets that remains after deducting all liabilities. This share represents the interests of the owners of the enterprise. The economic activity of any commercial enterprise requires the use of capital resources, that is, various types of capital (Abdullah & Tursoy, 2021). The capital of an enterprise can be differentiated on various grounds. Depending on the form of ownership of funds, the capital is differentiated into: equity capital (can be formed from share capital, additional capital, reserve capital; this part of the capital includes all types of reserves, results of revaluation of funds, retained profits or losses); borrowed or attracted capital (obligations of the organization to creditors, which can be banks, funds, other creditors). Depending on the composition of funds in accounting activities, capital can be represented by: Active capital resources (investment areas – fixed and current assets); Passive capital resources (sources of funds of the enterprise). Capital is subdivided by the term of useful use into: long-term (up to 1 year); short-term (1 year and less) (Dafermos & Nikolaidi, 2021). The relationship between assets and equity and debt capital can be expressed through the formula (Fig. 1).

$$\text{ASSETS} = \text{CAPITAL} + \text{PLEDGES}$$

Figure 1. Structure of assets of a commercial enterprise
Source: developed by the author

The accounting system should be supplemented with an independent concept of "capital" as it is positioned in

the financial statements, as it is not insignificant for users of financial statements. Such a definition would optimize the approach to capital accounting. Capital in the accounting system is an aggregate of funds invested by the owners of the company and received by it in the course of financial and economic activities. The amount of capital depends on the final financial results and owners' decisions on its distribution, and changes from year to year (Zhang, 2013). In the process of diagnosing the financial condition of the enterprise, the amount of capital, based on the structure presented in Figure 1, is the difference between assets and liabilities. Thus, the capital of a commercial enterprise structurally consists of the following components: the authorized fund, reserve capital, the amount of retained profit or loss and special purpose funds. The formation of each of them may be mandatory or voluntary. Mandatory formation is regulated on a legislative basis, which is determined by the legal status of a particular type of legal entity. Voluntary formation is determined by the intentions of the enterprise and is reflected in the constituent documents and accounting policy of the enterprise (Renaldo *et al.*, 2021).

Formation of the authorized capital (statutory fund, share capital, share fund) is mandatory for all types of commercial enterprises. When establishing a joint stock company, the charter is approved, which must contain information about the amount of the authorized capital. In a production cooperative society, the authorized capital is approved. There is no minimum or maximum size for the share fund (Akbaralievich & Akbarovich, 2023). Thus, the activity on formation of the charter capital is one of the main activities of a commercial organization. However, this raises the problem of the moment of accounting of operations on the formation of the authorized capital. On the one hand, any commercial enterprise is considered to be established from the moment of state registration (Nugraha *et al.*, 2019). However, before that, there is a sequence of events related to the launch of the business. Firstly, it is the meeting of participants and making a decision on the establishment of the enterprise, approving the authorized capital and determining the share of each participant. In addition, the partners can make cash contributions. All these stages of events occur before the registration of the company, so there is a situation when business activities are conducted in relation to the company, but it is not yet officially registered.

The question arises as to when the obligations of the participants should be accounted for as a contribution to the authorized capital. On the one hand, there is the date of the participants' decision to establish the company and approve the charter. On the other hand, there is the date of state registration, which confirms the fact of business creation. In practice, these two dates do not coincide. According to the rules of the chart of accounts, it is required to account for the formation of the authorized capital after state registration in accordance with the legislation. In such a situation, unpaid contributions of participants to the authorized capital should be reflected on the date of state

registration. Reflection of an earlier date has no grounds, as at that time the commercial organization did not exist yet. It should be noted that in Azerbaijan, the greatest role in improving accounting activities towards harmonization with international standards belongs to the new chart of accounts, which is included in the IFRS-based accounting rules approved by the Board of the Ministry of Finance on 30 January 2017. This chart of accounts provides for several main synthetic accounts for capital accounting. The synthetic accounts designed to record capital transactions in business entities are listed in the third section of the chart of accounts, "Capital". This section consists of 5 subsections and 13 synthetic accounts.

Data on the current state and movement of the authorized capital are recorded on account 301 "Nominal (Authorized) Capital". The Instructions for the use of this account do not contain a rule on the share fund. It may be proposed to correct this shortcoming and include in the instruction a reference to the unit trust. In its essence, a mutual fund is like a pooled capital. Therefore, it is logical to reflect the status and movement of the mutual fund on account 301 "Nominal (authorized) capital", which is what happens in practice. To avoid theoretical disputes on this issue, a subaccount "Mutual Fund" may be opened within account 301 "Nominal (Authorized) Capital". Account 301 "Nominal (authorized) capital" is a passive account. Within the framework of accounting of the authorized capital on credit of account 301 are reflected the sums at the expense of which this type of capital resource is formed at creation of the commercial enterprise and further increase of the authorized capital in the process of economic activity. Accordingly, the reduction of the authorized capital is reflected on the credit of the account. The list of accounts with which can be correlated account 301 "Nominal (Authorized) Capital", is quite large and includes accounts for the accounting of tangible assets, cash, financial investments, settlements, intangible assets. Nevertheless, in practice, the

main correspondent account for the credit of account 301 "Nominal (Authorized) Capital" is account 302 "Unpaid part of the nominal (authorized) capital".

Accounting of operations on formation of the authorized capital is basic for all commercial organizations, as it is the authorized capital that is, in fact, the basis for the beginning of entrepreneurial activity. After state registration, formation of the amount of the authorized capital and management bodies, a business entity may start its activities. The existing rules of application of the Chart of Accounts provide for the entry of the authorized capital to the amount of the founders' contributions and reflection of this operation on the credit of account 301 "Nominal (authorized) capital" and debit of account 302 "Unpaid part of the nominal (authorized) capital". After such recording, the subsequent movement of the founders' contributions will be reflected on the credit of account 302 "Unpaid part of the nominal (authorized) capital" and debit of the accounts where valuables and cash are accounted for. Such order of reflection of actions connected with initial formation of the authorized capital is uniform for all commercial organizations. It is also advisable to keep analytical accounting on account 301 "Nominal (authorized) capital", which will allow accumulating information on the formation of authorized capital in the context of founders, stages of capital accumulation, types of securities. As an example, the algorithms of accounting of the authorized capital are offered.

Example 1. The authorized capital of a joint stock company is declared in the amount of AZN 150 thousand. The company was registered on 21 August 2023. Initially, the shares were placed between 5 shareholders equally (each in the amount of AZN 30 thousand). Cash of AZN 15 thousand each was received from four shareholders on 31 August 2023 and one shareholder deposited cash in the cash desk on 26 August 2023. The following entries should be made in the accounting records of the joint stock company (Table 2).

Table 2. Accounting for contributions from shareholders

Date	Contents of a business transaction	Amount, manat	Account correspondence	
			Debit	Credit
21.08.2023	The amount of the authorized capital is recognized	150,000	302	301
26.08.2023	The shareholder contributed half the value of his shares to the company treasury	15,000	221	302
31.08.2023	Shareholders transferred half the value of their shares to the company's bank account	60,000	223	302

Source: compiled by the author

As a result, the following will happen: the shareholders have not yet paid for their shares in full, the 301 account "Nominal (authorized) capital" will reflect the authorized capital in full in accordance with the company's charter. A similar situation is allowed for all commercial companies. Payment of contributions by the founders can be made not only in cash, but also in other types of property. From the point of view of accounting, payment for

a share of shares does not change the correspondence of accounts on account 301 "Nominal (authorized) capital". However, non-monetary contributions have a number of additional restrictions that must be taken into account. The founders of a commercial company agree on the valuation of the contributed property. In limited liability companies, for example, a participant may make a non-monetary contribution. As a rule, if the contribution is not in cash but

in the form of property other than cash, it must be valued by an independent expert authorized to do so. At the same time, it is prohibited to value the property by the founders themselves more expensive than it was valued by an independent appraiser. In joint-stock companies, an independent valuation of the contributed property should be carried out, regardless of the amount of the contribution and the type of shares (Czembrowski *et al.*, 2016).

The fair valuation of non-monetary contributions is important for tax accounting, as it forms the basis for calculating property tax, as well as participates in the calculation of depreciation charges (if the property valued as a contribution to the charter capital belongs to the category of fixed assets). The method of accounting for non-monetary contribution to the charter capital will affect the

formation of accounting statements and financial results of the organization, i.e. determine, among other things, the financial position of the commercial organization. If the share (shares) is paid for by inventories, their value is taken at the valuation agreed upon by the founders.

Example 2. The amount of the authorized capital of an LLC is declared in the amount of AZN 10 thousand. The company is registered on 21 August 2023. The amount of the share in the capital is distributed as follows: AZN 9 thousand to the first participant and AZN 1 thousand to the second participant. The first participant contributed his share in cash on 27 August 2023. The second participant contributed by surrendering his own computer. Entries should be made in the company's accounting records (Table 3).

Table 3. Accounting for contributions to the authorized capital of a limited liability company with property

Date	Contents of a business transaction	Amount, manat	Account correspondence	
			Debit	Credit
21.08.2023	Amount of recognized authorized capital	10,000	302	301
26.08.2023	Paid share in the authorized capital by the first participant	9,000	223	302
26.08.2023	The second participant brought in a computer	1,000	111	302

Source: compiled by the author

This completes the use of account 301 "Nominal (authorized) capital" for many commercial enterprises. This is because businesses are not inclined to change the initial amount of the authorized capital, which is usually set at a minimum level. However, commercial companies can change the amount of their authorized capital either upwards or downwards. This may be mandatory or voluntary. A mandatory increase of the share capital is related to changes in the statutory requirements for the amount of the share capital. The provisions of paragraphs 5, 6 and 7 of Article 90 of The Civil Code of the Azerbaijan Republic (1999) provide for the following options for voluntary increase of the authorized capital of an LLC: contribution to the property of the company; additional contributions from existing participants; use of contributions from new participants of a commercial company. For joint stock companies, the civil legislation of Azerbaijan in Article 104(1) provides the following legal options for increasing the authorized capital: increase in the nominal value (can be applied only by increasing assets); additional issue of shares.

The legislation regulates the term within which it is possible to contribute funds from the moment of making a decision to increase the value of the authorized capital. If the term established by law is not observed, the increase in the authorized capital will be considered as failed. The consequence of a failed increase is the company's obligation to return the participants' contributions within a reasonable period of time. Another source of authorized capital increases are funds from reserves and retained earnings. Generally, in the course of business operations of commercial companies, reserves are formed for various purposes. These reserves function as part of the companies' capital:

revaluation reserves; exchange rate reserves; statutory reserves; obligatory reserves; other reserves. In the chart of accounts for accounting of separate types of capital reserves, the corresponding synthetic accounts are intended. If a decision is made to increase the company's authorized capital at the expense of available capital reserves, the relevant amounts should be recorded on the debit of accounts depending on the type of reserve (accounts 331 "Revaluation reserve" – 335 "Other reserves"). These amounts will correspond to the credit of account 301 "Nominal (authorized) capital". When increasing the authorized capital at the expense of accumulated retained earnings, an entry should be made to debit account 343 "Retained earnings (uncovered loss) of previous years" corresponding to the credit of account 301 "Nominal (authorized) capital".

When deciding to increase the authorized capital at the expense of additional authorized capital or issue of additional shares, such operations should be reflected in the accounting in the same way as in the formation of the initial capital: a corresponding entry: (D-t 302, K-t 301). In this case, the amounts reflected on the credit of account 302 "Unpaid part of the nominal (authorized) capital" correspond to the debit of accounts of cash accounting, and if the contribution was made at the expense of other resources – accounts of other assets (D-transaction 221, 223, 121, 201... K-transaction 302). The date of reflection of such an operation is the date of actual making of an additional contribution (placement of shares). In some cases, the value of the additional contribution may be higher than its nominal value. To record the difference in value, the excess is written off to debit account 302 "Unpaid part of nominal (authorized) capital" and credited to account 311 "Share premium".

The excess of the sale price over the nominal value of the share shall be recognized in the same way. The date of reflection of capital increase is the date of state registration of changes in the constituent documents.

Example 3. At the meeting of shareholders, it was decided to issue an additional number of shares, which will be

further distributed among shareholders, to increase the authorized capital by AZN 270 thousand. The cost of selling the shares is AZN 210 thousand. Amendments to the charter were registered on 2 August 2023. Payment for the shares was credited to the company's account on 19 August 2023. These transactions should be recognized as follows (Table 4).

Table 4. Accounting for differences in share prices

Date	Contents of a business transaction	Amount, manat	Account correspondence	
			Debit	Credit
02.08.2022	The debt of shareholders for additionally issued shares is reflected	210,000	302	301
19.08.2022	Shares paid by shareholders	270,000	223 (221)	302
19.08.2022	The difference between the sale price and the nominal value is charged to additional capital account	60,000	302	311

Source: compiled by the author

Thus, on the example of capital accounting in commercial companies it is worth concluding that the development of accounting in Azerbaijan in the post-Soviet period took place in the direction of IFRS, in accordance with the requirements of which the relevant national standards of the country were adopted. At the same time, in accordance with the requirements of the market economy, the necessary legislative and regulatory framework was formed, on the basis of which the main directions of capital accounting in commercial enterprises were outlined.

Discussion

The study of capital accounting in Azerbaijan emphasizes the importance of complying with legal rules and regulations in the formation, accounting, and management of capital in enterprises. The results show that the key features of capital accounting in the country are closely related to compliance with the legal and regulatory principles defined by the current legislation. This is a critical factor in ensuring the financial stability of enterprises and their attractiveness to investors. One of the identified aspects is the importance of strict compliance with regulatory and legal requirements in the formation and accounting of authorized capital. This helps to ensure financial transparency and legality of enterprises' activities. For example, the problem of the unpaid part of the authorized capital highlights the importance of accurately accounting for this aspect and related legal aspects.

The findings of the study provide valuable recommendations and practical solutions to overcome the challenges of capital accounting in line with global standards. This underscores the importance of striving to harmonize accounting practices with international standards to ensure the sustainability of enterprises and attract investment. It is important to note that changes and amendments to capital accounting legislation, especially in 2018, indicate a constant evolution of rules and regulations. This implies the need to continuously monitor and keep accounting practices in line with the latest legislative changes to ensure conformity

and compliance. The results emphasize the importance of attention to detail and the relevance of capital accounting knowledge for enterprises in Azerbaijan. In addition, this study can also serve as a starting point for further research and development on financial accounting and regulatory aspects affecting the capital of enterprises.

Attention was drawn to the need for strict compliance with regulatory and legal principles in capital accounting in the study by P.R. Agénor *et al.* (2013), as it is a key factor for ensuring the financial stability of enterprises. Compliance with legal and regulatory principles ensures transparency and reliability of financial statements of enterprises. The authors found that accurate and timely compliance with these regulations helps to reduce the risks associated with possible violations and increases the confidence of investors and other market participants in the financial condition of companies. The study also found that the correct implementation of regulatory requirements in capital formation and accounting has a direct impact on the financial performance of companies, ensuring their stability and resilience in a variable economic environment. The results of the author's study, like those of the researchers, highlight the importance of compliance with regulatory and legal principles in capital accounting to ensure the financial stability of enterprises. This emphasizes the similarity of the findings, where this aspect is highlighted as critical for the successful functioning of companies.

I. Fuertes (2008) conducted in his work an analysis that focuses on the importance of harmonization of capital accounting practices with global standards in the context of modern economy. The idea that the alignment of internal capital accounting processes of enterprises with global financial reporting standards (IFRS, for example) is of key importance for attracting investors and ensuring their financial stability was emphasized. According to the author's findings, harmonization of accounting practices with global standards is important because it enables enterprises to ensure the comparability and adequacy of their financial reporting in the global arena. It is worth noting

that enterprises that comply with global standards can attract investment and resources more easily as their financial statements become more understandable and credible to a global audience. Harmonization of accounting practices with global standards allows companies to manage risks more effectively and assess their financial performance more accurately, which contributes to their stability and long-term growth.

In their study, K.J. Wiryadi & B. Novendra (2021) analysed the role played by legislation and regulations in the formation of the charter capital for different legal forms of enterprises. Particular attention was paid to the peculiarities of formation of authorized capital for LLC, JSC and other types of enterprises. The peculiarities of the process of formation and accounting of the authorized capital according to different types of enterprises were revealed. The authors considered in detail what specific requirements and regulations govern the formation of capital for each organizational and legal form, and how these regulations differ in each case. Included were mandatory minimum values, procedures for increasing or decreasing the authorized capital, and the specifics of contributions and their valuation. As in the study by the researchers, the author's results focus on the role of legislation and regulations in the formation of authorized capital for different types of enterprises and emphasize the importance of compliance of legislation and established norms in capital formation for ensuring financial stability of organizations.

In the study by E. Saez & G. Zucman (2020), the authors considered in detail the problems related to the accounting of the unpaid part of the authorized capital. They highlighted the main legal aspects related to this issue, paying special attention to the need for accurate accounting of this aspect. The importance of accurate accounting of the unpaid part of the authorized capital is justified not only to comply with legal requirements, but also to ensure the financial transparency and stability of enterprises. This aspect can have a significant impact on the financial condition and operations of companies, as the unpaid part of the capital affects their solvency and creditworthiness. Problems with the unpaid part of the authorized capital require careful analysis and control on the part of the company. It is worth noting that this should include the establishment of a clear policy on payment of capital, observance of payment deadlines, and accurate reflection of all financial transactions in the company's accounts.

M.E. Barth *et al.* (2023) analysed in their paper the changes in capital accounting over time. They noted that the rules and regulations governing capital accounting undergo constant evolutionary changes over time due to various factors including legislative developments, international standards, and changes in the economic environment. This analysis emphasized the need to continuously update and adapt capital accounting practices to meet new requirements and standards. In particular, capital accounting is sensitive to changes in legislation and international financial reporting standards and therefore

requires constant monitoring and adaptation. Ongoing changes in the regulatory environment relating to capital accounting may affect an entity's financial statements as well as its market position and investor relations. Lack of compliance with new requirements and standards can lead to loss of competitiveness of the enterprise and create risks for its operations.

During their study, H.N. Dang *et al.* (2019) analysed the impact of capital accounting on the structure of assets and liabilities of enterprises, which allowed them to determine not only the financial stability, but also the attractiveness of these enterprises for investors. Based on their analysis, the authors found that the way in which enterprises maintain capital accounting has a significant impact on the structure of their assets and liabilities. Capital accounting is one of the key determinants of the financial position of enterprises and their overall financial stability.

The results of the author's analysis emphasize that capital accounting is important in determining the financial strength and attractiveness of enterprises to investors. Well-organized and accurate capital accounting helps to create more stable and attractive financial positions of enterprises for investors. In general, strict adherence to regulatory and legal principles, harmonization of accounting practices with global standards, and the role of legislation in the formation of share capital are critical factors for the financial stability and attractiveness of enterprises to investors. There is also a need for systematic and accurate capital accounting to ensure financial stability, improve the transparency of enterprises and increase their attractiveness in the financial market.

Conclusions

This study has analysed and examined in detail the main aspects of capital accounting in the context of commercial enterprises in Azerbaijan. A number of key aspects related to the formation, accounting, and modification of authorized capital, as well as legislation and regulations governing this area in the country were identified. An important result of the study was a detailed description of the structure of capital accounts and the main stages of formation of authorized capital for different types of commercial enterprises – LLCs, JSCs and cooperatives, taking into account the requirements of The Civil Code of the Azerbaijan Republic and other regulations. Methods of accounting of the authorized capital were proposed, with examples of accounting entries for different scenarios of increase or decrease of the authorized capital.

The study also covered the issues of payment of the authorized capital, peculiarities of making contributions by the participants and their legal liability, clarified the procedures of registration of changes in the authorized capital and the impact of tax accounting of non-monetary contributions to the authorized capital. It also considered the main principles of IFRS implementation in the Azerbaijani accounting system and analysed the role of the new IFRS-based accounting system in capital accounting. The

study emphasized the importance of compliance of capital accounting practices with international standards for the attractiveness of enterprises to investors and ensuring financial stability in the market. Overall, the results of the study emphasize not only the relevance of the capital accounting problem in Azerbaijan, but also the need for more flexible, transparent legal regulations and accounting practices to ensure the efficient functioning of commercial enterprises in the country.

Further research in this area could focus on analysing capital accounting in different countries to identify best

practices and compare them with Azerbaijani norms and standards. As well as to conduct a comparative analysis of capital accounting in different organizational and legal forms of enterprises (LLCs, JSCs, cooperatives) to identify the peculiarities of their capital and accounting practices.

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Conflict of Interest

None.

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Гармонізація обліку капіталу в азербайджанських комерційних підприємствах відповідно до вимог МСФЗ

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Анотація. Тема дослідження, пов'язана з обліком капіталу на комерційних підприємствах, є актуальною, оскільки гармонізація цього процесу відповідно до вимог Міжнародних стандартів фінансової звітності (МСФЗ) стає невід'ємною складовою для залучення інвестицій, підвищення прозорості фінансової звітності та підтримання конкурентоспроможності на світовому ринку. Метою дослідження є розробка та впровадження методики обліку капіталу в облікову діяльність комерційних підприємств Азербайджанської Республіки. Серед використаних методів – аналітичний метод, статистичний метод, функціональний метод, метод системного аналізу, метод дедукції, метод синтезу та метод порівняння. Метою дослідження був поглиблений аналіз сутності обліку капіталу в азербайджанських комерційних підприємствах в контексті сучасних умов ринкової економіки. Основна увага була приділена вивченню законодавчої та нормативної бази, особливостей статутного капіталу товариств з обмеженою та акціонерною відповідальністю. В рамках дослідження були визначені ключові елементи розвитку фінансового обліку капіталів відповідно до вимог МСФЗ. Крім того, наведено конкретні приклади синтетичного обліку господарських операцій з формування капіталу на комерційних підприємствах, а також викладено правила їх відображення у фінансовій звітності. Особливу увагу приділено основам нових правил бухгалтерського обліку, розроблених відповідно до вимог МСФЗ. В результаті дослідження запропоновано рішення, спрямовані на усунення проблем, пов'язаних з обліком капіталу відповідно до вимог МСФЗ в діяльності азербайджанських комерційних підприємств. Ці рішення спрямовані на гармонізацію облікової практики з міжнародними стандартами, поліпшення прозорості фінансової звітності та підвищення привабливості для потенційних інвесторів. Результати можуть бути використані азербайджанськими комерційними підприємствами, сприяючи підвищенню фінансової прозорості, привабливості для інвесторів та гармонізації облікових практик зі світовими стандартами

Ключові слова: фінансова звітність; нормативно-правова база; бухгалтерська кореспонденція; прозорість; цивільний кодекс

Choosing a mortgage lending model in the Kyrgyz Republic

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Abstract. In the modern world, mortgage plays an important role in the life of the citizens of the country due to its important role in providing their housing needs. Thus, it is important to find the most effective model of mortgage lending for the country to maximize the living standards of its citizens. The aim of the work is to choose the most effective model of mortgage lending that can be used in the country and bring the greatest benefit to it. The main methods used in the research were analysis, deduction, induction, and abstraction. The paper examined various aspects of mortgage lending, focusing on the different payment models and their implications for borrowers. Two types of mortgage loans were considered: with annuity and differentiated payments, their main differences in terms of payment rates were described, and mathematical formulae for their calculation were specified. To illustrate the impact on the borrower of each of them, a theoretical example was provided, on the basis of which the differences between the two systems were described. The paper also describes three models for organizing mortgage lending systems: a closed (stand-alone) mortgage system, a truncated open model and an extended open model. The suitability of these models for the development of the Kyrgyz mortgage market was assessed based on their characteristics and features, positive and negative components. The work brings new knowledge in the context of studying the peculiarities of mortgage lending as a whole, as well as allows finding opportunities for improving its functioning in the Kyrgyz Republic

Keywords: finance; banking system; macroeconomics; entrepreneurship; social sphere

Introduction

The housing market plays an integral and important role in the economy of any country. It has a strong influence on many aspects of a country's social, economic and political development. In particular, it stimulates economic growth through activities in construction, architecture, real estate and related industries. This sector attracts investment, contributing to job creation and increasing national output. In addition, the housing market affects the financial stability of the country, as many citizens use property as a means of saving and investing (and actually housing). This also helps to diversify the investment portfolio and reduce risks, and also favourably affects the social stability of the country, as with affordable housing and stable housing prices, people feel more confident about the future and stability. As such, the industry creates numerous jobs in housing construction or housing maintenance (Kovalenko *et al.*, 2023).

Nowadays, with rapid socio-economic changes and the development of financial markets, the issue of affordable and sustainable housing remains a priority for many countries (Gupta & Hansman, 2022). The Kyrgyz Republic, as part of the global community, is also facing the challenges of ensuring housing affordability and creating effective mechanisms of real estate finance. In this context, the choice of an optimal mortgage lending model is of particular importance, affecting economic development, social stability and the welfare of citizens. Therefore, it remains relevant to consider different models of mortgage lending in order to select the most effective among them for the Kyrgyz Republic and its subsequent widespread use in the country.

Many scientists have been engaged in assessing the economic development of Kyrgyzstan as a whole. Thus, D. Sharipova & A. Kudebayeva (2023) assessed changes in welfare in Central Asia based on data from Kyrgyzstan and Kazakhstan. The scholars described the multifaceted factors influencing the dynamics of well-being in Central Asia, shedding light on the role of freedom of choice and financial satisfaction, on the basis of which they proposed individual state initiatives to improve the overall situation in the countries.

Scenarios for the future development of the country were also assessed by N. Strelkovskii *et al.* (2020). The scientists described 6 variants of the country's future development, which makes it possible to test certain options of long-term macroeconomic policy to assess its effectiveness.

Development in terms of digital transformation in the country was assessed by M. Amanalieva (2020). The scientist described the role of a systematic approach to the introduction of the principles of the digital economy, and also showed what actions are taken by the state authorities of the country, including regional ones, for these purposes. Partially, the crediting sphere in the country was assessed by L. Kuhn & I. Bobojonov (2021), with a special focus on credit in the agribusiness sector. In turn, the problems of infrastructure financing in Kyrgyzstan were assessed by J. Salimova-Tekay (2022), although she did not assess specifically the mortgage lending in the sphere. She believes that the country needs significant investment in this area in order to provide opportunities to address poverty, climate change adaptation and economic development. She sees government support as the main opportunity for financing at the moment. However, no works were found that investigated mortgage lending in the country as such, due to which conducting this study also remains relevant.

The aim of the paper was to draw conclusions about what should be the model of mortgage lending in the Kyrgyz Republic. This will make it possible to apply the available knowledge in practice and thus significantly improve the efficiency of the functioning of this sphere.

Materials and Methods

The study includes different mortgage lending models in order to understand their impact on the final amount of payments and their distribution over time. At the same time, the focus was on the choice between annuity and differentiated payment mortgages, as well as in terms of mortgage lending models (stand-alone, truncated-open and extended-open). The description of the benefits of each

system was assessed based on the general macroeconomic features of the modern development of Kyrgyzstan. In addition, in order to assess mortgage and annuity payments, calculations were made to describe the benefits and disadvantages of mortgage lending forms, namely annuity and differentiated. The values for the calculations were chosen on the basis of theoretical selection, i.e. they were not intended to show the real situation of the mortgage market in any of the countries. Nevertheless, even such calculations allowed comparing the advantages of each system. All the important constructions and calculations for the work were carried out in Microsoft Excel.

The approach that was used during the research was systematic. It allowed describing the factors affecting the development of mortgage lending in Kyrgyzstan in the form of a single system, within which these components interact with each other and lead this model to changes. This allowed significantly simplifying the process of assessing the internal state of economic development in Kyrgyzstan. One of the main methods used during the study was analysis. It made it possible to draw conclusions about what should be the optimal mortgage lending model in the country based on available facts about the current state of development of the Kyrgyz Republic, as well as general theoretical statements about mortgage lending models. Thus, the historical method was also used, since data characterizing the country's past development were evaluated.

Forecasting was also useful, which made it possible to assess the future development of the Kyrgyz Republic taking into account the selected mortgage lending models. The deduction method was used to select the main small factors affecting mortgage lending in the Kyrgyz Republic and to form a basic understanding of the current state of this sphere in the country. In turn, the method of induction allowed, by understanding the main features of different mortgage lending models, to draw conclusions about how they will function in the country, and which of them will be the most favourable for all participants of the loan origination process. The comparison method, in turn, made it possible to identify the advantages and disadvantages of each of the mortgage lending models, which made it possible to form a single opinion on which of them (stand-alone, truncated open or extended) would be the most efficient to use in the country. It was also used to evaluate annuity and differential mortgage lending methods. The construction of figures to form a more concrete understanding of the operation of the respective mortgage mechanisms was carried out using the graphical method.

Results

To begin with, it is worth considering the general state of the mortgage lending market in Kyrgyzstan. Some data on this matter is provided by the State Mortgage Company, as shown in Figure 1.

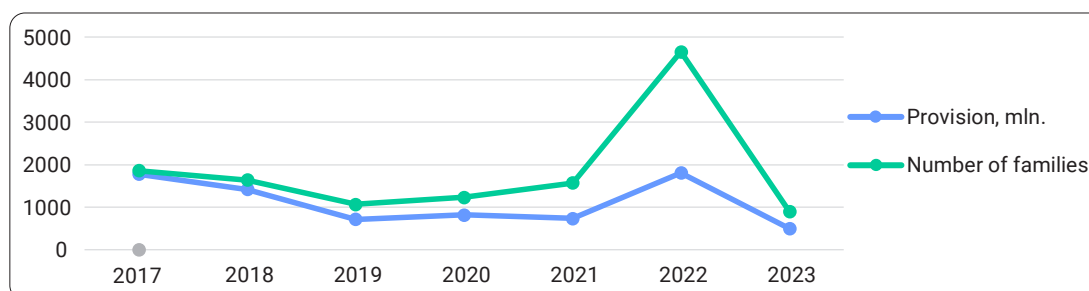


Figure 1. Data on the number of families and loan payments from 2016 to 2023

Note: the data for 2023 is up to July 2023

Source: compiled by the authors

As can be seen from Figure 1, the dynamics of mortgage lending in Kyrgyzstan is quite erratic: in some years the values of repayments are quite high (2022 and 2017), while in other years they are subdued. It is difficult to say what the trend is at the moment, as the full data for the whole period of 2023 remain unknown, but in case they increase to significant quantitative values, it would be possible to say that the situation in this market (at least in terms of state support) is gradually improving. There are three main systems of mortgage lending with government support in the country: social mortgage, preferential mortgage and affordable mortgage (4, 6 and 8 per cent respectively). Each of them has its own peculiarities and conditions for obtaining. In general, even considering the most "expensive" of the options at 8%, it should be noted that, given the

general state of economic development in Kyrgyzstan, such interest rates seem more than fair. Although the number of families receiving such support remains small, it is to be expected that it will increase over time.

In general, there are quite a few types of mortgage lending, but the main two are fixed or variable rate mortgages (McDonald & Thornton, 2008). Accordingly, in the first case, the borrower takes a loan at a fixed interest rate for the entire term of the loan and the monthly repayments remain constant throughout the term of the loan. In the second case, the borrower takes a loan at a variable interest rate that depends on market rates. This can cause the monthly repayments to change based on changes in interest rates. An intermediate option is a variable rate mortgage, where a combination of the above two options occurs: for

example, the rate may be fixed for the first few years of the loan and then switch to a variable rate. As it can be understood that, depending on the choice of the lending model, the final repayment amount will ultimately depend (Nazaralieva & Aitaliev, 2016). In addition, mortgage repayment models can be divided into 2 more groups: annuity and differentiated. In the first case, the amount of payment is constant throughout the period, while in the second case its amount varies over time and is higher at the beginning of the period than at the end. Both of these systems are worth considering; the formula for calculating an annuity payment is shown below (1):

$$A = P \times \frac{r \times (1+r)^N}{(1+r)^N - 1}, \quad (1)$$

where A – periodic payment; P – principal amount of the loan; r – interest rate for the period under review; N – number of payments for a mortgage loan.

In this case, the amount of the interest payment will be as follows (2):

$$pr_n = P_n \times r, \quad (2)$$

where pr_n – interest payment for the period under review; P_n – balance of the principal amount of the debt.

Thus, the amount of payment on the principal debt is determined as follows (3):

$$pd_n = A - pr_n, \quad (3)$$

where pd_n – payment of the principal debt for the period under review.

In this case, the balance of the principal amount of the debt can be calculated as follows (4):

$$P_{n+1} = P_n - pd_n. \quad (4)$$

In turn, the calculation of differentiated payments occurs differently, as shown below (5):

$$D_n = P \times r \times \left(1 - \frac{n}{N}\right) + \frac{P}{N}, \quad (5)$$

where D_n – payment for the period.

In this case, the amount of payment on the principal debt is unchanged and is calculated as follows (6):

$$pd = \frac{P}{N}. \quad (6)$$

And the amount of the interest payment changes and is found in the same way as in (2). The principal balance can be found as follows (7):

$$P_n = P - pd \times n. \quad (7)$$

In order to understand which mortgage lending model is more profitable, it is worth analysing them in more detail. To do this, it is worth having a closer look at how payments are distributed over time. For example, if the loan size is 100,000 USD, the interest rate is 5%, and the period is 20 years, then both annuity and differentiated payments can be calculated.

First, let's look at the situation with the annuity payment. As stated above, in this case the annual payment will be single, and using formula (1) and the data provided above, it can be calculated that it will be approximately 8,024.26 USD in year. However, the ratio of interest payments to the loan body will change as shown in Figure 2.

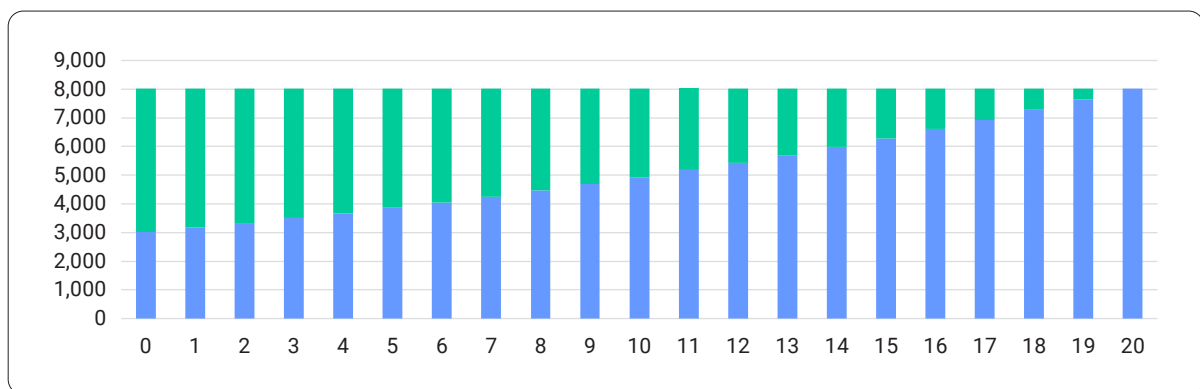


Figure 2. Change in the amount of loan principal payment

and interest in each of the mortgage loan payment periods with annuity payment, USD

Source: compiled by the authors

As can be seen from Figure 2, the amount of the repaid loan body gradually increases until it takes up almost the entire payment amount. However, the amount that is paid remains identical. It is worth noting that the total amount of payments for the period will be 168,509 USD, that is, the overpayment will be 68,609 USD or

almost 60.5%. Another option, in which the payment is calculated using the differentiated payment method, can be considered. In this case, the initial payment will be equal to 10,000 USD and gradually decrease by 250 USD up to 0 USD in the last period. These data are shown in Figure 3.

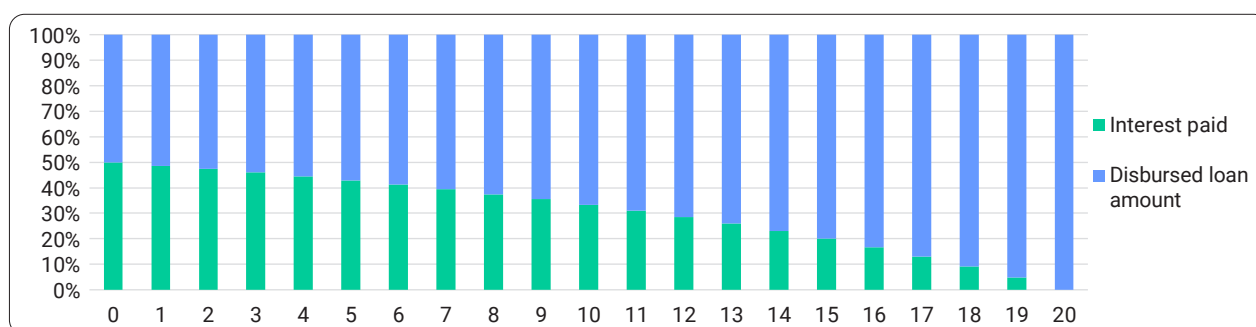


Figure 3. Change in the amount of repayment of the loan body

and interest in each of the mortgage loan repayment periods with differentiated payments, USD

Source: compiled by the authors

As it can be seen from Figure 3, part of the interest payments for a mortgage actually decreases, which is why the payment in the first period is the highest, although it decreases over time. It is also worth noting that the total number of payments in this case is equal to 157,500 USD, that is, higher than the original mortgage amount by 57,500 USD, and lower than the option provided above with an annuity payment by 11,109 USD, which may make it seem more profitable, although in reality this may not be the case. The reason that the second mortgage payment option will most likely not be the most optimal for households is the change in the price level in the country over time. In

other words, although the payment in the first option is higher than in the first, it may actually turn out to be more profitable. For example, if the inflation rate is high enough in subsequent years, the real cost of the loan will fall, making it less difficult for the household to repay. On the other hand, if inflation is not expected to increase in future periods, then the second option may be more effective. This can also be described using an extension of the theoretical example described above: if the inflation rate in the country in which the events take place is at an average annual rate of 5.5%, then the real amount of payments will be distributed as shown in Figures 4, 5.

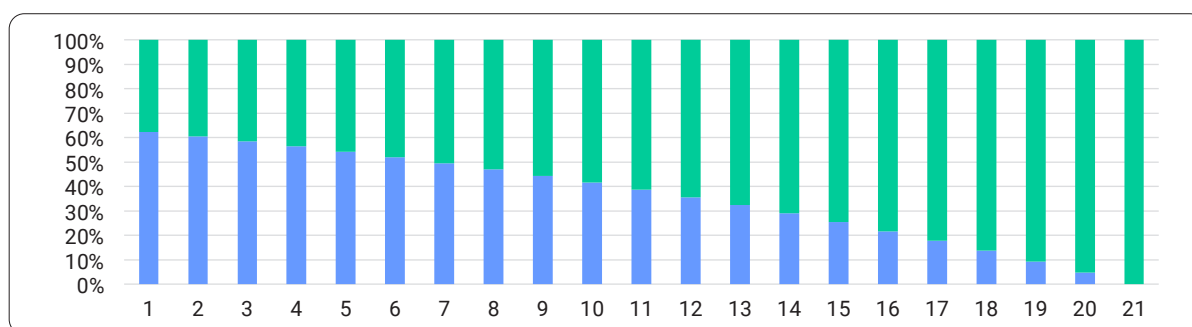


Figure 4. Change in the amount of loan principal payment

and interest in each of the mortgage loan payment periods with annuity payment, taking into account inflation, USD

Source: compiled by the authors

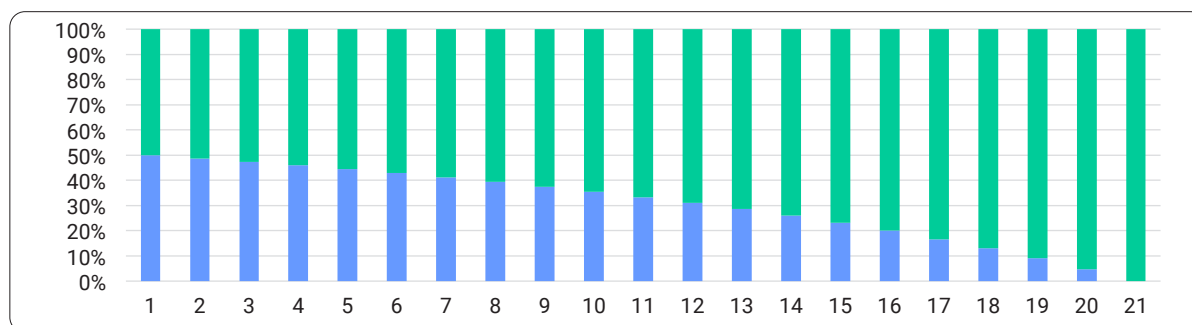


Figure 5. Change in the amount of repayment of the loan body and interest in each

of the mortgage loan repayment periods with differentiated payments taking into account inflation, USD

Source: compiled by the authors

As can be seen from Figures 4 and 5, future payments in this case are reconfigured, and payments at older periods have a low value. If summarizing the total amount of payments under such inputs, it turns out that the first model, whose payments are distributed evenly over time, will be cheaper than the second one (103.917 USD vs. 103 USD). Of course, these figures are theoretical, but they clearly show the state of affairs in mortgage lending. Thus, a household's choice of mortgage should be based primarily on its expectations about the future development of Kyrgyzstan and, in particular, the state of the country's main macro-financial indicators. Thus, if the homeowner believes that long-term inflation will be higher than the interest on the debt – he should unambiguously choose the annuity option. If the homeowner also has access to stock markets and relatively safe opportunities for capital accumulation, he can also take into account the discount rate, for example, the yield on government bonds. In such a case, the comparison should be made on the basis of the level of the discount rate, which is likely to be higher than the long-term expected inflation rate (Szumilo, 2021).

If describing the models of organization of mortgage lending systems, it is possible to distinguish three of them:

- closed (autonomous) mortgage system;
- truncated open model;
- extended open model.

The stand-alone mortgage system works on the principle of savings and loans. Borrowers must save a certain portion (typically 30-50%) of the required loan amount through a home-savings contract. Savings and loan associations, building societies and credit unions operate on this model. The system offers lower interest rates on deposits and loans, but is independent of general financial market conditions. The truncated open model, used mainly in the primary mortgage market, involves banks using mortgages obtained from customers as collateral for externally raised resources. The model relies on various sources of funding such as bank capital, customer deposits and interbank loans. Interest rates on loans are directly dependent on the state of the credit and financial market. The extended mortgage lending model includes the issuance of mortgage-backed securities that are traded on domestic and international markets. Mortgage bonds form a significant part of the investment portfolios of organizations such as insurance companies, because of which they play a significant role in international financial markets, although they are not common among developing countries (Fürstenau & Hommel, 2019).

As for their application in the realities of Kyrgyzstan's development, the first model, or autonomous mortgage system, can be actively used in the country. Moreover, its use can be considered the most efficient due to the fact that it excludes the use of intermediaries, and thus reduces transaction costs. In this context, there is only a question of the number of investors among individuals who will be ready to buy the offered propositions from developers: for the latter, such a form is quite favourable, as it allows them

to receive part of the funds during the construction of the building instantly. On the other hand, working directly with the developer brings additional risks for households due to the fact that it does not allow them to get guarantees about the receipt of the asset for which the funds were paid at the end (there is a risk of bankruptcy of the developer, which is particularly relevant in crisis years).

The second model, namely the truncated open model, is the most optimal, as it brings its share of benefits to all (which is why it remains the most commonly used model in developing countries). In this model, developers, or owners of buildings or flats, gain demand for them, banks gain profits for lending, and households directly acquire houses, as well as the certainty of paying the mortgage and providing all services properly (because the bank directly serves the customer) (Parnes, 2023). The lending rates are then directly dependent on the state of the financial system in the country, as well as macro factors. Due to the simplicity of the system, it is common in many countries of the world and should become the basic one for Kyrgyzstan. The extended model is more complicated – since it requires the issuance of securities, its efficiency requires a developed stock market, which is often lacking in developing countries and which is a problem in Kyrgyzstan. Funds for mortgages in this case are taken from the secondary securities market and provided by individual investors; it should be noted that investment banks and brokers also benefit, which makes this system not as efficient as it could be, but the average interest rate on loans should be fairer and lower than in a truncated open model (Hodula *et al.*, 2023). In addition, there are additional risks associated directly with stock market trading. The lack of control over mortgage loans has already led to significant negative consequences in 2008-2009, significant government control over this market in order to prevent a similar situation from occurring again should be expected. Thus, despite all the benefits, the model cannot be used in Kyrgyzstan effectively enough at this stage. For this purpose, it is necessary to develop institutions in general and the stock market in particular.

State Mortgage Company is the only authorized body for mortgage lending with the aim of providing affordable housing for citizens and creating a sustainable mechanism for attracting financial resources in the sphere of mortgage lending and economy class construction. Its mission is to contribute to the sustainable development of the country's economy through the development of the mortgage market, improving the population's access to housing and solving social problems in the field of housing to improve the quality of life of the society. SMC aims to become a stable and sustainably developing organization, providing affordable housing for citizens and contributing to the development of the economy and construction industry in the country. It provides financial support to citizens of Kazakhstan wishing to purchase housing. The Company issues mortgage loans for the purchase, construction, or repair of housing, which contributes to increasing the affordability of housing for the population. This affordability

consists of both lower requirements for obtaining such a loan and loyal rates that vary depending on the citizens purchasing the mortgage.

Recently, the company has achieved some impressive results. In particular, it has officially become a member of Asian Secondary Mortgage Market Associations (ASM-MA), which opens the door for it to share experience and co-operate in the development of the housing finance market in the Asian region. In addition, the company has successfully attracted significant funds in the public housing policy sector, including grants from the Government of the Federal Republic of Germany and loan funds from the Saudi Fund for Development. All of these funds are being utilized for mortgage loans and housing construction. SMC

has also started construction of the largest residential complex in Bishkek, which will consist of more than 5,000 flats and provide affordable housing for citizens at a price not exceeding 550 USD/m². The last-mentioned achievement is the development of an electronic portal that allows citizens to apply for mortgage loans online, providing a more convenient and affordable way to obtain financing for housing. In general, all these achievements testify to SMC's commitment to developing the housing sector, attracting investment and improving the availability of housing for citizens of the Kyrgyz Republic.

The development of the company is also evidenced by the dynamics of its financial statements, which is shown in Table 1.

Table 1. Selected financial indicators of State Mortgage Company

Years	2017	2018	2019	2020	2021	2022
Assets	2,636.26	4,319.03	4,956.31	5,446.76	6,656.9	12,458.91
Interest income	96.6	150.27	210.77	224.95	196.54	203.74
Net profit for the period	18.92	40.16	61.99	74.31	90.28	172.72

Source: compiled by the authors

As can be seen from Table 1, the company is characterized by stable growth in both income levels (interest – the main source of profit, and net – minus all liabilities). In addition, the company has significant growth rates of assets, as well as key indicators characterizing financial stability and liquidity. Thus, the company's activities can be considered effective.

Discussion

M. Nakiwala *et al.* (2023) assessed access and problems in terms of mortgage finance. Researchers observed that people's knowledge and attitudes towards mortgage finance significantly affect the utilization of mortgage loans in different countries. Strict mortgage loan eligibility criteria create disadvantages for low-income individuals in accessing mortgage loans compared to higher-income individuals. Therefore, in order to increase the level of acceptance of mortgage loans among the population, scholars have suggested making the most acceptable conditions for their acceptance, including the use of government support mechanisms. M. Calabria (2014) in his study described the relationship between banking crises and falling prices in the housing market. For example, while various measures, including monetary policy measures, may have played a role in the 2008 financial crisis, the main cause of losses for both households and financial institutions was the significant level of leverage in the mortgage finance system. The paper advocates policies that directly deleverage households and the financial system as integral components of mortgage finance reform. In other words, the scholar writes that the model implemented within a country should focus primarily on its sustainability on the part of borrowers.

As part of their study, D. Loomans & M. Kaika (2023) evaluated the possibilities of regulating the mortgage

system. The scholars write that regulation of the mortgage market has led to significant positive results in terms of the sustainability of the financial system, as well as helped to attract more investment in the sector. On the other hand, according to the researchers, in Canada it has also led to non-wealthy households using risky strategies such as hiding debts or using informal credit arrangements to be able to take out mortgages. In other words, the use of interventions by the state may not necessarily have a positive impact on the development of the field: therefore, the authorities should be cautious about such initiatives and be on their guard before making any decisions in this area.

L. Agnello *et al.* (2020) described findings from an analysis of housing market cycles in 20 Organization for Economic Co-operation and Development (OECD) countries from 1970 to 2015. The authors found that liberalization of the mortgage sector leads to longer housing booms, while a higher degree of securitization is associated with shorter housing crises. Institutional differences in national mortgage markets also play a role, as changes in housing finance such as mortgage capital withdrawals, average maturities, covered bond issuance and loan-to-value ratios affect the length of housing cycles. In terms of government involvement in this area, the scholars write that the tax deduction of mortgage interest and capital gains allows for better quality house price growth; the same applies to the provision of guarantees, credit, and liquidity by government-linked financial institutions. Overall, the findings showed that macroprudential policy, housing finance regulation and monetary policy can mitigate the macroeconomic effects of housing market ups and downs while improving financial stability, because of which it is important to find a balance between government support measures to overcome the disruptions caused by housing downturns

and avoid rapid house price growth. In turn, A. Fuster *et al.* (2019) evaluated the role of technology development on the mortgage lending market. The scholars showed that lenders with higher levels of technological development offer better terms and conditions for lending; similarly, borrowers are more likely to borrow from such counterparties. Scholars therefore point to a future trajectory for lending that focuses on the interaction of technology and finance to provide the greatest value for money.

L. Liu (2023) assessed the impact of fixed-rate mortgages on both rental and housing markets in the context of a life cycle model. The scientist divided the life cycle of a household into three continuous stages depending on their mortgage involvement and solved optimal management problems for each stage. They take into account factors such as down payment ratios, mortgage interest rates and the term of the mortgage. Overall, he concluded that mortgage length has a positive effect on long-term homeownership rates. Therefore, it is more efficient for homeowners to engage in such long-term relationships. C. Loibl *et al.* (2020) assessed the relationship between financial debt and mental health in older households. The findings highlighted the need for a nuanced approach to shaping one's debt obligations. The researchers wrote that while debt obligations in general cause people stress, housing debt such as a mortgage may cause less stress than other forms of debt such as credit cards or personal loans. Thus, government authorities should firstly create an affordable housing market in the country and adequate conditions for mortgages, rather than other forms of lending.

The mortgage market model present in the US was analysed by L. Lambertini *et al.* (2017). The scholars presented a dynamic stochastic general equilibrium (DSGE) in which the housing sector, mortgages and endogenous default were represented. The scholars show that two types of shocks can then occur: a mortgage risk shock and a housing demand shock, which is broadly reminiscent of the 2008-2009 crisis as well as the Great Depression (1929-1939). This shows that the model built by scientists really more or less plausibly reflects real world events. In addition, it clearly shows the dangers inherent in its use, namely the occurrence of financial crises with often huge negative consequences, especially for emerging economies. This once again emphasizes the fact that applying such a strategy for Kyrgyzstan is not only ineffective, but will probably lead to significant negative consequences in case of problems in the mortgage market.

Thus, the truncated model, which is based on the interaction between banks as intermediaries and borrowers, is the most effective for Kyrgyzstan, at least for the time being. However, it is worth realizing that in order to develop

the mortgage market more efficiently and quickly, domestic economic actors may need assistance from the state (Kish, 2019). This is primarily due to local financial conditions, where households cannot afford to borrow at the high rates that banks may require to cover their risks. The state, through its mechanisms, can enable such contracts (for example, by paying part of the mortgage for households, or by providing additional guarantees for banks to lower interest rates) (Kim & You, 2021). Such a policy would achieve a much higher level of efficiency in the functioning of the mortgage credit market in the country.

Conclusions

The study shows that in Kyrgyzstan, the choice of mortgage lending model should be carefully assessed against the country's development context. The stand-alone mortgage system, where borrowers accumulate part of the required loan amount before taking out a mortgage loan, may be efficient due to direct interaction with developers and lower transaction costs, but it is difficult to use in practice due to higher risks for households due to direct interaction with developers. The extended mortgage lending model implies the use of mortgage-backed securities, which makes it difficult to implement and requires a developed securities market and institutions in principle, which makes it impossible to implement in the country. Nevertheless, it has its benefits, such as the possibility of ensuring fairer interest rates. In addition, it brings with it risks associated with securities, so it must be supported by government intervention and control to prevent financial crises. The best model was chosen to be the truncated open model, which is commonly used in developing countries, allowing banks, households, and property developers alike to reap their share of the benefits. It is quite simple to implement, which makes it worth implementing in Kyrgyzstan, at least in the current realities.

Ultimately, the choice of mortgage lending model should be consistent with the borrower's financial situation, expectations of inflation and economic stability, and the state of the financial market in Kyrgyzstan. Careful consideration of these factors will allow borrowers to make informed decisions that best suit their individual needs and the economic realities of the country. It is relevant for future research to propose other alternatives for the described mortgage lending models and to continue to evaluate and analyse this market among academics.

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None.

Conflict of Interest

None.

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Вибір моделі іпотечного кредитування в Киргизькій Республіці

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Анотація. У сучасному світі іпотека відіграє важливу роль у житті громадян країни через її вагомий роль у забезпеченні житлових потреб. Таким чином, важливо знайти найбільш ефективну модель іпотечного кредитування для країни, щоб максимально підвищити рівень життя її громадян. Метою роботи є вибір найбільш ефективної моделі іпотечного кредитування, яка може бути використана в країні та принести їй найбільшу користь. Основними методами дослідження були аналіз, дедукція, індукція та абстрагування. У роботі досліджено різні аспекти іпотечного кредитування, з акцентом на різні моделі виплат та їхні наслідки для позичальників. Розглянуто два типи іпотечних кредитів: з ануїтетними та диференційованими платежами, описано їх основні відмінності з точки зору ставок платежів, а також наведено математичні формули для їх розрахунку. Для ілюстрації впливу на позичальника кожної з них було наведено теоретичний приклад, на основі якого описано відмінності між двома системами. У роботі також описано три моделі організації систем іпотечного кредитування: закрыта (автономна) іпотечна система, усічена відкрита модель та розширена відкрита модель. Оцінено придатність цих моделей для розвитку іпотечного ринку Киргизстану на основі їх характеристик та особливостей, позитивних та негативних складових. Робота привносить нові знання в контексті вивчення особливостей іпотечного кредитування в цілому, а також дозволяє знайти можливості для вдосконалення його функціонування в Киргизькій Республіці

Ключові слова: фінанси; банківська система; макроекономіка; підприємництво; соціальна сфера

**Analysis of the effectiveness of freelance exchanges
and their demand among corporate customers
in the context of tax regulation**

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Abstract. The relevance of the study is conditioned by the dynamic development of the freelance market and the prospects for cooperation between freelancers and corporations, considering the specifics of taxation of such labour

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relations. The paper examines the essence of the concepts of “freelancer” and “freelance exchange” and substantiates the reasons for the establishment and popularisation of freelancing in modern conditions. The freelance markets of the countries of the Balkan Peninsula and Ukraine were analysed in terms of supply and demand, the number of vacant projects, the cost that the customer is willing to pay for the completed project. The purpose of this study is to analyse the actual performance indicators of existing freelance exchanges and assess the prospects for cooperation between corporations and freelance employees in the context of the possibility of optimising the taxation of legal entities. The methodological basis of the study was the use of system analysis in evaluating the results of freelance exchanges and attracting and cooperating with corporate clients, theoretical data on further prospects for using online labour exchanges by enterprises to attract the contractor of project work were highlighted. The advantages and disadvantages of cooperation in the customer-contractor field on the online labour exchange in the context of financial aspects are summarised. The relevance of the further study of the development processes of freelance exchanges, due to their growing popularity among employers, is substantiated. The study results and the conclusions formulated on their basis are of significant importance for the management level of companies, since based on the conducted research and already existing analytical information, the effectiveness of attracting freelance employees through freelance exchanges, the possibility of reducing the company’s labour costs and optimising the tax burden in terms of paying taxes for an employee has been confirmed

Keywords: free hiring; online platforms; employment; online work; project

Introduction

Freelancing as a form of employment is based on temporary contracts and is a system that develops dynamically and has all the prospects for further development. The world of work is changing and foreign labour markets in the post-industrial economy are becoming the norm, transforming the concept of job and career safety (Cross & Swart, 2021). Since freelancing is a relatively new field, it is worth considering it in comparison with classic labour relations and the advantages of using it, considering possible risks. The active development of technologies, in particular, information and communication technologies, determines changes in forms of employment and increased requirements for employees, which causes decrease in the volume of standard employment, and the conventional practice of assigning a workplace to an employee loses its relevance (Avdullahi *et al.*, 2022). More than five years ago, according to McKinsey’s analytical data, more than 160 million freelancers worked in Europe and the United States (Manyika *et al.*, 2016). In such circumstances, it is worth mentioning the apt statement by V.M. Adam (2019) – the key element of the economy of the future will not be a corporation, but a person, thus emphasising the importance of each individual and their skills and abilities, with the help of which the goal is generally achieved. In other words, each individual contractor becomes a synergistic unit until a specific goal is met, while at the same time being at the level of only Internet communication. That is, the persons who are not full-time employees of the organisation are increasingly influencing the final appearance of each individual product that the organisation produces.

At the same time, developers of online employment platforms promise to link jobs to knowledge workers around the world (Horton *et al.*, 2018). In modern conditions, freelancing is the most profitable mode of cooper-

ation between employers and work performers, which in a crisis can be a salvation for both the internet business link and unemployed specialists. This non-standard form of employment is becoming more popular every year and causes changes in the structure of the labour market. In any case, the customer legal entity creates the basis for legislative relations between the state, the organisation, and the contractor (Mahomodally & Suddul, 2022). Under such conditions, it is advisable to emphasise that the corporation dictates the conditions for organising the production process and assigns employees a particular status in relation to the structure. O. Yu. Vitko & A.V. Chernyakhovsky (2019) argue that freelancing is more appropriate to consider as a form of economic activity within the information and communication environment, which consists in performing work (providing services) by an independent specialist who is not in an employment relationship with a specific customer, that is, a corporation. Currently, participation in entrepreneurial activities and an entrepreneurial career is the creation/management of a business on a permanent basis, or even its absence (Ma & Yang, 2018).

However, modern realities reflect the era of “new business”, where the employer saves on direct costs, but still gets the job done. There is no need to pay for and maintain the office, purchase and maintain office equipment, form non-material incentives such as day-off and gifts to employees, and of course, the key one is the payment of wages. This refers to the absence of an employment procedure and compliance with all social guarantees provided for in the Labour Code and the manager’s workload. In Ukraine, the cost of freelancer services is on average three times lower than the price for similar work performed through an agency or outsourcers. By comparison, freelancers in the US get about USD 60 on average. This is three times more

than that of full-time employees of similar specialities (Litorovych, 2020). It is logical to say that freelancing is part of modernity, part of the market economy, the online labour market and a completely new form of labour relations, which is associated with the conditions dictated by the present. Processes that activate freelancing contribute to changes in business activities, offering a new product and reducing the need for "physical presence" at the enterprise, with the possibility of remote work, freeing up the personal time of employees, reducing the financial costs of maintaining the administrative staff for the company. Such assumptions should be transferred to the scientific field for further development of research on this topic.

The aim of the research is to examine the performance metrics of freelance platforms and evaluate the potential for collaboration between corporations and remote workers, with a focus on enhancing the effectiveness of corporate taxation.

Materials and Methods

The study involves the search for ways to optimise the taxation of corporate clients by entering into contracts for the performance of project work by performers on freelance exchanges, which are important aspects of the establishment of new labour relations. This study uses a qualitative approach and a thorough review of the literature to better understand the reasons that contributed to the development of freelancing, and the various methods and actions that companies can use to attract contractors to perform the required task. Therefore, the theoretical basis was the results of already published papers, the main tasks of which were the theoretical substantiation of the effectiveness of using freelance exchanges among companies to optimise their costs, in terms of wages and taxation. For this purpose, the following methods were used: theoretical (logical, analysis; synthesis; concretisation; generalisation; economic and mathematical modelling); mathematical statistics; graphical representation of results.

The search for relevant information was conducted among papers by researchers who have already investigated this issue, and the basis of indicators for applying the method of mathematical statistics was data from official sources and the most popular freelance exchanges in Ukraine and foreign countries. The sample for the study consists of the countries of the Balkan Peninsula (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Montenegro, North Macedonia, Romania, Serbia, Slovenia, Turkey), as well as Ukraine. Ukraine was chosen for comparison as a country with one of the largest freelance markets in the world and high intellectual potential inherent in Ukrainian labour resources, so its successful experience can be used by other countries to develop their own freelance markets. Using the logical method and the generalisation, a theoretical analysis of the existing concepts of "freelancing", "freelance exchange", "online labour platform" in the economic

scientific literature was carried out; the benefits of freelance were outlined; the problem, purpose and methods of research were highlighted.

An analytical investigation of available and reliable information on increasing the scale of freelancing in the Balkan Peninsula and Ukraine was carried out. Using the method of economic and mathematical modelling, the financial results of management decisions made were evaluated, in terms of the cost of paying a full-time employee and the option of concluding a contract with the contractor, using freelance exchanges, and logical conclusions were formed about the possibility of optimising corporate taxation with the implementation of a more efficient option. The prospects for concluding contracts with external performers were substantiated, the purpose of which was to optimise the costs of the enterprise in terms of payment of wages, and the problematic issues of legal registration of employment contracts containing specific conditions dictated by the legislative framework for regulating freelancing in Ukraine were specified.

Results

State of the freelance markets

The study of the effectiveness of freelance exchanges and their demand among corporate customers in the context of tax regulation features has yielded the following results. Nowadays, there is no systematic approach to investigating the analytical data of freelance exchanges, but a rapid growth of their indicators is observed which predicts the overall stability of the development of this area. The moment of transition of employees to freelancing is an example of the establishment of new alternative forms of working relationships that have already been born and are developing. The practice of free hiring is a rejection of the classic model of a manager and an employee. An employee can combine legal work with several employers and at the same time has basic social guarantees.

Freelance exchanges are online platforms that provide a supply-demand relationship for services that can be obtained electronically. With the development of the Internet business, freelancing is also rapidly developing, although there is a biased attitude to this type of labour relationship, which is primarily associated with the risks of receiving poorly provided services from the contractor or the lack or incompleteness of payment from the buyer. Since online platforms that provide an opportunity for such communications are interested in increasing their ratings, the leading ones regularly provide statistical data used in their work to calculate the dynamics of such services and their demand in general.

Comparing the share of the online freelance workforce in Ukraine and the countries of the Balkan Peninsula, it can be noted that in terms of this indicator, Ukraine is somewhat inferior only to Bosnia and Herzegovina (Fig. 1). Main occupations in the field of freelancing for the specified countries are presented in Table 1.

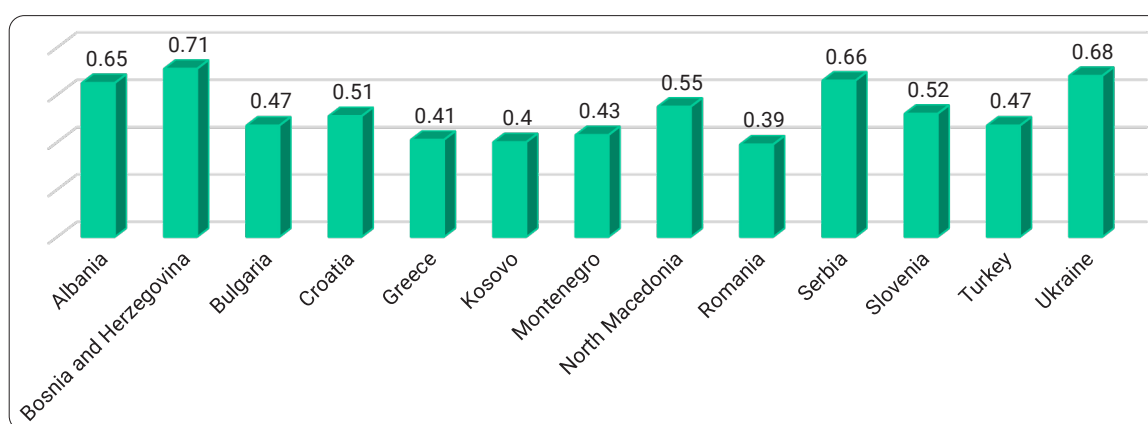


Figure 1. Share of online freelance workforce in the countries of the Balkan Peninsula and Ukraine

Source: compiled by the authors

Table 1. Main occupation in freelance market in the countries of the Balkan Peninsula and Ukraine

Country	Main occupation in freelance market
Albania	Software development and technologies
Bosnia and Herzegovina	Creative and multimedia
Bulgaria	Creative and multimedia
Croatia	Creative and multimedia
Greece	Software development and technologies
Kosovo	Creative and multimedia
Montenegro	Software development and technologies
North Macedonia	Sales and marketing support
Romania	Software development and technologies
Serbia	Software development and technologies
Slovenia	Creative and multimedia
Turkey	Creative and multimedia
Ukraine	Software development and technologies

Source: compiled by the authors

The main directions of freelance work are different in leading countries. "Creative and multimedia" direction is prevailing in Bosnia and Herzegovina, while the main direction for Ukraine, Albania and Serbia is "Software development and technologies". Globalisation continues in the world, accelerated production of goods, improvement of services provided, and the expansion and division of organisations themselves leads to the popularisation of project work, and it is more expedient to attract freelancers for this type of work. The choice of performers will depend on the orientation of companies – on the level of remuneration of employees of different continents, the ratio of time zones of the company and the performer. Global experience shows that working with freelancers allows the company to reduce costs, and freelancers – to work in the best conditions and

freely choose the location from where to work, the activity within their competence, and the work schedule.

Business in cyberspace is also characterised by other distinctive features: functioning in the form of temporary alliances or partnerships; legal independence of participants from each other; the predominance of flexible non-hierarchical structures; geographical disunity of partners (What is upwork..., 2020). The basis of a virtual enterprise is the creation of its own unified information system – a set of methods and tools for searching, collecting, storing, processing, analysing and transmitting internal and external information. In general, the tips are universal and slightly different from the principles of comfortable work with employees:

- fixing agreements;
- breaking down a large project into tasks;

- coordination of the implementation of each stage is highlighted tasks.

The freelance platform service helps companies take care of the bureaucratic side of cooperation: the security of document flow and transactions is guaranteed by the exchange, which is an obvious advantage for a freelancer. However, it is worth considering the situation on the part of the company. Businesses are always looking for ways to optimise costs. In this case, it is labour-intensive and illogical to hire an employee with an entry in the employment record book. For this type of work, it is better to find a contractor. And the company would be able to work in a hybrid

organisational form, which is likely to remain in demand even in the absence of lockdown restrictions. Another additional advantage of freelance exchanges is the simplification of the search procedure for a performer, with an additional opportunity to get acquainted with the results of their previous work and customer reviews.

Positive experience in the development of the freelance market in Ukraine

Studying the positive experience of Ukraine can be a useful lesson for other countries. The Ukrainian freelance market is one of the largest in the world, and further growth is expected (Fig. 2).

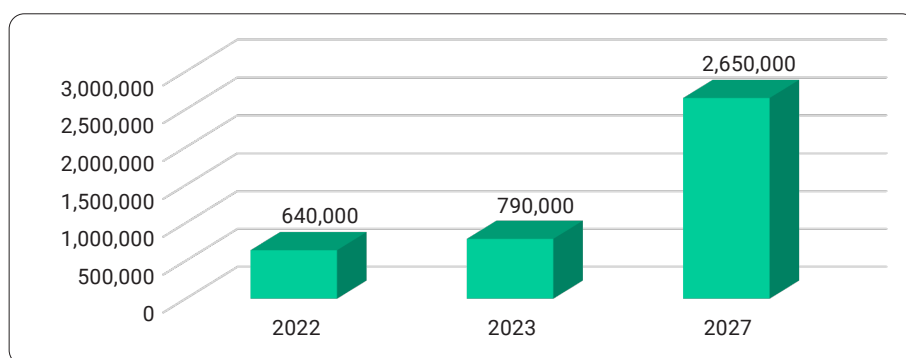


Figure 2. Indicators of freelancer growth in the Ukrainian market in 2022-2023 and forecast for 2027

Source: compiled by the authors

If the dynamic of the annual growth of freelance specialists is maintained, the number of freelancers will approach 4 million by 2030, which will amount to 16% of the country's working-age population, that is, every sixth Ukrainian will work as a freelancer (according to official data in Ukraine, as of 2023, there are about 24.5 million persons of working age – from 15 to 64 years) (World population dashboard..., 2024). For example, in Ukraine, the number of working-age people reaches 24.5 million people, while in the United States this figure reaches 57.3 million, which is 36%, reflecting the popularity of this type of employment among the citizens of the country. In addition, only the growth of such indicators is projected, and by 2027, more than 50% of the US labour force will enter the freelance market (Litorovych, 2020). Remote services on online exchanges are a phenomenon of the 21st century. Today, there are about 145 large-scale online freelance exchanges, bringing together a number of professional participants in various industries, which have received USD 5 billion since 2018, and this figure is growing. The modern global economy is changing: the conventional forms of working day and the scale of classic hiring will not exist, but freelancing and outsourcing will take their place. Ukraine in the era of reformatting the labour market does not lag behind global trends and is one of the leaders of freelancing. Statistics for 2013-2020 show that in terms of the number of employees working through online platforms, Ukraine ranks fourth in the world, and according to European indicators, the

country is the absolute leader. The number of freelancers in Ukraine was about 9 thousand people in 2011, 495 thousand – in 2019 and in 2023 it reaches 790 thousand people.

The COVID-19 pandemic has helped develop the sphere, as people are left at home and unable to lead their usual lifestyle. Therefore, in 2020, freelance exchanges recorded an unheard-of increase in registrations from 550-800 to 900-1200 potential work performers (The 2022 Global..., 2022; How many IT..., 2023).

In second place in terms of growth is the business that provides information services (+9 thousand or 24%). An additional confirmation of the development of the IT sector among freelancers is the list of services and products that are published on the Internet and the most popular among them are (IT services are..., 2022):

1. Integration of e-wallets in the app.
2. Design of applications and web platforms (3D animation, background animation, minimalism of graphic design).
3. Long-term – mobile development trends: voice search. iBeacon service, blockchain for cybersecurity, AI, machine learning, creation of SuperApp.

The earnings of a Ukrainian freelancer depend on the type of work. According to statistics, Ukrainian freelancers earn an average of USD 650 to USD 2.1 thousand per month. Average project budget in 2023 increased by 27%, the number of freelancers – by 23%, number of customers – by 14%, number of projects – by 18% (Fig. 3).

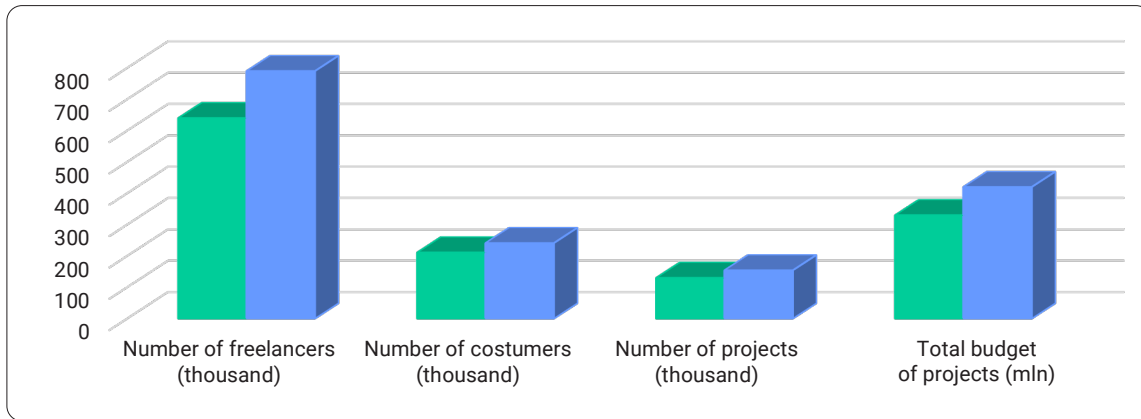


Figure 3. Dynamics of growth in the indicators of freelance exchanges in 2022-2023 on the example of the Freelancehunt exchange

Source: compiled by the authors

The largest share of freelance services is occupied by IT (web programming) – 83%, the second place is occupied by design and creativity (logo development, design projects) – 6%, and the third is shared by copyright and social media marketing promotion – 11% (Bozhkova, 2018).

A new stage of industrial relations is coming: hired labour is gradually being replaced by more flexible forms, which are characterised by part-time work and high professional mobility (The model of..., 2022). Such a system is useful for the employer, since it allows manoeuvring the quantity and quality of labour depending on the economic situation.

Freelancing opportunities to improve the unemployment situation (on the example of Kosovo)

Kosovo has one of the lowest rates of online freelance workforce in the countries of the Balkan Peninsula. At the same time, Kosovo is characterized by certain negative trends in the labour market as a whole. Thus, as of 2023,

the number of the working-age population was two-thirds. The total number of the labour force aged 15 to 64 reached 458,338 people, the number of inactive populations in the same age range was 702,326 people, of which 450,462 were women and 251,864 were men. At the same time, quite high levels of unemployment among young people are observed: 9,752 young people were unemployed, and 90,846 young people were unemployed despite the fact that they do not receive education or training (Kosovo Agency of..., 2024). Key statistics on the labour market in Kosovo are presented in Figure 4. Unemployment in Kosovo is a significant problem, as is the high level of economic inactivity, but the biggest challenge is the high rates of unemployment and inactivity among women and youth (Avdullahi *et al.*, 2022). The overall rate of inactivity among the population of Kosovo reached 60.5%, while this rate for women is 77.2%, for men – 43.2% (Kosovo Agency of..., 2024).

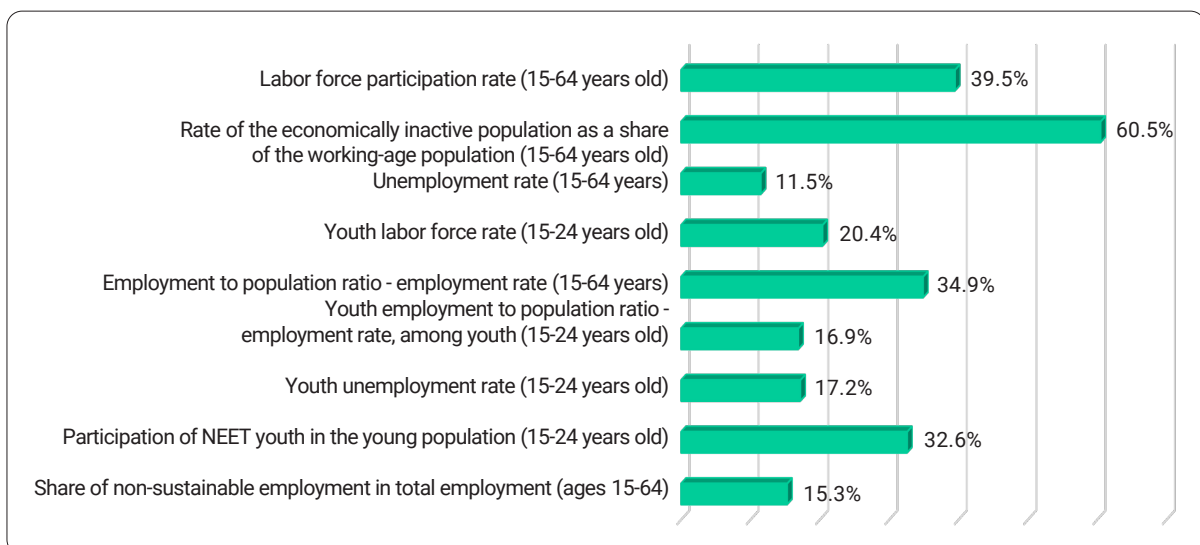


Figure 4. Basic statistical data on the labour market in Kosovo

Source: compiled by the authors based on Kosovo Agency of Statistics (2024)

According to research, the highest percentage of unemployed is present among unqualified job seekers. It can also be noted that one of the main reasons for the economic inactivity of women aged 25 to 64 who have an education below secondary level is the need to take care of children or the family (more than 70% of inactive women). At the same time, for women who have an education above the secondary level, this share is lower (about 60% on average), but the influence of such a factor as the lack of suitable work increases (about 30%). In such conditions, freelance can be an effective tool for increasing the economic activity of women, because it allows working at home at a convenient time. At the same time, according to surveys, about 85% of women, as well as more than 90% of men, have a desire to work as a freelancer (Baraku, 2020).

Using the experience of Ukraine described in the work, the countries of the Balkan Peninsula, especially Kosovo, can intensify efforts to develop the freelance market. First of all, in this process it is worth taking into account the advantages of cooperation with freelancers, defined above. In addition, valuable achievements of Ukraine are the presence of developed platforms for freelancing, technical potential in the field of IT, experience of working on international projects, as well as the availability of education, including various courses for mastering professions that can be pursued online.

Taxation of freelance activities in Albania

Starting in 2024, the personal income tax rate for self-employed persons in Albania is 15% if the income does not exceed 14 million ALL (which is about 120 thousand in euros). Income that is higher than this amount is taxed at a rate of 23%. If the annual turnover of a self-employed person does not exceed the noted 14 million ALL, it is considered a small enterprise. Under the new legislation, small businesses may be exempt from paying income tax until 2030. It is important to note that if a self-employed person receives 80% of income from one client or 90% from two clients, this type of employment is not considered freelance. Such persons are considered employees and are taxed according to the appropriate scheme. Clients in this case are considered employers, and the norms of tax legislation also apply to them. The dividend tax rate is 8%. Other income from investments is taxed at a rate of 15%. Self-employed persons in Albania pay social contributions of 26.4%. The maximum social contributions amount to about 450 euros per month, because they are calculated on the maximum salary, which is 1600 euros. In addition, any person who independently conducts any economic activity is a VAT payer. The standard VAT rate in Albania is 20%. The VAT registration threshold is set at 10 million ALL (Digital Nomad Tax, 2024).

For comparison, according to paragraph 178.1 of the Tax Code of Ukraine (2010), individuals who are not entrepreneurs must register with the regulatory authorities at their place of permanent residence and receive a certificate of registration. Income received by an individual for remote

work during a calendar year is subject to personal income tax and military tax on the general system. And with a simplified tax system, a freelancer can choose only the third group of single tax payers with/without value-added tax, due to current legislation. It is also worth remembering that the amount of remuneration will be subject to taxation with a single social contribution. To choose a tax system, it is advisable to consider the advantages of cooperation between a company and an individual entrepreneur on the simplified tax system, since it is the most common in Ukraine.

Discussion

The analysis of specialised literature highlights the fact of the development of theoretical research on the essence of the concept of "freelancing" and the lack of statistical information on the main advantages and disadvantages of the use of such cooperation for companies, since it is only gaining popularity among Ukrainian businesses. Given this, it is worth turning to the existing studies by Ukrainian and foreign researchers. It is important to note that the relevance of the topic is becoming increasingly publicised in foreign scientific and methodological journals and practical expert assessments. For example, the study by V.M. Adam (2019) indicates that freelancers are independent highly qualified employees who are freelance performers and independently perform work using modern means of communication with the customer and work without entering into a "long-term employment contract". This statement is appropriate because human resources are considered the most valuable part that organisations need to achieve their goals, despite the fact that they are needed to varying degrees by the company at different times, and therefore "short-term hiring" is an effective way to solve the problem, and freelancing should be considered the most rapidly spreading trend in the field of employment.

Full-time employment has become a tradition of the last century, but the increase in the number of workers every year, the era of digitalisation and the economic downturn of recent years make many potential employers unable to provide permanent jobs, and therefore these factors gave an impetus to the development of a different model of legal relations in the field of employment (Rose, 1990; Manyika *et al.*, 2016). Organisations often make decisions about hiring freelancers in order to complete a specific project or supplement the workforce only for a certain period of time (Burke & Cowling, 2019). Due to such an ambiguous position regarding the company's staffing table, freelancers' labour relations require an alternative inclusive approach compared to conventional employer-employee relations (Barlage *et al.*, 2019). Since online labour and freelance exchanges are essentially a new and specific step in the development of the world's economy, it is worth focusing not only on the positive aspects, but also on the difficulties that they lead to. L.F. Lieskova (2017) attributed a number of factors to the main shortcomings of the freelancer's activity, among which it is worth highlighting three: sometimes there are weak guarantees of receiving a fee for work;

instability of income; lack of a social package. In contrast, a number of existing freelance exchanges help strengthen the relationship between entrepreneurs and freelancers and increase their productivity. They cover adaptation, communication, project tasks, invoicing and payment of payments, and generally perform the main function that is in demand by the company – they help to find a performer, and a freelancer to get a job.

Finding a suitable employee is still time-consuming, and additional confirmation of this assumption can be found in the studies by a number of researchers, since online search platforms for performers do not automatically identify the appropriate freelancer for each specific project, so there is still a need to select “manually”: skills, experience, qualifications or feedback from previous projects that they worked on (Malone & Laubacher, 1999; O'Mahony & Bechky, 2006). However, there is a paradox of the popularity of freelance exchanges and the increase in the number of free employees not only in Ukraine, which was reflected in the work by evaluating official analytical data and indicators of freelance exchanges operating in Ukraine, but also in the world. This is confirmed by a number of statistics, in particular, five years ago in the United States, 34% of the labour force was free workers, and in the European Union, this figure was already approaching 15%. Leading organisations strive to achieve specific goals, and they must have human, financial, and physical resources to achieve them. At the same time, online platforms allow a potential contractor to inform foreign customers about their ability to fulfil an order efficiently. Information support is particularly important for freelancers from developing countries, contributing to the development of cross-border micro-businesses. Corporate management is increasingly giving managers the opportunity to hire employees as needed through freelancer platforms. This means that more and more companies are turning to online labour exchanges as a resource for finding professional performers.

Dozens of platforms have emerged to serve different types of clients, employees, and projects, from general micro-tasks to structured technical projects where there is an obvious need to provide professional services. And there is a demand for such work among freelancers, since tens of millions of people are looking for work through such platforms (Kuek *et al.*, 2015). A specific feature of free hiring, and therefore, the functioning of freelance platforms, is the understanding that freelancing is not about permanent work for one company, so the probability that the company will not continue to cooperate is significant. According to research, approximately 63% of freelancers consider lack of security to be the main obstacle to remote work (Malik *et al.*, 2020). As for companies, the risk category is completely different for them, but no less significant. Although freelancer search platforms, as noted in the study above, reduce the administrative burden at the enterprise, control the remuneration system depending on the type of free employment (project, piecework, or hourly), there are still a number of conditions under which the use of Internet services

of such a plan in a corporate context leads to high costs of financial transactions and errors in the chain of logical subordination and management, which is complicated by the process of agreeing on the work rights and obligations of such a contractor (Karyy, 2015). Although the attitude to freelancing in the world is still controversial, it is worth paying attention to the factors of the attractiveness of the freelance market for enterprises, which A. Davis-Blake & B. Uzzi (1993) describe in their paper, highlighting four main ones: the cost of work, the external environment, the size of the organisation, the degree of bureaucracy, and the skills necessary to perform work tasks. The peculiarity of the conducted research is that theoretically each of these factors to one degree or another positively affects the choice of both the customer and the contractor.

Another obstacle to successful cooperation between the company and the freelancer is the professionalism and decency of the performer. On the one hand, as stated in a number of studies by foreign researchers, freelancers have a high level of knowledge, which is often found in conventional full-time employees of organisations (Atkinson, 1984; Kolot, 2009). On the other hand, the company is not insured against the fact that the contractor will not meet the requirements of professionalism, will not complete the task or will not meet the project deadlines, that is, there are no guarantees that the freelancer will cope with the task. S.M. Savchenko & O.P. Gribinichenko (2017) give several reasons for this trend: a shift in the economic structure – from industry to the service sector, and the dominance of the “service economy”; an increase in the intellectual component in almost any type of work, which often involves the creation, search, processing, and analysis of information; the development of information and communication technologies.

More and more organisations work with freelancers, who are individual entrepreneurs who are neither employers nor employees, and mostly sell their services to organisations on a temporary basis (Burke, 2015). Since 2016, the revenue of the global job search platform Upwork has more than quadrupled from USD 164 million in 2016. 71% of freelancers reported an increase in the amount of work they were able to get online over the past few years, as online platforms provide the optimal place for freelancers to connect with companies. The best skills needed for companies looking to hire freelancers are mostly IT. These include Blockchain, Amazon DynamoDB, React Native, Angular, Computer Vision, Go and many others. Due to the pandemic, many professionals are now looking for online earnings to earn a living, and are taking advantage of the flexible work schedule that freelancing offers. This opinion is confirmed by the results of a recent study of the global freelance platform Fiverr, which with the help of Internet resources published information that more than 68% of remote workers express interest in freelancing due to the crisis of recent years.

The modern freelance market is developing dynamically and already demonstrates significant indicators of

development and prospects for further expansion. At the same time, companies are developing interest in hiring employees using online platforms, the main reasons for which are the ability to cooperate with foreign specialists, increased competition between potential performers, replacing classical labour relations with a contract with a freelance employee, tax optimisation and manoeuvring with salary values.

Conclusions

New stage of industrial relations is being developed, characterised by a gradual transition from classical hiring to a completely new relationship between the employer and the employee. Work from anywhere in the world, high professionalism and competition between performers due to the lack of binding to the place, part-time work, and high professional mobility. Such a system is useful for the employer, as it allows manoeuvring the quantity and quality of labour depending on the economic situation. Manoeuvrability in adjusting the amount of labour and the quality of hiring is a modern indicator of efficiency for companies. Freelancers are people who have registered their activities in accordance with the current legislation, motivated to perform work efficiently and quickly in order to quickly get paid for their work.

Based on the results of this study, relevant conclusions have been formed that can be used in the future as an effective scientific base for investigating the prospects for further popularisation of hiring freelancers among enterprises, in the conditions of a modern economy and a dynamic labour market. For the company, the privileges of working with a freelancer who has officially registered their activity are not only obtaining high-quality work, but also the appearance of a counterparty whose activities can be reflected in the financial statements, thereby successfully

using cooperation in the legal area of work. The conducted analysis shows the positive experience of Ukraine in the field of providing freelance services, which can be used by other countries to develop their own freelance market, in particular, the countries of the Balkan Peninsula.

A study of the analysis of the effectiveness of freelance exchanges for corporate business was conducted and it was found that attracting freelancers to enterprise projects contributes to economic benefits for the latter. It also explains the organisational necessity for the company in the experience of freelancers due to the lack of its own competent specialists in certain narrow industries. A qualified freelancer has knowledge that significantly exceeds the required area and can take a real company project to a completely different level. Thus, the involvement of freelancers in the company's projects becomes a modern pattern, since the new market rules dictate the conditions under which new business opportunities open up, with the involvement of highly qualified employees and reducing costs with the possibility of optimising the tax burden. Cooperation with a freelancer increases the efficiency and productivity of companies, has a positive impact on business processes, but carries risks of late or complete failure to complete the task, due to the limited ability of companies to protect their rights and interests in such situations. In general, the issue of the effectiveness of using freelance exchanges for business requires further investigation, although the real results can be evaluated today.

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Conflict of Interest

None.

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Аналіз ефективності фріланс-бірж та їх затребуваності серед корпоративних клієнтів в контексті податкового регулювання

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Анотація. Актуальність дослідження зумовлена динамічним розвитком ринку фрілансу та перспективами співпраці фрілансерів і корпорацій з огляду на специфіку оподаткування таких трудових відносин. У статті розглянуто сутність понять «фрілансер» і «біржа фрілансу» та обґрунтовано причини становлення і популяризації фрілансу в сучасних умовах. Проаналізовано ринки фрілансу країн Балканського півострова та України з точки зору попиту та пропозиції, кількості вакантних проектів, вартості, яку замовник готовий заплатити за виконаний проект. Метою даного дослідження є аналіз фактичних показників діяльності існуючих бірж фрілансу та оцінка перспектив співпраці між корпораціями та позаштатними працівниками в контексті можливості оптимізації оподаткування юридичних осіб. Методологічною основою дослідження стало використання системного аналізу при оцінці результатів діяльності фріланс-бірж та залучення і співпраці з корпоративними клієнтами, висвітлено теоретичні дані щодо подальших перспектив використання онлайн-бірж праці підприємствами для залучення підрядника проектних робіт. Узагальнено переваги та недоліки співпраці у сфері «замовник-підрядник» на онлайн-біржі праці в контексті фінансових аспектів. Обґрунтовано актуальність подальшого дослідження процесів розвитку бірж фрілансу, що зумовлено їх зростаючою популярністю серед роботодавців. Результати дослідження та сформульовані на їх основі висновки мають суттєве значення для управлінського рівня компаній, оскільки на основі проведеного дослідження та вже наявної аналітичної інформації підтверджено ефективність залучення позаштатних працівників через біржі фрілансу, можливість скорочення витрат компанії на оплату праці та оптимізації податкового навантаження в частині сплати податків за працівника

Ключові слова: вільний найм; онлайн-платформи; зайнятість; робота онлайн; проект

Analysis of Ukraine's external military-economic relations during the war with Russia

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Abstract. The relevance of this study is determined by the need to identify the consequences of the war for the economy and the prospects for the development of military-economic relations between Ukraine and other countries. The purpose of this study was to investigate the dynamics of the volume and structure of Ukraine's foreign economic relations during the wartime period and to outline future ways of expanding Ukraine's foreign activities. To fulfil this purpose, the following methods were used: statistical data analysis; comparison; graphical; and data generalisation. The main results obtained in this paper include the identification of the dynamics of volumes and goods that occupy a considerable part of Ukraine's exports and imports after the beginning of the Russian invasion in 2014; analysis of the geographical structure of foreign trade and trends in trade with the European Union in 2013-2022; assessment of the commodity and geographical structure of exports and transfers of defence goods from Ukraine in 2014-2021; determining Ukraine's share in the total volume of exports and imports of defence-related items, the main consumers of exported products, and tracking changes in this share over 2018-2022 compared to 2013-2017; analysis of defence imports in the first half of 2023; substantiation of the proposal to develop the production of defence items, namely drones and long-range missiles, which can be used both to increase the protection of Ukraine's territory and to strengthen the country's position in the international market for the export of weapons and equipment during and after the war. The results and conclusions are of practical importance for the Government of Ukraine in developing areas for the development of the country's defence sector and military-economic relations with other countries

Keywords: armed aggression; exports and imports; defence; commodity structure; arms production

Introduction

In the context of globalisation, foreign economic relations between countries play a vital role, reflecting the system of economic relations in trade, investment, finance, and other activities. Well-established economic ties allow countries to function fully and successfully in the global space and maintain a competitive environment around the world. War is the most unfavourable factor that slows down the development of any country's economy and threatens the security of the entire world. During armed conflicts in the world, the structure of exports and imports of goods in many countries' changes, and the production and supply of defence products between countries intensifies. Russia's armed aggression against Ukraine, which began in 2014, has led to difficulties in exporting certain goods and has also increased the need to import military-industrial products. Therefore, there is a need to investigate the volume of Ukraine's foreign trade, specifically in military goods and equipment, which will allow improving the mechanisms of state regulation of foreign economic activity, determining Ukraine's place in the world's military-industrial market and outlining the prospects for developing relations with other countries in the defence sector.

Ukrainian, Polish, German, Brazilian, and other scholars have investigated the development of the defence industry and military-economic relations between Ukraine and other countries in the context of the war with Russia. The study of the conceptual framework of economic relations in the military-industrial complex was conducted by O. Usachenko *et al.* (2021), who proved that the required level of Ukraine's defence capability can be achieved by improving the mechanism of economic support for the country's defence. Trends in the development of Ukraine's military-economic cooperation with other countries of the world in the current context were investigated by L. Shemayeva & P. Tolok (2021), who analysed the types of military-economic activities, assessed the development of the Ukrainian

defence industry, and stressed the need to expand the possibilities of Ukraine's international military-economic cooperation in the world arena.

The nature of relations between countries regarding the arms trade was studied by O. Pamp *et al.* (2021), and the structure of the arms transfer network between countries was considered. Scientists have proven that the past topological properties of a retail network have a substantial impact on its future evolution. The regulation of foreign economic activity under martial law was investigated by S. Skrypyk *et al.* (2022), who noted that the complexity of the conditions of the wartime period in Ukraine necessitates the search for improved mechanisms to influence this activity. The complexity of regulating foreign economic activity is caused by the need to maintain competitiveness in the global market. O.V. Levchuk (2023) analyses the specific features of integration processes between the countries of the European Union (EU) and covers the prospects for Ukraine's participation in international military-economic cooperation.

Since the outbreak of Russian hostilities in Ukraine, many industries have faced problems with the supply of raw materials, sales of products, and the overall normal functioning of production. S. Ishchuk & L. Sozansky (2023) investigated the causes and consequences of the problematic functioning of machine building in Ukraine, demonstrating the transformation in the structure of machine building since 2014. Scientists have observed the growing need for the Ukrainian government to act to support the development of machine building. Given the considerable contribution of scientists to the study of this issue, in the context of Russia's full-scale armed aggression against Ukraine, the relevance of scientific substantiation of the priorities of international military-economic cooperation is increasing.

The main purpose of this study was to analyse Ukraine's international economic relations, specifically in the military-industrial sphere, and to identify ways to increase

Ukraine's export potential during the war and after its end. The main objectives of this study were to investigate the dynamics of Ukraine's export and import activities, determine Ukraine's place in the global defence market, and outline measures that will help strengthen Ukraine's defence capabilities and enhance its competitiveness in the global arms market.

Materials and Methods

The investigation of Ukraine's military-economic relations with other countries utilised diverse methods. These included statistical analysis to examine the volumes of imports and exports of goods and services, comparisons of external trade across different time periods, graphical representation of findings, and generalisation to summarise information on the development of Ukraine's military-economic relations from 2014 to 2023 and to draw appropriate conclusions.

The theoretical framework for this paper included the scientific studies of Ukrainian, Polish, Brazilian, American, German, and other scholars who have examined the theory of international relations, their development since the First World War, the diversity of modern models of international trade, the impact of various factors on the volume of global exports of defence goods, the compliance of arms exports with international legal norms, etc. Statistical data on exports and imports of goods, trade balance indicators, commodity and geographical structure of exports and imports for 2014-2023 were analysed based on information obtained from the State Customs Service of Ukraine (2023) and State Export Control Service of Ukraine (2020). Information on the planning of the development and production of unmanned aerial vehicles for the military was analysed based on the Resolution of the Cabinet of Ministers of Ukraine No. 763 "On the Implementation of a Pilot Project for The Production, Procurement and Supply of Ammunition for Unmanned Systems and Unmanned Systems' Warheads" (2023).

Using the method of comparison, the author compares the volumes of trade turnover in Ukraine's foreign activities in 2013, which preceded the beginning of Russia's armed

aggression against Ukraine, in 2015, 2021, and 2022. Comparison of the volume of exports of defence products from Ukraine by country and for each year of the war period was made based on information on the volume of international transfers and exports of arms for 2014-2021 obtained from the State Export Control Service of Ukraine (2020). The comparison of data on international arms transfers for 2013-2017 and 2018-2022, as well as Ukraine's share in global exports and imports for these periods, is based on the data from the Stockholm Peace Research Institute Report, which monitors arms sales agreements around the world (Wezeman *et al.*, 2023). The use of the graphical method made it possible to display data on Ukraine's foreign trade in goods for 201-2023 in the form of a graph, which allowed showing the dynamics of changes in exports, imports, and trade balance for each year of the analysed period.

The application of the generalisation method allowed summarising the results obtained in the study on the trends in the development of Ukraine's external military-economic relations and determine Ukraine's place in the world export of military goods; formulate conclusions that serve as a summary of the study results and substantiate proposals for the future strengthening of the country's defence capability and strengthening its position in the international arena.

Results

The country's foreign economic activity under martial law is characterised by certain specifics and limitations of the state's capabilities. Wartime affects the economy both internally and externally, in terms of economic relations with other countries. The circumstances in which Ukraine found itself during the war point to the need to find ways to rationally apply and combine instruments to stimulate and deter the country's foreign trade activities to achieve the desired trade balance.

Since 1991, Ukraine has been actively developing foreign trade in goods and services with other countries. However, the war unleashed by Russia has had a negative impact on all areas of activity in Ukraine (Fig. 1).

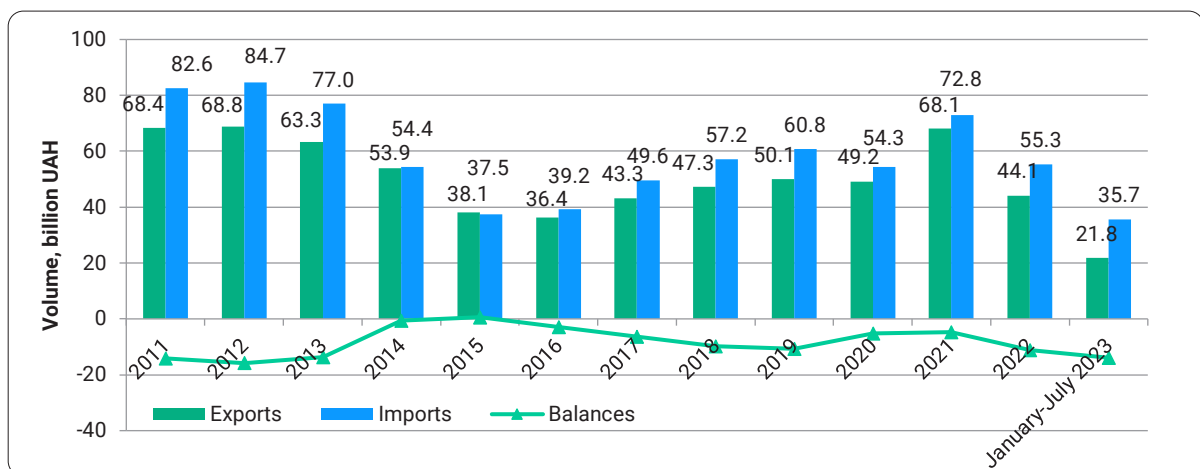


Figure 1. Dynamics of Ukraine's foreign trade in goods in 2011-2023

Source: compiled by the authors based on State Customs Service of Ukraine (2023)

As Figure 1 demonstrates, in 2015 and 2016, Ukraine's foreign trade declined on average: exports by 45% and imports by 55%, due to the outbreak of Russia's war against Ukraine in 2014. In 2017, the level of international trade began to recover, and in 2021 it almost reached the pre-war level. However, in 2022, with the beginning of the full-scale Russian invasion, trade volumes again fell to the level of 2017. Throughout the analysed period, there was a negative trade balance, which

indicates that imports exceeded exports and Ukraine's dependence on goods from other countries (State Customs Service of Ukraine, 2023). For an in-depth analysis of foreign trade activity, it is worth examining the commodity structure of Ukraine's exports and imports since 2013, which precedes the military period starting in 2014. The study of exports should be carried out by commodity items that are the most important in the commodity structure (Table 1).

Table 1. Commodity structure of exports from Ukraine in 2013, 2015, 2021, and 2022 (in mln USD)

Product name	2013	in % of total volume	2015	in % of total volume	2021	in % of total volume	2022	in % of total volume
Total	63,312	100	38,127.1	100	68,072.3	100.0	44,135.6	100.0
Live animals; products of animal origin	1,084.1	1.7	823.4	2.2	1,345.2	2.0	1,471.8	3.3
Plant-based products	8,875.9	14	7,971.5	20.9	15,538.0	22.8	13,472.7	30.5
Fats and oils of animal or vegetable origin	3,507.1	5.5	3,299.8	8.7	7,037.2	10.3	5,948.6	13.5
Ready-to-eat food products	3,557.2	5.6	2,468.4	6.5	3,788.5	5.6	2,496.9	5.7
Mineral products	7,494.9	11.8	3,099.5	8.1	8,414.4	12.4	4,322.5	9.8
Products of chemical and related industries	4,327.3	6.8	2,130.8	5.6	2,815.6	4.1	1,286.8	2.9
Wood and wood products	1,144.4	1.8	1,107.2	2.9	2,005.8	2.9	1,884.9	4.3
Precious metals and products made of them, including:	17,570.7	27.8	9,470.7	24.8	15,991.0	23.5	6,003.5	13.6
• ferrous metals	14,319.3	22.6	8,077.6	21.2	13,950.1	20.5	4,532.4	10.3
• ferrous metal products	2,589.8	4.1	917.0	2.4	1,293.0	1.9	1,051.4	2.4
Machinery, equipment and mechanisms; electrical equipment, including:	6,975.0	11	3,940.9	10.3	5,260.2	7.7	3,732.3	8.5
• nuclear reactors, boilers, machinery	3,840.9	6.1	1,961.6	5.1	2,120.9	3.1	1,175.0	2.7
• electric machines	3,134.1	4.9	1,979.2	5.2	3,139.3	4.6	2,557.3	5.8
Land transport vehicles, aircraft, floating craft	3,344.0	5.3	679.2	1.8	676.4	1.0	360.5	0.8

Source: compiled by the authors based on State Customs Service of Ukraine (2023)

Table 1 shows that the most important in the overall structure of Ukrainian exports in the pre-war period (2013) were non-precious metals and products from them, accounting for 27.8%. After the outbreak of the Russian-Ukrainian war in 2014, the share of these goods in exports gradually

decreased, reaching a decline of 14.2 percentage points (p.p.) in 2022. There was also a noticeable decrease in exports of nuclear reactors (by 3.4 p.p.), which were mainly exported to Russia. The commodity structure of imports also underwent certain changes during the war period (Table 2).

Table 2. Commodity structure of imports from Ukraine in 2013, 2015, 2021, and 2022 (in mln USD) USA)

Product name	2013	in % of total volume	2015	in % of total volume	2021	in % of total volume	2022	in % of total volume
Total	76,964	100	37,516.4	100	72,843.1	100	55,295.7	100.0
Live animals; products of animal origin	1,892.1	2.5	548.2	1.5	1,594.0	2.2	1,175.2	2.1
Plant-based products	2,669.8	3.5	1,146.2	3.1	2,130.5	2.9	1,927.0	3.5
Ready-to-eat food products	3,218.8	4.2	1,607.7	4.3	3,578.4	4.9	2,645.1	4.8

Table 2, Continued

Product name	2013	in % of total volume	2015	in % of total volume	2021	in % of total volume	2022	in % of total volume
Mineral products	22,362.1	29.1	11,690.0	31.2	14,968.8	20.5	13,123.5	23.7
Products of chemical and related industries	8,435.3	11	5,009.2	13.4	9,743.0	13.4	6,213.4	11.2
Polymeric materials, plastics, and products made from them	4,592.9	6	2,646.2	7.1	4,816.7	6.6	3,247.3	5.9
Precious metals and products from them	5,002.9	6.5	2,004.2	5.3	4,372.5	6.0	2,591.4	4.7
• ferrous metals	2,230.7	2.9	685.7	1.8	1,550.0	2.1	953.8	1.7
• ferrous metal products	1,205.1	1.6	522.0	1.4	1,126.2	1.5	642.4	1.2
Machinery, equipment and mechanisms; electrical equipment	12,470.1	16.2	6,273.4	16.7	14,206.0	19.5	9,159.2	16.6
• nuclear reactors, boilers, machinery	6,909.6	9	3,578.2	9.5	8,000.0	11.0	4,199.7	7.6
• electric machines	5,560.5	7.2	2,695.2	7.2	6,206.0	8.5	4,959.5	9.0
Land transport vehicles, aircraft, floating craft	5,901.5	7.7	1,743.6	4.6	7,572.4	10.4	5,658.6	10.2

Source: compiled by the authors based on State Customs Service of Ukraine (2023)

As Table 2 demonstrates, mineral products (29.1%) and nuclear reactors (9%) and electrical machinery (7.2%) accounted for the largest share of Ukraine's imports in the pre-war period, including in 2013. The analysis shows that during the period of intensified hostilities (2015 and 2022), imports of mineral products increased by an average of 2.1

p.p. After the full-scale invasion, imports fell mainly in nuclear reactors (by 3.4 p.p.), chemical products (by 2.2 p.p.), and ferrous metals (by 0.4 p.p.). An analysis of exports and imports of goods by geographical structure allowed identifying the main areas in the global space of Ukraine's foreign economic relations (Table 3).

Table 3. Geographical structure of Ukraine's exports and imports in 2013, 2015, 2021, and 2022

Indicator	2013	2015	2021	2022
Exports (%)				
Russia	23.8	12.7	5.0	1.1
Europe	27.0	34.1	39.4	63.2
Other countries	49.3	53.2	55.6	35.7
Total	100	100	100	100
Imports (%)				
Russia	30.2	20.0	8.4	10.0
Europe	37.1	40.9	39.7	48.8
Other countries	32.7	39.2	51.9	41.2
Total	100	100	100	100

Source: compiled by the authors based on State Customs Service of Ukraine (2023) and State Export Control Service of Ukraine (2020)

As Table 3 shows, before the war, a considerable part of trade was with European countries and Russia. However, during the 2014-2022 war, exports and imports with Europe increased significantly. The war changed the geographical structure of trade, mainly due to the severance of ties with Russia, which had diplomatic relations with Ukraine until 24 February 2022.

The development of modern international relations in wartime is characterised by the international transfer of defence goods. Ukraine's international military-economic

cooperation in times of war, economic downturn and limited financial capabilities of the state is still an important factor in strengthening the country's defence capability in the face of the enemy, as well as a factor in the transformation and development of the defence industry, and in strengthening its competitiveness in the international arena in the field of modern defence technologies.

In the early 2000s, the right to export weapons, develop technologies and provide services in this area was granted to the following companies, among others:

Spetsstechnoexport, Progress, Ukrinmash, Promoboronexport (terminated on 14.02.2020), TASKO-Export, Ukroboronservice. Ukraine's international relations with other countries have always been actively developing in the defence industry since the country gained independence.

In January 1994, representatives of the governments of Ukraine, the United States and Russia officially signed a joint document on the intention to deprive Ukraine of all its nuclear weapons. Later, in December 1994, the Budapest Memorandum was signed, which prescribed the substantial disarmament of Ukraine (Tolub, 2023). The consequences of the signing of this document are being witnessed by the entire world today. At the time of signing the Budapest Memorandum, Russia acted as a security guarantor for Ukraine, which in turn handed over to Russia 176 intercontinental ballistic missiles, 4,200 tactical nuclear warheads: 581 X-55 cruise missiles. Many weapons were disposed of. Also sold during 2001-2014:

762 aircraft, 2,815 tanks, and 1,910 missile launchers (Tolub, 2023). This arsenal of weapons far exceeds the amount that Ukraine had available before the full-scale invasion in 2022. Prior to the full-scale invasion, Ukraine's defence industry was actively working to export to other countries. In 2005-2014, military equipment and weapons were sold for almost USD 2 billion. USA: 202 aircraft, 232 helicopters, 714 infantry fighting vehicles and armoured personnel carriers, 832 tanks, 4,930 vehicles, 28,555 rocket and artillery weapons, and 1.824 million small arms and ammunition (Tolub, 2023).

Following Russia's annexation of the Republic of Crimea in 2014 and the outbreak of hostilities in eastern Ukraine, the situation with arms exports has changed somewhat, as the need for weapons has increased in Ukraine. Since 2015, exports have gradually stabilised, but Ukraine has not managed to reach pre-war export volumes. The bulk of exports was shifted to high-tech products (Table 4).

Table 4. Volumes of international transfers and exports of defence products in 2014-2021

Name	Consumer state	Number by year, units								
		2014	2015	2016	2017	2018	2019	2020	2021	Total
International transfers of certain categories of weapons										
Battle tanks	USA								5	5
	Ethiopia	11	4							15
	Nigeria	12	11							23
	Thailand		5	10	16	13				44
	Democratic Republic of the Congo (DRC)			25						25
Armoured combat vehicles	USA	1							1	2
	Thailand	17	20	34		2				73
	Nigeria	10								10
	Indonesia			5				2		7
	United Arab Emirates (UAE)			108						108
	Uganda							1		1
	Saudi Arabia								60	60
Large-calibre artillery systems	Myanmar						14			14
	Nigeria	6	12							18
Combat aircraft	USA							1		1
	Croatia	5								5
Combat helicopters	Chad	1								1
	Belarus	6								6
	Nigeria	2								2
	South Sudan		5							5
	UAE								2	2
Military ships	China	1								1
Missiles and missile launchers	Algeria	18				9				27
	Indonesia		2	3						5
	Poland			40						40
	Kazakhstan					6				6
Export of small arms and light weapons, portable air defence systems										
I. Small arms										
Revolvers and pistols	DRC	2								2
	Moldova	2								2
	Peru	580	4							584
	UAE		2							2

Table 4, Continued

Name	Consumer state	Number by year, units									
		2014	2015	2016	2017	2018	2019	2020	2021	Total	
Revolvers and pistols	Turkey			4		200				204	
	Jordan				1					1	
	Malaysia					1				1	
	USA					1		10		11	
	Poland							16	583	599	
Rifles and carbines	USA	10,166	10,000	10,000		5,068				35,234	
	Georgia	100								100	
	Canada	10,400					5,800			16,200	
	Czech Republic	5,000								5,000	
	DRC	1								1	
	Uganda	3,000								3,000	
	Zambia		2,544							2,544	
	Mongolia			10	10	20	180			220	
	Poland						3,502			3,502	
	Qatar						20			20	
	UAE							5		5	
	Assault rifles and submachine guns	USA				15,040					15,040
		Uzbekistan				2,000					2,000
Indonesia							21	21		42	
Assault rifles	DRC	2								2	
	Zambia		104							104	
Light machine guns	DRC	1								1	
	South Sudan	830		170						1,000	
	Zambia		17							17	
	Turkey			46					2	48	
	Israel							1		1	
II. Light weapons											
Heavy machine guns	South Sudan	62		88						150	
	USA					177				177	
Hand-held, under-barrel, and easel grenade launchers	Jordan				2					2	
	USA						2			2	
Portable anti-tank rifles and grenade launchers	Turkey								2	2	
	Jordan						24			24	
Portable anti-tank guided missiles and missile systems	UAE								2	2	
	Belarus	1	18							19	
	USA		89	85	790					964	
	Saudi Arabia					950	2,060			3,010	
	Jordan				22					22	
	Qatar							51	459	510	
	Bangladesh							23		23	
	Turkey								315	315	
	Morocco							124	1,000	1,124	
	Chad							53		53	
III. Portable air defence systems											
Triggers	Germany	10								10	
	UAE		8							8	
	USA		3				6			9	
	Turkey				3					3	
Rockets	USA		226							226	
	UAE		8							8	
Total		30,247	13,082	10,628	17,884	6,447	11,629	307	2,432	92,656	

Source: compiled by the authors based on State Customs Service of Ukraine (2023) and State Export Control Service of Ukraine (2020)

Table 4 shows that in 2014-2021, of the total volume of international transfers, the largest number of armoured combat vehicles were transferred to the UAE, Thailand, and Saudi Arabia, and the largest number of missiles and launchers were transferred to Poland in 2016. The bulk of small arms, including rifles and carbines, as well as assault rifles and submachine guns, were exported from Ukraine to the United States and Canada in 2014-2017. The largest number of defence products was exported in 2014, and gradually decreased until 2021. A report presented by the Stockholm Peace Research Institute shows that Ukraine was the 17th largest arms exporter in the world in 2018-2022. During this period, its share decreased by 70% compared to 2013-2017, namely from 1.7% to 0.5% of global exports. The main recipients of Ukraine's military products in 2018-2022 were China (48%), Saudi Arabia (13%), and Thailand (7.5%). In 2021, global defence spending totalled USD 1.98 trillion USD, of which USD 5.9 billion was the share of Ukraine, which was 0.3%. At the same time, Ukraine ranked 14th among importers in 2018-2022. Therewith, the share of imports to Ukraine in the global volume increased from 0.05% in 2013-2017 to 2% in 2018-2022. The main suppliers of defence products are USA (34%), Poland (17%) and Germany (11%). Specifically, in 2022, Ukraine became the third largest importer of major weapons after Qatar and India (Wezeman *et al.*, 2023).

According to the German Ministry of Economy, in the first half of 2023, Ukraine received military weapons and equipment worth more than 1.65 billion EUR (Federal Ministry for Economic Affairs and Climate Action, 2023). Notably, Russia's armed aggression has forced Ukraine not only to become one of the world's main arms importers, but to start developing the production of its own modern weapons, which Ukraine plans to supply to the entire world in the future. One of the first steps in this area was the adoption Resolution of the Cabinet of Ministers of Ukraine No. 763 "On the Implementation of a Pilot Project for the Production, Procurement and Supply of Ammunition For Unmanned Systems and Unmanned Systems' Warheads" (2023). This regulatory document will accelerate the production and supply of Ukrainian drones for the needs of the army, as well as create conditions for the development of Ukrainian military technologies. Furthermore, it is important for Ukraine to develop and establish mass production of long-range missiles, which are a valuable weapon for winning a war and a competitive product for entering the international market.

Thus, during the war with Russia, Ukraine's economic relations with other countries of the world, both in the field of trade in goods for various purposes and in the field of exports and imports of defence products, have undergone certain changes. The decline in foreign trade in certain goods, especially in the industrial sector, gradually slowed the development of Ukraine's economy. Since its independence, Ukraine has transferred to other countries and destroyed many weapons in compliance with international agreements, which has weakened its defence capabilities

in the war with Russia. In 2014-2021, Ukraine continued to export defence products in large volumes, gradually decreasing them. Today, as one of the world's major importers, Ukraine is taking many steps towards establishing its own arms production, which will help it become one of the major arms exporters in the future and boost economic development in the post-war period.

Discussion

The study of the development of Ukraine's foreign economic relations during the war started by Russia in 2014 allowed analysing the dynamics of trade volumes over this period, identifying the main types of commodity products that were imported and exported during the war, as well as the volume of exports and imports of defence goods. The results obtained made it possible to formulate the main trends in the export of military products and outline the prospects for Ukraine's participation in global arms exports.

The analysis of the essence of economic international relations suggests that there is a scientific interest in the theory and common models of such relations, as well as in the strategic trade behaviour of developed countries. A critical explanation of theories of international trade was provided by Bharat *et al.* (2023), who rightly emphasised that attention should be paid to models that incorporate income inequality across countries, political trade strategies, and real-world factors. At the same time, Z. Chen (2022) studied the traditional theory of international trade and noted that, given the current development of science and technology, international trade theories should be changed, as regional economic development should aim to achieve the goal of sustainable and healthy development.

As international trade takes place in a globalised environment, it has recently seen rapid growth, which has also been facilitated by the reduction of tariff and non-tariff barriers. This has led to a rapid increase in the total value of exports and imports, making international trade larger and more complex (Tyas *et al.*, 2023). The paper emphasises that military events have had a significant impact on the development of Ukraine's economy and the structure of exports and imports of foreign trade. An analogous view is supported by L. Karlsson & P. Hedberg (2021), who investigated the impact of war on trade between 1830 and 1913 and argued that one of the main reasons for the rapid integration of commodity markets was the peaceful nature of a certain period of the 19th century. It is true that war reduces trade between the belligerents and with other countries not involved in the conflict.

At the same time, returning to international trade patterns, as O. Krpec & V. Hodulak (2019) rightly point out, the impact of military conflicts on the smoothness of trade flows leads to changes in the economic structures of countries, trade policies, and changes in established trade patterns. This undoubtedly affects the position of countries in the international trade system. When studying international trade in wartime, a special emphasis is placed on the transfer (export) of defence products between countries.

Investigating this issue, B. Vroege (2021) examines the involvement of the European Defence Fund in the development of weapons and emphasises that international and EU norms are not effective enough, as they allow EU member states to export weapons despite the serious risk of their use and violation of international humanitarian law.

At the same time, G. Maletta (2021), studying the issue of responsibility for the arms trade to reduce human suffering in Yemen, emphasises that there has been some inconsistency in the actions to control arms exports by EU member states: specifically, in the application of international humanitarian law standards in their decisions to transfer weapons to coalition members involved in the conflict. Agreeing with the opinion of J. van Lieshout & R. Beeres (2021), it should be noted that the impact of legislation on arms export control requires in-depth research. In a different context, namely how arms trade is conducted within an international network of alliances, this issue was addressed by C.C. Chou *et al.* (2023), who showed that two states connected in a network of political alliances have links in the arms sales network, i.e., the network of alliances is a strong incentive for bilateral arms sales.

The paper examines the dynamics of arms transfers between countries, but in this aspect, it is important to investigate the nature and essence of international relations in the course of such transfers. The main theories on how states strengthen their military power are taken for granted in the study of international relations. However, S.L. Willardson & R.A. Johnson (2021) put forward and tested seven hypotheses using aircraft traffic data from 1990-2010, finding support for some hypotheses drawn from the democratic peace literature, but most of the hypotheses were argued to be liberal trade. Studying the globalisation of arms production, C. Choi & S. Park (2023) note that this has not led to the convergence of the national defence industry to a liberal market model. The researchers conducted an in-depth study of South Korea's defence industry reform, which began in 2008, and the subsequent increase in arms exports (Choi & Park, 2023) and noted that the goal of South Korea's defence industry reform was to maintain its advantage among other countries.

The paper emphasises the need for Ukraine to develop the potential to produce long-range missiles, which are a valuable combat resource. Supporting this opinion, H.C. Farias *et al.* (2023) note that missiles have become a modern weapon and an important defence product with high technological potential. Studies of the evolution of missile transfers in the period from 1950-2010 show:

- steady growth of international missile transfers relative to other categories of defence products;
- high concentration of the market of missile suppliers, with the US, Russia, and France exporting an average of 84.6% of the total (Farias *et al.*, 2023).

The current international arms trade market is unevenly distributed, due to considerable differences in the development of military technologies in different countries. Supporting this opinion, X.-Y. Wang *et al.* (2023) note that there

is a fixed hierarchical structure in the arms trade, but the emergence of developing countries may change this situation. International arms trade relations are built on economic forces, followed by political, security, and strategic factors.

Scholars have investigated the impact of certain factors on changes in international arms exports and imports in many ways. For instance, A. Baronchelli *et al.* (2021) studied the effectiveness of the embargo on the trade in small arms and light weapons, which showed that the embargo reduces exports of these weapons to sanctioned countries by 33%; the EU embargo leads to a 37% reduction in arms supplies, and the United Nations embargo has little impact. The impact of sanctions, specifically the different consequences of diverse sanctions instruments, was also investigated by S.K. Afe-sorborg (2019), who rightly noted that imposed sanctions lead to a decrease in trade flows, but the threat of sanctions leads to an increase in sales flows. This is because economic entities increase their turnover before the actual imposition of sanctions to minimise any adverse consequences. The impact of advertising on the market of arms and military equipment was investigated by G. Jasiński (2023), whose opinion should be agreed with that although advertising used in the arms market does not directly affect the country's desire to obtain it, it is still crucial in terms of image and information, and helps to draw attention to some aspects of the arms sector (increased security, improved international cooperation, technological development, etc.).

Thus, the analysis of the results of scholars' research on foreign economic relations of countries and the development of the arms export-import market demonstrates the scientific interest in studying this issue. The main conclusions drawn in this paper regarding the impact of military events in Ukraine on the development of foreign trade, including arms transfers to other countries, are consistent with the opinions formulated in the studies of other scholars and may also help to identify ways to strengthen Ukraine's position as an arms exporter in the global market.

Conclusions

The findings of this study strongly suggest that Ukraine's external military-economic relations have weakened under the influence of Russia's armed aggression and require the identification of areas for their development in the current conditions.

The purpose of this study and the analysis of Ukraine's foreign economic relations during the wartime period allowed formulating the following conclusions. The war launched by Russia in 2014 against Ukraine has led to a change in the commodity structure of exports and imports, namely a decrease in ferrous metals and products and nuclear reactors in the commodity structure of both exports and imports. An analysis of the geographical structure of foreign trade showed that since 2014, the volume of trade with European countries has been on the rise. The study revealed that Ukraine's defence sector has been constantly developing, which allowed the country to occupy a prominent place among the world's exporters of military equipment

and weapons even after the outbreak of hostilities in eastern Ukraine. It was proved that in 2014-2017, most of the exported equipment and goods were armoured combat vehicles and small arms. A comparison of exports and imports of military goods showed that exports in 2018-2022 decreased by 1.2 p.p. compared to 2013-2017, while imports increased by 1.95 p.p., indicating an increase in Ukraine's demand for military products. The study substantiated the need for Ukraine to develop its defence sector, specifically by introducing the production of drones and long-range missiles. This will contribute to the development of the defence sector to improve the country's defence capability in times of war and expand opportunities to increase exports of military products.

The conclusions are of practical importance for the Government of Ukraine and can be used in the development of measures for the development of foreign trade and economic policy and national arms production. The principal areas of further research will be an in-depth investigation of the conditions and features of the international arms market.

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Conflict of Interest

None.

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Аналіз зовнішніх військово-економічних відносин України під час війни з Росією

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Анотація. Актуальність дослідження визначається необхідністю виявлення наслідків війни для економіки та перспектив розвитку військово-економічних відносин між Україною та іншими країнами. Метою даної роботи є дослідження динаміки обсягу та структури зовнішньоекономічних зв'язків України у воєнний період та окреслення подальших шляхів розширення зовнішньоекономічної діяльності України. Для досягнення цієї мети було використано такі методи: статистичний аналіз даних, порівняння, графічний, узагальнення даних. Основні результати, отримані в роботі, включають визначення динаміки обсягів та товарів, які займають значну частину експорту та імпорту України після початку російського вторгнення у 2014 році; аналіз географічної структури зовнішньої торгівлі та тенденцій у торгівлі з Європейським Союзом у 2013-2022 роках; оцінку товарної та географічної структури експорту та передач товарів оборонного призначення з України у 2014-2021 роках; визначення частки України в загальному обсязі експорту та імпорту товарів оборонного призначення, основних споживачів експортованої продукції та відстеження змін цієї частки протягом 2018-2022 рр. порівняно з 2013-2017 рр.; аналіз оборонного імпорту у першому півріччі 2023 року; обґрунтування пропозиції щодо розвитку виробництва товарів оборонного призначення, а саме безпілотників та ракет дальньої дії, які можуть бути використані як для підвищення захищеності території України, так і для посилення позицій країни на міжнародному ринку експорту озброєння та техніки під час та після війни. Результати та висновки мають практичне значення для уряду України при розробці напрямів розвитку оборонного сектору країни та військово-економічних відносин з іншими державами

Ключові слова: збройна агресія; експорт та імпорт; оборона; товарна структура; виробництво озброєнь

**Based on data: Assessing the impact
of the “double reduction” policy on the local economy**

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Abstract. The policy of “double reduction” has been applied by the Chinese government, and therefore, an assessment of its impact on various components of economic and social development in this and other countries is relevant. The purpose of this paper was to determine how the outflow of students abroad (due to the use of the “double reduction” policy) affects the economic development of local economies. The main methods used in the study were analysis, abstraction and forecasting. The article presents a survey of Chinese students studying abroad, which shows differences in satisfaction, cost of living and employment rates in different countries. The essence of the “double reduction” policy, which was aimed at solving various problems in the education system, was also considered. It describes the purpose of the policy and the actual impact it had on students and teachers. In addition, it was noted how the policy was related to the out-migration of students, and the negative and positive effects of the policy on the country were also discussed in detail. The correlation between these factors and the gross domestic product was also explored, highlighting the

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potential interaction between these indicators. In particular, it was shown that the level of satisfaction with education was diverse and did not have a significant correlation with other factors, such as unemployment and living costs. In turn, other indicators that did influence the level of study satisfaction were noted. This paper brings new knowledge to the assessment of the development of China's economy and its education sector. It also provides a better understanding of how the trends in student out-migration affect the economic development of other countries

Keywords: regionalism; socio-economic consequences; economic consequences; education; sustainability

Introduction

The education sector in China has always been characterized by certain peculiarities. For example, the educational process within the country was very rigorous, and mathematics and engineering were very popular (Cheng *et al.*, 2020; Li & Eryong, 2021). In addition, opportunities to study abroad in countries such as the United Kingdom and the United States of America have become widespread (Cheng & Agyeiwaah, 2022). Schools have also placed a lot of emphasis on learning languages, particularly Chinese and English, as well as cultural texts and values. All of this combined to make the learning process in the country too difficult for students in some places, causing psychological and physical health problems (Huang, 2020). In response to this challenge, China's government officials introduced the "double reduction" policy. China's "double reduction" policy is a multifaceted education reform policy introduced by the Chinese government in 2021 (Wang *et al.*, 2022; Dai, 2023). It aims to address several key issues in China's education system, mainly focusing on reducing the burden of excessive academic work and private tutoring for students. However, the implementation of this policy has also led to other changes, including the impact on trends in student out-migration. Therefore, it is important to investigate what exactly they will be and how they will affect the development of the local and Chinese economies.

A significant number of scholars have studied the state of education in China. Thus, C. Zhang (2023) assessed the current factors influencing the development of education in China. He showed that an important role is played by a large population of the country, and therefore numerous individuals of different personalities. He also assessed the difference in the level of education in rural and urban areas. Nevertheless, he did not offer clear advice in terms of formulating public policy in this area. L. Guo *et al.* (2019) also studied the development of education in China, in particular, paying attention to equality in education. The scientists noted that everyone should have equal access to quality education, regardless of their background. This is important not only from a moral and ethical point of view, but also for more efficient future economic development. B. Xu (2021) wrote about the transformational changes in the country's higher education system. He notes that the education sector has made significant progress in terms of increasing competition and solving many of the problems that existed before. The researcher also mentions reforms and describes their role and importance. However, he does not offer any advice on how to further improve the efficiency of the system.

B. Wu (2021) also studied China's regulatory changes in the after-school tutoring industry. Such a policy has led to rapid changes in the industry, which have not always had a positive effect, according to the scientist. J. Li *et al.* (2022) evaluated in their study the analysis of public opinion on the implementation of the "double reduction" policy in education. Their monitoring has shown that public opinion can vary greatly depending on where it is collected, in which segments of the population. According to the researchers, the reform was generally perceived positively, although some negative components were also described. A study on the impact of the double reduction policy on the Three Children policy was conducted by Q. Liu (2022). The researchers pointed out that there are contradictions between the two policies, given that one of them is aimed at increasing the birth rate, while the other is aimed at reducing it. They also pointed to the possibility of synergies between them in the future. Some changes in the context of music school education were studied by S. Wen & H. Jianmin (2023). They considered this policy as a means of promoting the development of aesthetic education among students. The researchers noted that it had a positive impact on the rural population and helped bridge the gap with urban schools in terms of music education.

Thus, the purpose of the study was to analyse the impact of Chinese students who went abroad due to the implementation of the "double reduction" strategy on the development of the local economy.

Materials and Methods

As part of the study, 175 Chinese students were surveyed online, studying in selected countries abroad. They were asked specific questions about their satisfaction with their studies (from 0 to 10), tuition fees, and employment status. As part of this survey, students had to answer 4 questions: the country in which they are currently studying, satisfaction with their studies (from 0 to 10), cost of living (in dollars per month) and employment status (whether they have a job or not (note that this includes both formal and informal methods of earning money, such as part-time jobs)). This information was aggregated and analysed from different angles, which was the basis for the conclusions drawn in the paper. Different students responded quite differently to questions about the level of study within their universities, as well as their expenditure and employment status. The survey was anonymous, all participants were informed about the purpose of using the information and gave their consent to the survey and information processing.

The selected data were evaluated using statistical data analysis. Firstly, a correlation matrix was built for these indicators to assess the interaction between them. Subsequently, for the indicators with a sufficient level of correlation (above 0.5), a regression equation was built to build a relationship between the number of students studying in the country, the average cost of living and the level of employment. The resulting formula can be seen below (1):

$$y = -32 + 0.02x_1 + 49.93x_2, \quad (1)$$

where y – number of Chinese students studying in a particular country; x_1 – the average cost of living in the country; x_2 – the level of employability of students.

Other characteristics of the model are as follows:

1. Adjusted R^2 is 0.3775.
2. The value of the F indicator is 0.03756.
3. The corresponding p-values for each value (y , x_1 and x_2): 0.11, 0.07 and 0.08.

Based on the data obtained, the relevant conclusions were drawn about how the number of students studying in a country depends on the relevant indicators of living standards in that country. The main approach used in the study was a systematic one. It made it possible to assess the factors that influence the development of the local economy and the situation of students in certain territories by understanding the interaction between these factors, which helped to improve the accuracy of the models.

The main method, in turn, was the analysis, which allowed drawing important conclusions within the study on the impact of the “double reduction” policy on the economy, which was experiencing an influx of students from China. The historical method allowed evaluating the available data on the development of the country’s education sector in retrospect. Abstraction was also used, which made it possible to disregard certain factors that did not have a significant impact on the development of education and the impact on local economies, which also improved the quality of the model. Forecasting was also used to assess the future prospects for the development of this concept and its comprehensive impact.

Results

China’s “double reduction” policy is generally aimed at addressing a variety of educational and societal issues, especially in the context of primary and secondary education. It has many goals, including reducing the burden of homework and after-school tutoring for students in China, reducing the financial pressure on families due to expensive tutoring services, and improving the overall quality of compulsory education in China. It was introduced primarily due to the fact that Chinese students spend a significant amount of time studying, which leads to long hours of on-campus study and extracurricular activities. The competitive nature of the education system, driven by high exam rates, has led to a greater reliance on extracurricular tutoring. The introduction of the “double reduction” policy

results in strict regulations on private tutoring services, especially those offering core subjects such as maths, Chinese and English. This also applies to extracurricular activities, preventing schools from offering excessive extracurricular activities and encouraging the creation of a more balanced schedule for students. In addition to reducing academic pressure, the policy promotes a more holistic approach to education, paying much more attention to students’ physical and mental health, fostering creativity, critical thinking and overall personal development. The Chinese government has introduced strict monitoring and enforcement mechanisms, and schools and other educational institutions face fines in case of violation. To compensate for the decline in private tutoring, the Chinese government is also seeking to strengthen the public education system, which includes increasing funding for public schools, improving the quality of education, and expanding access to educational resources. The aim is to make public education more attractive to students and parents, and to increase access to education and reduce the financial burden of education for families (The General Office..., 2023).

The survey found that sleep deprivation and obesity have become pressing issues among Chinese students, and that studying for high-pressure exams leads to mental health problems, which can lead to anxiety and suicidal thoughts. Thus, the policy itself aims to alleviate the pressures associated with education that also arise in the context of the one-child policy and some cultural characteristics. The policy promotes a student-centred approach to learning, respecting the individual and their interests. It allows for a balanced workday for these students and does not allow for ranking them by academic performance. In general, public sentiment varies regarding these changes. Some politicians support the initiative because of its potential to ensure equity in education; however, there are also negative sentiments, especially regarding the impact on the tutoring industry, which could lead to bankruptcy of some companies and loss of jobs or earnings for such employees (Aliyeva, 2023). It is possible to already see the first effects of its introduction. Thus, the tutoring industry has undergone significant changes, with many institutions becoming non-profit and staff reductions. Mental health problems among students have become less pronounced, with students having more time to balance their personal lives and their studies. However, in order to draw clearer conclusions, it is worth testing these theories over longer periods of time.

And although such policies are aimed at improving the situation of students, paradoxically, they can also lead to an outflow of students, as was observed in China. There are several reasons for this. For example, for some students, the reduced availability of private tutors, which many Chinese students and their families used to seek, has led them to go abroad to seek better education. In addition, economic considerations for moving abroad, including employment opportunities and relatively higher salaries for work performed, remain relevant. In addition, government policy it-

self encourages a more diversified approach to education, and students' study abroad and subsequent return (and thus their experience) can improve the internal training system and the functioning of enterprises and government institutions. In other words, the main reasons for students to go abroad remained relevant, and some may have even intensified, which did not lead to a decrease in outflows but only contributed to the continuation of the trend. In general, the question of how beneficial such an outflow of students is for the country is debatable, given

that this phenomenon has both positive (strengthening international cooperation, improving education standards, attracting new financial flows) and negative components (possible loss of human resources, innovation, demographic outflow as such). In any case, if any of the phenomena becomes too widespread, its negative aspects tend to outweigh the positive ones. Therefore, they should be kept under control. As part of the study, a survey among the target group of students about their study abroad experience was conducted (Table 1).

Table 1. Average survey results by Chinese students abroad in individual countries

Country of study	Amount of students	Satisfaction with learning	Average cost of living (\$ per month)	Employment, %
Canada	19	8.2	1,854.9	15.79%
Japan	9	5.8	1,491.3	22.22%
Great Britain	36	8.3	2,126.4	16.67%
United States	41	6.3	2,504.8	21.95%
Sweden	5	7.4	2,465.2	0%
Hong Kong	13	7	2,102.3	23.08%
Australia	17	7.7	2,267.7	17.65%
New Zealand	6	8.2	1,764.5	16.67%
Singapore	10	7.2	2,135.1	20%
France	6	5.8	1,947.7	16.67%
Germany	9	7.5	1,777.9	11.11%
Italy	2	6.9	1,800	0%
Spain	2	6.4	1,597.5	0%

Source: compiled by the authors based on a survey

As can be seen from Table 1, in different countries, the selected list of students assessed the level of education in different countries quite differently, spent, on average, different amounts of money for living, and had different levels of employment. In order to find the relationships between these values, it was initially decided to build a correlation matrix shown in Table 2. Table 2 shows that the main correlation is observed between the number of students in a particular country, the average cost of living in that country

and the level of employment, while satisfaction with studies does not play such a high role. It is interesting that the higher the number of students in a country, the higher the average cost of living: perhaps students pay more attention to employment prospects in the country and the possibility of receiving relatively higher salaries, which they see in countries with a higher cost of living. It is also likely that this is due to other indicators that also characterize the standard of living in countries with higher prices.

Table 2. Correlation matrix between various indicators characterizing the study of Chinese students abroad

	Amount of students	Satisfaction with learning	Average cost of living (\$ per month)	Employment rate, %
Amount of students	1			
Satisfaction with learning	0.193	1		
Average cost of living (\$ per month)	0.53726	0.17398	1	
Employment rate, %	0.51658	-0.03559	0.1371	1

Source: compiled by the authors

Based on the two selected indicators, a regression equation was constructed, which can be depicted as shown in Formula 1 in the methodology. In general, the model can be characterized as explaining a relatively small amount of variation in the dependent variable, but it is adequate, and the variables, although not reaching the recommended

values below 0.05, still describe the variables with relatively high accuracy. Although this model cannot be considered completely satisfactory, it does allow drawing some conclusions. First, it suggests that students do not always evaluate only the quality of education, but also other indicators when applying to a foreign higher education institution.

Secondly, in future studies, it is worth conducting a similar survey, but with a much wider list of questions and students from more countries to make the model even more clear

and adequate. It was also decided to try to find a correlation between the country's gross domestic product (GDP) and the values shown above. This data is shown in Table 3.

Table 3. Indicators of GDP change in selected countries at different time intervals

Country	Change in GDP level for 2022, %	Average (over 49 years) GDP change rates, %
Australia	7.9	6.9
Canada	6.9	5.9
France	-5.9	4.9
Germany	-4.4	4.9
Hong Kong	-2.5	8.1
Italy	-4.9	5.1
Japan	-15.5	4.8
New Zealand	-3.3	6.2
Singapore	10.1	10.4
Spain	-2.1	6
Sweden	-8	4.8
Great Britain	-1.7	5.8
United States	9.2	6.1

Source: compiled by the authors based on the data from The World Bank (2023)

Table 3 shows the average GDP growth rate and its change in 2022, calculated on the basis of World Bank data. A correlation value was calculated between the

obtained data and the indicators obtained as a result of the student survey. The new correlation matrix can be seen in Table 4.

Table 4. Correlation matrix with new values of GDP levels

	Amount of students	Satisfaction with learning	Average cost of living (\$ per month)	Employment rate, %	For the year 2022	In average
Amount of students	1					
Satisfaction with learning	0.193	1				
Average cost of living (\$ per month)	0.537	0.174	1			
Employment rate, %	0.517	-0.036	0.137	1		
Change in GDP level for 2022	0.496	0.335	0.511	0.281	1	
Average (over 49 years) rates of GDP change	0.088	0.161	0.263	0.414	0.636	1

Source: compiled by the authors based on the data from The World Bank (2023)

As can be seen from Table 4, GDP growth for 2022 and over a significant historical period correlates with some indicators obtained in the survey. However, they cannot be used to validate the model, as adding them to the model makes it less adequate, and the p-value for all indicators increases (i.e., their quality deteriorates). Nevertheless, the level of change in GDP for 2022 has a certain correlation with the number of students studying in the selected countries, which may indicate some existing interaction between these indicators.

The above information suggests that it is highly likely that more Chinese students will be willing to move to countries with employment opportunities and better living standards. Their influx may have a different impact on the country's economy, including local consumption, which will increase and thus boost business revenues (Ziberi et

al., 2022). In addition, they can bring in new labour in certain professions, often in jobs that are often filled only by students (e.g. waiters). There may also be a cultural impact on the areas where these students will live. Nevertheless, all such trends are long-term and will not be immediately noticeable for the country. Moreover, in order for this to have a truly significant effect, the number of students who move must be really large, which is likely to happen only in a few years. The impact on China's domestic economy has already been partially described. Such a policy will lead to a reduction in the burden on students, and thus ensure their psychological and physical development is more sustainable. However, there is also a negative impact, which leads to an outflow of students and thus all the corresponding negative effects. As a result, China may lose a large amount of talent; such trends may lead to human capital depletion,

with potentially highly skilled people leaving the country in search of better opportunities. This, like a decrease in consumption, will cause economic losses for the country. The consequences can also be seen from a demographic point of view, leading to an ageing population. The impact of such phenomena is so multifaceted that it is often difficult to assess whether they are more beneficial or harmful. In any case, China should be interested in returning students from abroad to create added value within their home country.

Discussion

The role of education development for the economy was noted by I. Ozturk (2008). He noted that education is necessary for economic development, and that its balance contributes not only to economic development but also to productivity and creates individual income per capita, which is confirmed by the conclusions in the paper above. This is why Chinese policymakers pay so much attention to this area. Research in the context of assessing education as a basis for economic development was conducted by D.M. Neamtu (2014). The assessment itself was based on the example of Romania. He emphasizes the negative impact of austerity measures on human capital and stresses the need to invest in education. Japan was mentioned as an example, which prioritized education and human resource development. Thus, the scholar notes the importance of aligning the educational system with labour market demands, increasing investment in education, and promoting participation and success in school; he also wrote about the role of political stability and economic growth in increasing human capital. He considers this to be a key part of Romania's future economic development. In China, the introduction of the "double reduction" policy has slightly different reasons, namely to ensure a healthier student population. Nevertheless, actions in the same direction as in Romania, from the point of view of public policy, should also be taken by the state.

The Chinese policy of "double reduction" was studied by Q. Wang *et al.* (2021). They noted that in the context of the intelligent education industry, this policy aims to increase equality in education by developing and promoting high-quality online educational resources; it should encourage the creation of networks of high-quality schools that use national and local educational platforms to offer free high-quality educational resources and courses to students from different grades and subjects. Thus, its use has far-reaching implications for China's education system and economy, reducing family spending on education and allowing for student-centred learning. The policy underscores the importance of government control over the private tutoring industry for overall prosperity. It is expected that the process of implementation will be long and complex, which will improve the quality of education and make it more equitable. These components of the "double reduction" policy have been discussed above. The final economic impact of this policy is difficult to predict, but in the long run it should be positive due to the increased efficiency of such workers.

J. Yang (2022) assessed the impact of COVID-19 on students studying abroad, with a focus on Chinese international students. He showed that Chinese international students faced significant levels of anxiety in the early stages of the COVID-19 pandemic, which was primarily caused by preconceived fear of COVID-19 and contradictory information often received from different sources. In addition, Chinese students studying abroad were often forced to resort to cheating and plagiarism due to academic pressure and pressure from their families. These trends ultimately have a negative impact on the quality of education of such students, as well as their future success in finding a profession. The study also examined the impact of social support on reducing loneliness among international students: It was found that national ties between Chinese students and a close-knit Chinese student community reduced their loneliness, as did relationships with partners in the host country. Therefore, the provision of such national groups in the host country is an important component of the country's psychological health. The paper above did not investigate how social groups influence students' willingness to continue studying in a particular country, or their level of success in it. Nevertheless, it should be acknowledged that this approach is worthy of attention and should be evaluated in the future with a focus on the "double reduction" policy.

Some problems of the "double reduction" system were described by J. Li *et al.* (2021). They noted that tutoring outside the university has lost momentum and needs to adapt to survive, while reforms in schools have changed student learning. In other words, the previous tutoring system has significant problems and needs to adapt to the new conditions, especially given that changes in this area should continue in the future. Researchers have also noted the increasing role of parents in the upbringing process. Nevertheless, as shown in the paper above, it is worth mainly expecting positive changes in the long term from such implementations in the country. An assessment of the impact of China's "double reduction" policy on Chinese students studying in European countries was conducted in work by B. She *et al.* (2023). As noted by scientists, the "double reduction" policy has both positive and negative aspects. For example, the ban on private educational centres and tutoring classes due to this policy has prompted students and parents to seek educational opportunities in Europe, the United States, and Australia. These policy changes are likely to boost the foreign education market for Chinese students as younger students show interest in studying abroad. In general, these trends are dangerous for China in their own way if they lead to a significant outflow of highly intelligent people. But on the other hand, it also makes it possible to achieve better teaching conditions at universities for students who cannot afford to study on their own, as shown in the paper above, based on student surveys. These trends can indeed be harmful to the country's development, both economically and socially, especially if they become more widespread than they are today. Therefore, the state author-

ities should pay attention to how they can ensure the return of students from abroad after they complete their studies.

X. Zhang *et al.* (2022) investigated public views on education under China's "double reduction" policy using questionnaires and data analysis. Public perceptions varied according to their knowledge of the policy and their role (whether they were parents or teachers). The consensus among the public is that the policy aims to reform the education and training industry to ensure equitable distribution of resources, improve the quality of school education, diversify teaching and learning methods, and promote fairness and equity in the national public education system. Based on these findings, the authors offer the following policy recommendations: to promote understanding of the "double reduction" policy among the public, especially targeting older and less educated people to improve their perception of the education system; to address the problem of excessive number of additional courses in education and training to ensure equitable distribution of domestic educational resources, improve the quality of school education, and create a fair education system with diverse teaching and learning methods. It is worth noting that similar recommendations have been made earlier in the paper, and they make sense. Nevertheless, it is also worth remembering that education, both at school and university, should still provide students with the knowledge they need for their future profession. Therefore, making existing education systems too easy can also be harmful.

Given the above information, some recommendations can be made in terms of China's education policy. Thus, it is important to continue to study the impact of the "double reduction" policy on the education system and student well-being, which may include ongoing regular data collection on student satisfaction, academic performance, and mental health. Teachers should also be supported to improve their condition in the face of increased workloads and uncertainty about their roles due to policy changes. It may be effective to allocate additional funds to support mental health services in educational institutions to provide counselling, stress management programmes and health awareness initiatives to address the psychological problems students may face during their studies. In addition, it would be effective to improve the level of public education, making it more attractive, which could be manifested in increased funding, improved quality of education and easier access to educational resources. The formation of such actions within the country can improve the situation in terms of the development of the educational sphere, the psychological and physical condition of students.

Conclusions

Thus, China's "double reduction" policy is a multifaceted approach to addressing educational and social problems.

Its goals include alleviating excessive academic workloads for students, reducing financial pressure on families due to expensive tutoring services, and improving the overall quality of compulsory education in China. The main components of the "double reduction" policy include stricter regulations on private tutoring services, especially in important subjects such as maths, Chinese and English. Beyond simply reducing academic pressure, the policy emphasizes holistic education with a focus on students' physical and mental well-being, fostering creativity, critical thinking and overall personal development.

One of the most important outcomes of this policy is its impact on students' mental and physical health. By adopting a student-centred approach to learning and respecting individuals and interests, the policy creates a more balanced and less competitive environment where students are not judged solely on the basis of their academic performance. Nevertheless, the public has had a mixed reception to the policy introduced by the country's political elite.

As part of this work, a survey of Chinese students abroad was conducted to assess their situation. It was shown that their level of satisfaction with their studies is generally heterogeneous. This variable also did not show a significant correlation with other variables, such as unemployment and living costs. Nevertheless, it was possible to establish that the latter two variables have a certain relationship with the number of students enrolled in higher education institutions in different countries. Although the model presented in this paper is not perfect, it provides good knowledge and opportunities to improve understanding of the logic of Chinese students' choice of countries for future education. The influx of Chinese students can stimulate local consumption and increase the income of enterprises in host countries, providing a new workforce in various specialities. In addition, the cultural influence of these students can promote intercultural understanding and knowledge exchange. Domestically, however, such policies lead to an outflow of students, potentially causing a loss of talent and human capital. This can have economic consequences, including reduced consumption and potential demographic problems such as an ageing population.

It is important for further research to find ways to improve the existing "double reduction" system for China's development. In addition, providing new methods to improve the efficiency of the country's educational system as a whole remains an important component.

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Conflict of Interest

None.

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На основі даних: оцінка впливу політики «подвійного скорочення» на місцеву економіку

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Анотація. Політика «подвійного скорочення» застосовується урядом Китаю, а тому оцінка її впливу на різні складові економічного та соціального розвитку в цій та інших країнах є актуальною. Метою даної роботи було визначити, як відтік студентів за кордон (внаслідок застосування політики «подвійного скорочення») впливає на економічний розвиток місцевих економік. Основними методами дослідження були аналіз, абстрагування та прогнозування. У статті представлено опитування китайських студентів, які навчаються за кордоном, яке показує відмінності у задоволеності, вартості життя та рівнях зайнятості в різних країнах. Також розглянуто сутність політики «подвійного скорочення», яка була спрямована на вирішення різних проблем в системі освіти. Описано мету політики та фактичний вплив, який вона мала на студентів та викладачів. Крім того, зазначено, як політика була пов'язана з еміграцією студентів, а також детально обговорено негативні та позитивні наслідки політики для країни. Також було досліджено кореляцію між цими факторами та валовим внутрішнім продуктом, що дозволило виявити потенційну взаємодію між цими показниками. Зокрема, було показано, що рівень задоволеності освітою був різноманітним і не мав значної кореляції з іншими факторами, такими як безробіття та вартість життя. У свою чергу, були виділені інші показники, які дійсно впливали на рівень задоволеності навчанням. Ця робота привносить нові знання в оцінку розвитку економіки Китаю та його освітнього сектору. Вона також забезпечує краще розуміння того, як тенденції еміграції студентів впливають на економічний розвиток інших країн

Ключові слова: регіоналізм; соціально-економічні наслідки; економічні наслідки; освіта; сталість

**Management and administration
of financial resources using digital technologies**

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Abstract. The integration of digital technologies in the financial industry holds significant promise for enhancing the effectiveness and availability of financial services. However, it is also confronted with various financial and organisational limitations that must be resolved. The objective of this study is to examine the financial and organisational limitations that occur during the implementation of digital technologies in financial management. In order to accomplish this objective, various techniques such as analysis, synthesis, generalisation, systematisation, and statistical methods were employed. The study revealed that the implementation of digital technologies in the financial sector encounters substantial obstacles and constraints. An inherent challenge arises from the incongruity between emerging digital technologies and antiquated traditional management models, resulting in deficiencies and vulnerabilities in organisational management. The study emphasises the significance of organisations modifying their management models in order to achieve optimal utilisation of digital tools. The findings also demonstrate the significance of organisational elements such as culture, competencies, digital resources, senior management support, and organisational structure in shaping choices to embrace and execute digital technologies. Thus, the study helps to solve current issues related to the introduction of digital technologies in the financial sector and contributes to improving its efficiency and sustainability. The practical significance of the study is to increase the understanding of financial and organisational constraints that arise during the introduction of digital technologies in financial management and to contribute to the development of more effective approaches to digital financial management

Keywords: organisational constraints; data security; regulators; efficiency; privacy

Introduction

Investigation of the impact of digital technologies on the financial sector and the limitations that arise in the process of their implementation is of great importance in the modern world. With the growing role of digital tools in financial management, risk management, and financial inclusion, it is becoming mandatory to study the challenges that arise during this process. The research focuses on identifying financial and organisational constraints that may hinder the successful implementation of digital technologies in the financial sector. First of all, there is a contradiction between traditional management models and digital technologies, which can create additional challenges for organisations in achieving the maximum benefits of digital financial management. The second important aspect is the lack of financial literacy among users of digital financial services, which may limit their ability to use these innovations to their full potential. Organisational factors such as culture, competencies, digital resources, and management support should also be considered, as they affect the digital adoption process. Removing these constraints is an important challenge for developing digital financial management and improving the efficiency of the financial sector as a whole.

In their study, M.M. Shevchenko *et al.* (2023) underscore the significance and pertinence of advancing digital financial technologies within Ukraine's financial sector. They emphasise the necessity of enhancing financial services and bolstering the country's competitiveness in the contemporary global landscape. The study examines different types of digital financial technologies and their functions, as well as the influence of technological structures on the growth of the financial sector. In their study, S. Mishchenko *et al.* (2021) examine the management of innovation risks with the aim of maintaining the stability of financial institutions in Ukraine. The authors categorise various types of innovation risks and propose enhancing oversight of operational and regulatory risks through the utilisation

of cloud technologies and blockchain. The authors suggest implementing measures for insurance coverage and compensation for losses by establishing a collective insurance fund comprising financial institutions.

The paper by O. Borzenko & A. Hlazova (2022) presents theoretical approaches to the study of digitalisation, including the theory of the information society, the theory of economic cycles, and the theory of globalisation. The researchers (Chornovol, 2022; Spytska, 2023) examine how these theoretical approaches delineate the primary patterns of digitization in the economy and assess the principal trends of digitization in the financial sector, encompassing the utilisation of cryptocurrencies and digital currencies issued by central banks in international transactions. They examine the characteristics of digitalization in Ukraine, with a particular focus on the banking sector. It highlights that the digitalization efforts of Ukrainian banks are in opposition to the global trends in banking fintech solutions.

O. Dmytryk *et al.* (2022) examine organisational and legal support for digitalisation of innovations in the financial and tax sectors. The researchers identified the role of digital technologies in financial and tax innovations, including blockchain, big data, artificial intelligence, cloud technologies, and the Internet of Things. The paper also substantiates the digital innovation management system and suggests an algorithm for digitalisation of the financial sector.

N. Linawati & I. Wijaya (2022) conducted a study aimed at determining the impact of socio-demographic characteristics and financial education on financial capacity, with financial applications as a moderate variable. The study was conducted among representatives of Generation Z aged 19-26 years. The findings demonstrated that gender exerts a substantial influence on financial sustainability, and the utilisation of financial tools contributes to alleviating the influence of gender on financial sustainability. The paper centres on the significance of financial education

and the function of digital financial applications in enhancing financial literacy among the younger cohort.

V.O. Timashov & O.V. Sevastyanyenko (2022) examined the impact of financial security, including the digitalisation of the financial sector, on Ukraine's economic security in the context of military operations. They analysed data from 2015 to 2021, considering various components of financial security, and identified integral indicators of economic security using various methods. The results showed that the digitalisation of the financial sector had a great impact on Ukraine's economic security, increasing the integral indicator of economic security. This paper shows that digital financial processes in Ukraine have helped ensure the stability of the financial system even during military conflicts.

Given the growing role of digital technologies in the financial sector and the challenges that arise in the process of their implementation, the purpose of this investigation is to analyse financial and organisational constraints. The study will be conducted on the example of Ukraine.

Materials and Methods

Research on the management and administration of financial resources using digital technologies included the use of analysis, synthesis, generalisation, systematisation, and statistical method. This study examined the implementation of digital technologies in organisational management, financial literacy, organisational factors of influence, data security and privacy issues, and the role of regulators in digital financial management. The analysis was used for detailed consideration and disclosure of key aspects of financial resource management and administration using digital technologies. This method allowed for a thorough analysis of complex problems, such as contradictions between digital technologies and traditional management models, and an analysis of the impact of organisational factors on the adoption and implementation of digital decisions.

The synthesis was used to create a comprehensive understanding of optimal strategies and approaches to managing financial resources using digital technologies. As part of this study, the synthesis allowed combining various aspects of digital financial management into a single concept. The results of the analysis of organisational factors, financial literacy, technological capabilities, and regulatory methods were used for this method. Synthesis allowed identifying opportunities for optimising processes, improving efficiency and reducing risks in the field of digital financial management. The generalisation was used to combine various data, results of analysis and synthesis into a single knowledge system for managing and administering financial resources using digital technologies. Within the framework of this method, the results of the analysis of financial literacy, the introduction of digital technologies in organisational management, the role of regulators in the digital financial environment, and data security and privacy issues were summarised. This method allowed the study to create a common concept of digital financial management that combines best practices and recommendations

for various fields of activity, including organisational management, financial literacy, regulation and cybersecurity.

The systematisation was used to organise and structure the obtained data from the literature analysis to establish the logical order and distribution of information on key aspects of the problem. This method allowed the study to create a system of classification and categorisation of facts, trends, and problems related to the introduction of digital technologies in the financial sector. The statistical method was used to analyse statistical data aimed at studying the effectiveness and prevalence of digital technologies in the financial sector. This method provided an opportunity to better understand statistical relations in the context of digital transformation of the financial sector, providing objective conclusions based on numerical data.

The choice of methods of analysis, synthesis, generalisation, systematisation, and statistical method was justified by the need for a comprehensive investigation of various aspects of the problem of financial resource management in a digital environment. These methods allowed systematising and analysing information, explaining and substantiating conclusions and recommendations on organisational adaptation, financial literacy, regulation, and cybersecurity. The use of these methods facilitated a detailed review of the problem and a comprehensive understanding of digital financial management and its impact on organisations and society as a whole.

Results

Analysis of the current state of digital financial management in Ukraine

The financial system of Ukraine is a complex mechanism, the management and administration of which affects the efficiency of the national economy. To better understand its structure and features, it is important to consider two main factors that determine its effectiveness, namely: the establishment of financial relations in society and the organisation of management of the national financial system. Financial relations are an integral part of the economic life of society. Effective financial management implies the existence of well-established financial relations between the state, economic entities, and other market participants. Effective management of the financial system includes solving various tasks, such as ensuring the stability of the financial market, regulating money circulation, controlling inflation, and other aspects that affect the financial stability of the country.

The national financial system of Ukraine has a multi-element structure, which can be considered at three levels. The first level covers the general set of financial relations in society, the second level defines separate parts of these relations, and the third level consists of elements that are the basis for other parts of the financial system. The third level distinguishes such elements as financial and legal institutions that regulate certain sets of public relations in the financial industry (Timashov & Sevastyanyenko, 2021). The organisation of the financial system of Ukraine is based on

a number of legislative acts and regulatory documents. The Constitution of Ukraine defines the fundamental principles of financial relations, and the laws of Ukraine regulate issues related to the state budget, taxes, money circulation and other aspects of finance. The legislation of Ukraine also includes bylaws issued by the Cabinet of Ministers of Ukraine and other departments.

Ukraine's international finances are regulated through contracts concluded with other countries and international financial organisations. These include loan agreements, investments, and other financial transactions. A general overview of the financial system of Ukraine shows that this system is a complex and multi-level structure that includes various areas and links. The legal framework for financial

activities in Ukraine is determined by the Constitution, laws and regulations that control financial relations in the country. The study shows that financial management faces a variety of challenges and challenges caused by the rapid development of digital technologies, changes in the economy and the constant need to adapt to new realities. For example, according to research, the share of the digital economy in Ukraine's total gross domestic product (GDP) is gradually growing. In 2019, this share was only 4.3%, but the following year it increased to 5.3%. However, in 2022, this process was temporarily slowed down due to a full-scale war, which had a negative impact on the size of the digital economy in GDP. This figure is projected to grow to 7.7% by 2024 (Fig. 1).

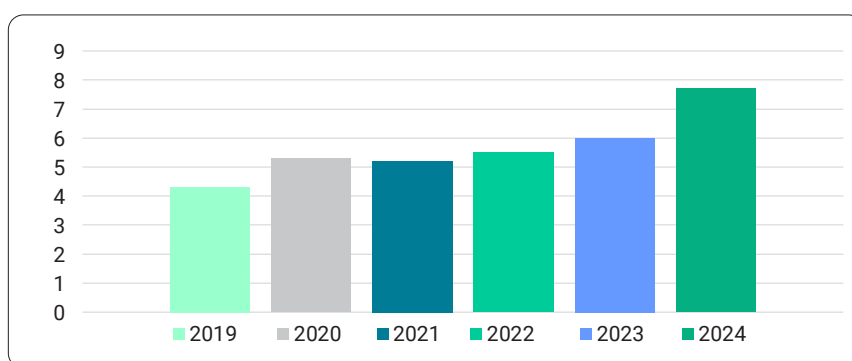


Figure 1. Share of the digital economy in Ukraine's GDP, %

Source: compiled by the authors based on S. Bashlai & I. Yaremko (2023)

Table 1 shows a list of problems in financial management and provides a brief description of each of them. They cover a variety of aspects, including digital transformation, economic security, financial literacy, governance and legal

frameworks, innovation management, and the adoption of global standards. Addressing these challenges requires strategic planning, collaboration, and continuous training to ensure the stability and efficiency of the financial sector.

Table 1. Challenges in financial management

No.	Challenge	Description
1	Adoption and implementation of digitalisation	The need to adopt and implement digital technologies in the day-to-day operations of the financial sector to improve efficiency and competitiveness.
2	Market liquidity and financial technology challenges	Analysis of the impact of financial technologies on market liquidity, identification of specific technologies that create new challenges for banking.
3	Impact of financial digitalisation on economic security	Research on the impact of digital transformation on economic security systems, in particular in connection with possible cyber-attacks or economic crises.
4	Financial literacy in a digital environment	Analysis of the high level of complexity of financial instruments and the need for effective programs to improve financial literacy.
5	Governance and legislative framework for financial innovation	Research the regulatory framework and determine optimal management when implementing financial innovations to ensure stability and trust.
6	Position of accountants during digital transformation	Analysis of the challenges faced by accountants in the context of mandatory digital transformation and transition to electronic accounting.
7	Intrapreneurship in the banking sector	Consideration of the role of domestic entrepreneurship in promoting innovation and accelerating digital transformation in the banking industry.
8	Innovation and security management in the financial sector	Analysis of the relationship between effective innovation management and security in the financial sector in the context of rapid technology development.
9	Limitations of corporate finance in the context of digital transformation	Investigation of problems and limitations that may arise in the corporate finance process due to the introduction of digital technologies.

Table 1, Continued

No.	Challenge	Description
10	Transformation of management in the tourism industry	Analysis of the impact of digital technologies on the management of the tourism industry and the need to adapt management practices.
11	Integration of artificial intelligence and blockchain in the banking industry	Investigation of the use of artificial intelligence and blockchain in the banking industry and solve related problems.
12	Sources of financial law in Ukraine and the EU	Comparative legal analysis of sources of financial law and their impact on the legal system.
13	Theoretical approaches to the study of digitalisation in the global economy	Review of theoretical approaches and frameworks for studying digital transformation in the global economic context.
14	Security management in crisis situations	Analysis of security management methods in crisis situations and their application for Ukraine.
15	Acceptability of global standards in jurisdiction	Investigation of the acceptability and implementation of global standards in a particular jurisdiction, with a focus on the use of IFRS in Ukraine.
16	Public finance management in Ukraine	Analysis of current problems and challenges in the field of public finance management in Ukraine.
17	Development of digital technologies in financial exchange centres	Review of the application and development of digital technologies in financial exchange centres and their impact on efficiency.
18	Financial and legal aspects of economic security	Investigation of financial and legal aspects of ensuring the economic security of the state and consideration of their impact on the financial system.

Source: compiled by the authors based on F. Kitsios *et al.* (2021), D. Broby (2021), T. Koskelainen *et al.* (2023)

The use of digital technologies in financial management in Ukraine is growing and is becoming increasingly important for the development of the financial sector and effective financial management (Kurhan *et al.*, 2023). The introduction of digital technologies includes various aspects, such as the introduction of digital payment systems, the use of artificial intelligence and data analytics for financial decision-making, automation of accounting and analysis, the development of electronic financial services, and many other aspects.

The role of digital technologies in financial management

The use of digital technologies in financial management has a number of significant advantages (Table 2). Firstly, it improves the speed and accuracy of financial analysis and reporting. Digital tools automate the processes of collecting, processing and, analysing financial data,

which allows responding faster to changes in the market and make informed decisions. Secondly, digital technologies contribute to improving the efficiency of financial management and reducing costs. This is achieved by automating many processes that previously required significant resources and time. In addition, the introduction of digital technologies improves communication and cooperation between different divisions of the company and simplifies access to financial information for stakeholders. Moreover, the use of digital technologies makes financial management more flexible and adaptive to changes in economic conditions. This allows companies to respond faster to market challenges and increase their competitiveness. Lastly, digital technologies contribute to improving the security of financial information and transactions, which is critical in the face of modern cybersecurity threats.

Table 2. Advantages of using digital technologies in financial management

No.	Advantage	Description
1	Improvement of financial literacy	Provides access to resources and information for better financial management.
2	Improved risk management	Helps financial institutions better manage risks, including cyber threats.
3	Expansion of financial accessibility	Facilitates access to financial products and services for all segments of the population.
4	Easing corporate finance restrictions	Provides businesses with alternative sources of financing.
5	Optimised financial processes	Reduces errors and increases the efficiency of financial processes.
6	Promotion of green development	Supports the development of green technologies and sustainable development.
7	Improvement of operational stability	Contributes to the stability of financial institutions and systems.
8	Increase in efficiency and savings	Automates processes and reduces operating costs.
9	Enhanced access to financial services	This will help overcome geographical barriers and facilitate access to services.
10	Improved data management and analysis	Helps collect, analyse, and report financial data.

Table 2, Continued

No.	Advantage	Description
11	Accelerated innovation	Promotes innovation in financial management by creating new products and services.
12	Improved customer experience	Offers convenience and a personalised experience for customers.
13	Enhanced security and privacy	Includes strong security measures and data encryption.
14	Improvement of financial well-being	Assists in making informed decisions and improves financial well-being.

Source: compiled by the authors based on S.M.R. Parvin & N. Panakaje (2022); B. Chen (2023)

Digital Finance, which uses technologies such as artificial intelligence and data analytics, has the potential to revolutionise financial management by improving algorithms and valuation mechanisms. These advances can lead to the creation of transparent and information-based credit systems that will improve the efficiency of capital allocation in the financial sector (Wang, 2022; Zabediuk & Yatsuk, 2023). In addition, digital tools can expand the ability to warn and manage risks, allowing users to manage financial risks more effectively. One area where digital tools can have a significant impact is the management of small and medium-sized enterprises (SMEs). Research has shown that increasing awareness of the digital platform among small and medium-sized business leaders can contribute to better financial choices and improve the company's success. By using digital finance tools, SMEs can access financial services and resources that were previously unavailable, enabling them to maintain and grow their businesses (Msomi & Kandolo, 2023). In addition, adapting digital technologies in accounting and financial management can help SMEs organise their records and verify their financial condition, leading to better informed decisions.

Financial literacy is another important aspect of improved financial management, especially in the digital age. Digital innovation is transforming financial services, leading to changes in consumer behaviour and personal money management. However, effective financial transactions using digital tools require skills, awareness and attitude to use these tools, and an understanding of digital transactions. Thus, promoting financial literacy in the digital age is essential for people to effectively use digital finance tools to improve financial management. Digital financial reach is also a key factor in improving financial management. Research has shown that digital financial engagement promotes socio-economic development by reducing costs, improving efficiency, and increasing the competitiveness of service providers (Parvin & Panakaje, 2022). By providing access to digital financial services, individuals and businesses can overcome obstacles to financial inclusion and participate more fully in the digital financial market. This can lead to better financial management and better use of financial resources.

The introduction of digital tools in financial management is not without problems. The digital divide, which is characterised by uneven distribution and obstacles to the development of digital technologies, can lead to new financial alienation among disadvantaged groups. The lack of resources such as online tools and financial literacy can

hinder the adoption and effective use of digital finance tools (Dong, 2023). Therefore, efforts must be made to bridge the digital divide and ensure that all people have access to the necessary resources and skills to use digital financial management tools.

Financial and organisational constraints in the implementation of digital technologies

The introduction of digital technologies in organisations faces various financial and organisational constraints. One of the key problems is the contradiction between digital technologies and traditional management models. Expanding digital technologies, while offering numerous benefits, can also exacerbate existing challenges in organisational management (Lingling & Li, 2023). This highlights the need for organisations to adapt their management models to make effective use of digital technologies.

Financial literacy is another important aspect that can become an obstacle to the adoption of digital technologies. The transformation caused by digital innovation in financial services requires people to have the necessary skills, awareness, and attitude to use digital tools effectively. Lack of financial literacy can hinder the adoption and use of digital technologies for financial management. Organisational factors also play a significant role in the successful implementation of digital technologies. Organisational culture, technological competencies, digital resources, senior management support, and organisational structure influence an organisation's decision to adopt and implement digital technologies (Omrani *et al.*, 2022). Ignoring organisational factors can reduce the effectiveness of digital technologies and require additional costs for their implementation. In addition, governance and the legal framework for implementing financial and fiscal innovations in the digital environment can pose challenges (Dmytryk *et al.*, 2022). The digitalisation of financial markets and the use of digital instruments require improved control and regulatory mechanisms to ensure effective governance. In the context of small and medium-sized enterprises, the introduction of digital technologies in accounting and financial management can have a positive impact on their credit constraints (Flaminiano & Francisco, 2021). Digitalisation allows SMEs to automate financial processes, reduce costs, and improve efficiency. However, the adoption of digital technologies in small and medium-sized enterprises can also face obstacles, such as limited resources and the lack of digital skills.

The issue of data security and privacy is critical in managing finances when using digital technologies. The

introduction of digital tools, collection, storage, and use of data, can put pressure on privacy and data protection. Organisations should have clear guidelines and policies regarding data privacy and security, including transparent information about data collection, storage, and use. In the context of digital financial management, data security and privacy issues can hinder the prospects for digital financial inclusion. Lack of trust and concerns about data privacy are among the challenges facing achieving inclusive digital funding. The introduction of digital financial instruments requires people to be confident in the security and confidentiality of their financial data. The use of digital technologies in financial management also raises concerns about data management and management. Creating transparent and informative credit systems and strengthening risk management capabilities through digital finance relies on effective management mechanisms (Wang, 2022). The collection, processing, analysis, and distribution of financial data require strong confidentiality and security measures.

Regulators play a crucial role in the development of digital financial management. They are responsible for creating and implementing rules governing the use of digital technologies in financial services. Regulators must find a balance between promoting innovation and ensuring consumer protection, data security, and financial stability. They play a vital role in creating appropriate and up-to-date tools, frameworks, and regulatory approaches to promote digital financial management. This includes providing clear information about the rules and ensuring that data confidentiality and security requirements are met. Regulators also play a role in shaping the adoption and implementation of new technologies, such as blockchain and decentralised identity management. They need to create a robust framework for managing digital identifiers and ensure the security and confidentiality of individuals' digital information. Regulators can contribute to the development and implementation of these technologies by providing guidance and oversight to ensure compliance with regulatory requirements.

The use of regulatory technologies, also known as RegTech, is becoming increasingly important in the digital transformation of traditional industries, including the financial sector. RegTech solutions use technologies such as artificial intelligence and data analytics to optimise regulatory processes, improve compliance, and improve risk management. Regulators can contribute to the implementation of RegTech solutions to improve the efficiency and effectiveness of regulatory practices in the field of digital financial management. Regulators also play a role in addressing the challenges and risks associated with digital financial management. They need to develop and enforce regulations that reduce risks such as fraud, money laundering, and cybersecurity threats. Regulators can work with industry stakeholders to develop best practices and standards for digital financial management, ensuring the integrity and stability of the financial system.

Discussion

The results of the study of the financial system of Ukraine indicate key aspects that affect the effectiveness of this system. First of all, well-established financial relations between various participants, including the state and economic entities, are important for the stability and development of the national economy. The multi-level structure of the financial system includes a general set of financial relations, separate parts of these relations and elements that form the basis of the system. The organisation of the financial system is based on the legislative framework and international treaties. It is important to handle financial relations in Ukraine through laws and regulations, and conclude contracts with other countries and international financial organisations. The study also highlights the importance of developing the digital economy in Ukraine and the impact of the conflict on it, which can lead to temporary instability. In general, an effective financial system is a key factor for the country's sustainability and development, but it requires continuous improvement and adaptation to changes in the economy and geopolitical environment.

Digital transformation in the financial sector of Ukraine is becoming increasingly important and influential. The growth of the digital economy in the country's GDP shows this. Key challenges include changes in banking, market liquidity, and economic security in the face of digital transformation. Additional aspects include the growing complexity of financial instruments, the need to improve financial literacy, and the importance of effectively managing innovation in accordance with the legal framework. The role of accountants and intra-coaching in the banking sector is also becoming relevant in the context of digital transformation. The study also points to the need to pay attention to cybersecurity and measures to ensure economic security in the context of digital transformation. All these aspects require improvement of management strategies and cooperation between different industries and stakeholders to ensure the stability and efficiency of the financial sector in Ukraine.

With the help of digital technologies, financial management acquires a number of important advantages. First, it helps to improve the speed and accuracy of analysis and reporting in the financial sector. Digital tools allow automating the collection, processing and analysis of financial data, enabling faster informed decision-making and responding to market changes. Second, the use of digital technologies increases the efficiency of financial management and helps reduce costs. This is achieved by automating many processes that previously required significant resources and time. In addition, digital technologies facilitate communication and collaboration between different divisions of the company and simplify access to financial information for stakeholders. It is also important to note that the introduction of digital technologies makes financial management more flexible and adaptive to changes in the economic environment. This allows companies to respond faster to market challenges and increases their competitiveness. Ultimately,

the use of digital technologies contributes to improving the security of financial information and transactions, which is of great importance in the context of modern cybersecurity threats (Makarov *et al.*, 2023).

In the context of digital technologies, it is also worth noting their impact on the management of small and medium-sized enterprises. The use of digital financial instruments helps SMEs gain access to financial resources and services that were previously less accessible, allowing them to maintain and grow their businesses. This may include improved accounting and financial analysis to help SMEs make better informed decisions. In addition, improving financial literacy in the context of digital technologies is an important aspect. Financial innovations can change consumer habits and require new skills and understanding to use these tools effectively. Therefore, improving financial literacy is an important challenge in the digital age. In general, the use of digital technologies in financial management can improve the quality and effectiveness of financial management and promote socio-economic development. However, it is important to address the challenges associated with the digital divide and ensure access to these technologies for all segments of the population.

The introduction of digital technologies in financial management introduces significant obstacles related to financial and organisational aspects. One of the key challenges is the interaction between digital innovation and traditional management practices, which can lead to dissonance in the organisational environment. The need for financial literacy is becoming urgent for the effective use of digital tools in financial management, as its lack can become an obstacle for users. In addition, organisational factors such as culture, staff competence, technology resources, and senior management support are important for the successful implementation of digital solutions. Data security and privacy issues are important in the context of digital financial management, as insufficient measures can undermine trust and leave personal and financial data vulnerable to threats. Regulators play an important role in creating an effective regulatory framework that promotes the development of digital financial management, while ensuring that the rights and interests of users are respected and financial stability is achieved. However, regulators must also consider innovation and change regulatory approaches to respond to the challenges of the digital age.

L. Puspitawati & M. Virginia (2022) examine an important aspect in the context of digital transformation, namely the impact of human resource competence on financial digitalisation and its impact on the quality of financial reporting in the public sector. The study indicated that the proficiency of employees has a notable influence on the process of enhancing the digital transformation of finance, as well as on the calibre of financial statements. This paper emphasises the significance of expertise and proficiency in utilising financial software, as the production of accurate and reliable financial reports necessitates specialists who are adept at utilising the provided tools. Effective financial

applications are essential for successfully implementing financial digitalization in the public sector. The study also examines the concept of "Society 5.0", which aims to harmonise information technologies and people as users of these technologies. This idea highlights the importance of the balanced use of technology for business progress and minimising the use of human resources through the digital transformation of business processes. Comparing the authors' research with the data, it can be noted that both studies focus on the importance of the human factor in the process of digital transformation in the field of finance. They emphasise that human resources and competence are key factors for achieving quality and success in digital financial management.

The study by M. Nasiri *et al.* (2022) examines the impact of three key prerequisites for digital transformation (digital orientation, digital intensity, and digital maturity) on the financial success of companies. They base their research on literature data related to strategic management and digital transformation. The researchers adopt a comprehensive approach to analysing problems by investigating various dimensions of digital transformation, including digital orientation, digital intensity, digital maturity, and their influence on the financial performance of companies. This approach enables the consideration of a broader spectrum of factors that influence digital transformation and its outcomes. In contrast to this study, which primarily emphasises the significance of financial literacy and organisational aspects in digital adoption, the researchers in this study investigate a broader array of factors associated with digital transformation and their influence on the financial prosperity of companies.

The study of the financial system of Ukraine points out the importance of effective financial relations, the role of the legislative framework and digital transformation in the sustainable development of the country. Digital transformation in the financial sector in Ukraine is becoming key, but requires addressing challenges in banking, cybersecurity, and financial literacy. The use of digital technologies facilitates financial management and contributes to improving the efficiency and security of financial transactions. For small and medium-sized enterprises, digital innovations open up access to resources and improve accounting. However, there are challenges related to digital innovation integration, financial literacy, and data protection that require attention and collaboration between different industries and regulators.

Conclusions

The introduction of digital technologies in finance includes many advantages, but requires attention to various financial and organisational constraints. These limitations include contradictions between digital technologies and traditional management models, the importance of financial literacy among users, data security and privacy issues, organisational factors, and the regulatory framework. To successfully implement digital innovation in the financial

sector, organisations must adapt their management models and culture. Continuous development of users' financial literacy is key to maximising the benefits of digital tools. Ensuring data security and privacy is a must to maintain user trust and successfully implement digital financial services. In addition, regulators play an important role in the development of digital financial management, defining standards and regulations, ensuring security and compliance with regulatory requirements. Collaboration between organisations, regulators, and other stakeholders is essential to address the complex challenges and risks associated with digital finance. In general, the development of digital technologies in the financial sector promises great potential for improving access to financial services and optimising financial management, but requires attention to the above factors to achieve success and create a reliable and efficient digital financial system.

For successful implementation of digital technologies in the financial sector, it is necessary to pay attention to improving the financial literacy of users, ensure data security, and cooperate with regulators to develop adequate

standards and regulations. Actively adapting organisations to new technological realities and promoting innovation will help ensure the effective use of digital tools in financial management.

The practical significance of this study is to provide valuable recommendations for financial organisations and regulators on the successful implementation of digital technologies in financial management, which will contribute to improving the efficiency, security, and accessibility of financial services for all segments of the population. Key areas for further research may include exploring the impact of digital technologies on financial inclusion, further developing regulatory technologies to improve oversight of the digital financial market, and exploring new methods to ensure the privacy and security of digital financial transactions.

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Conflict of Interest

None.

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Управління та адміністрування фінансових ресурсів з використанням цифрових технологій

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Анотація. Інтеграція цифрових технологій у фінансову галузь має значні перспективи для підвищення ефективності та доступності фінансових послуг. Однак вона також стикається з різними фінансовими та організаційними обмеженнями, які необхідно вирішувати. Метою цього дослідження є вивчення фінансових та організаційних обмежень, які виникають під час впровадження цифрових технологій у фінансовий менеджмент. Для досягнення поставленої мети було використано різні методи, такі як аналіз, синтез, узагальнення, систематизація та статистичні методи. Дослідження показало, що впровадження цифрових технологій у фінансовому секторі стикається з істотними перешкодами та обмеженнями. Основною проблемою є невідповідність між новими цифровими технологіями та застарілими традиційними моделями управління, що призводить до недоліків та вразливостей в управлінні організаціями. Дослідження підкреслює важливість того, щоб організації модифікували свої моделі управління, щоб досягти оптимального використання цифрових інструментів. Результати також демонструють важливість таких організаційних елементів, як культура, компетенції, цифрові ресурси, підтримка вищого керівництва та організаційна структура у формуванні вибору щодо впровадження та використання цифрових технологій. Таким чином, дослідження допомагає вирішити актуальні питання, пов'язані з впровадженням цифрових технологій у фінансовому секторі, та сприяє підвищенню його ефективності та стійкості. Практичне значення дослідження полягає у поглибленні розуміння фінансових та організаційних обмежень, які виникають під час впровадження цифрових технологій у фінансовому управлінні, та сприянні розробці більш ефективних підходів до цифрового фінансового менеджменту.

Ключові слова: організаційні обмеження; безпека даних; регулятори; ефективність; конфіденційність

Basic principles of corporate social responsibility management under martial law

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Abstract. Corporate social responsibility is an integral element of the modern business model, especially for large companies. Effective management of this process ensures a positive result for both society and the business itself. Therefore, the study aims to substantiate the theoretical foundations of the management process in the context of corporate social responsibility, considering the military conditions in which Ukrainian business operates. To achieve this goal, a systematic approach and methods of analysis, comparison, deduction, comparison, and decomposition were used. The study analyses current approaches to understanding the corporate social responsibility of business. The main vectors in which the corporate social responsibility of enterprises is implemented are allocated. An author's interpretation of the concept of corporate social responsibility management was formed. The basic principles of implementation of the communication policy for both the internal audience (company employees) and external stakeholders (partners, customers, society, the state) are formed and argued. The features and main directions of implementation of corporate social responsibility initiatives of Ukrainian businesses in the context of war are studied and highlighted. It is established that the priority of corporate social responsibility of companies in Ukraine is to ensure business continuity (allowing to pay salaries and taxes), ensure the safety of personnel (arrangement of bomb shelters, relocation of employees and their families), support for defence capability (various assistance to the Armed Forces of Ukraine) and assistance to territorial communities. The results of the study can be used by the business environment to form a management mechanism for implementing corporate social responsibility initiatives, as well as by the academic community that studies this issue

Keywords: social values; entrepreneurship; society; organisational management; humanitarian aid; philanthropy

Introduction

By building a positive image through the implementation of projects that demonstrate corporate social responsibility, companies can build their reputation as socially conscious business entities, which allows them to maintain and increase their competitiveness while creating a positive impact on the environment and society, which is especially important in the context of an economy operating in crisis and war conditions. Businesses can influence social aspects by creating jobs, providing effective remuneration systems, and developing partnerships with the public, through the implementation of various humanitarian and educational programmes. Businesses need to understand their role in society and take active steps to improve their social impact. This creates a relationship between enterprises, society, and the state as a whole, contributing to economic and social development (Marco-Lajara *et al.*, 2020; Velte, 2022). Therefore, ensuring the functioning of an effective mechanism aimed at managing these processes is an extremely important and urgent task for business, especially for Ukrainian enterprises that are currently operating in the wartime conditions paradigm.

D. Bukreieva & K. Denysenko (2022) studied the issue of social responsibility of entrepreneurship as a factor that contributes to the development of business activity identifying the key forms of social responsibility within the corporate component and determining its impact on the performance of enterprises. A comparative analysis of the tools for supporting social responsibility used in our country and the European Union states was conducted, which created specific ways to enhance business activity by creating a favourable image of the company. H.P. Zhaldak & M.O. Chuprina (2021) studied the issues of corporate social responsibility (CSR) of business entities from the standpoint of managing reputational risks for business. The

authors determined that to obtain positive financial and economic results from the implementation of CSR-related activities in the long term, it is advisable to implement them in parallel with the development of the organisation's strategic management framework. Thus, this study attempts to combine the social responsibility of companies with the formation of the company's image and reputational risks of organisations.

The social responsibility of business entities and the peculiarities of their formation and implementation at different historical stages of Ukraine's development were highlighted by O. Vladymyr & N. Bazhanova (2022). The author S. Gahramanova (2023) analysed the content of the social responsibility of business and the role it plays in the development of the national economy, contributing to the solution of social problems at different stages of the formation of moral and ethical approaches to doing business in different countries of the world and Ukraine in particular. However, the process of managing such a phenomenon as corporate social responsibility is not considered by the authors of this study. The problem of optimisation of CSR management of business structures was considered by M. Nadeyko (2021). The author concludes that in the course of management, it is necessary to assess not only the costs of social investments, but also to determine the effectiveness of implemented projects, and the result of the impact of social responsibility management on the organisation should be determined by the average effectiveness of the implementation of a set of measures in various areas of CSR. It is also proved that the effect of social responsibility management will largely depend on the extent to which the company's management is inclined to take risks. I. Stoyko *et al.* (2022) substantiated the need to disseminate CSR approaches among the business community, and their

activation directly during the wartime period. They also partially emphasise the expediency for businesses to maintain a balance between ensuring financial and economic efficiency and implementing social and environmental projects, which is a fundamentally important element of ensuring the sustainable development of an organisation.

Despite the existing scientific developments in the field of corporate social responsibility of business entities, the issues of managing this aspect of activity are only partially covered and require more detailed study, especially in the context of the war economy. Therefore, the purpose of the study is to substantiate the principles and mechanisms for implementing the process of managing corporate social responsibility companies, considering the impact of war on the peculiarities of business functioning in Ukraine.

Materials and Methods

The information basis for the study was formed upon the scientific works of scientists from Ukraine, the United States of America, the United Kingdom, France, Germany, and Spain, who deal with the issues of corporate social responsibility of business and issues related to the management of this process. The analysis of the works of the scientific community was carried out to identify modern approaches and concepts to the interpretation of the concept of corporate social responsibility of business, to identify the main principles of implementation of the management process of this activity, and to distinguish its parameters and components. Critical reflection on the results of the analysis was used to form the authors' interpretation of the concept of corporate social responsibility management.

Deduction as a method of scientific knowledge, the principle of which involves the transition from the general to the specific in combination with abstraction, which was used to separate the most common and important features and characteristics from a certain set of signs and characteristics, was used to form key functional systems of corporate social responsibility management. The systemic approach, which involves a comprehensive study of large and complex processes and phenomena to examine them as a whole from the standpoint of harmonised, coordinated functioning, was applied to the study of the process of corporate social responsibility management of business entities. At the same time, decomposition, which provides for the division of an object (mechanism, system) into subsystems or lower-level elements that are studied separately, but with due regard for the coherence of tasks and goals of each of these subsystems-components with the overall goal of functioning of the process or mechanism as a whole, the four main functional components of corporate social responsibility management were analysed.

A comprehensive analysis of the "planning" subsystem was used to identify aspects that must be considered when planning corporate social responsibility initiatives. A comparison of approaches to ensuring and functioning of the

subsystem "organisation" was used to justify the need to integrate corporate social responsibility management into the company's main business processes. The analysis of control as a management process in the context of corporate social responsibility was used to identify specific mechanisms, methods and tools that enable companies to guarantee the effective implementation of their social and environmental initiatives following the developed strategies and plans. The method of concretisation, which involves the transition from the abstract to the concrete to highlight the functional links of the phenomenon or process under study, was used to substantiate the importance of the communication component of the corporate social responsibility management system in the context of ensuring the formation of a positive company image with its subsequent possible transformation into concrete economic benefits for the enterprise. The generalising approach was used to formulate the key principles of organising a communication system with both the internal audience and external stakeholders.

An assessment of the results of a sociological survey on the extent to which young people are aware of corporate social responsibility issues, how they consider this aspect when choosing a job, and what manifestations business CSR should have been carried out to substantiate the importance of managing this component of the business model of modern companies (How young people..., 2021). An assessment of the results of a survey of businesses in Ukraine on how they manifested their corporate social responsibility during the war made it possible to identify five main vectors of CSR implementation (Sustainability of Ukrainian..., 2023). Using comparison and statistical research methods, in particular structural analysis, which was used to calculate the share of an element in the total, the percentage of Ukrainian companies' participation in the implementation of their corporate social responsibility in the context of five key areas that turned out to be the most important in the context of the war in Ukraine was calculated.

Results

Corporate social responsibility, as noted by L. Moir (2001), is a business model that is capable of self-regulation and enables businesses to be socially responsible to themselves, stakeholders, society, and the state. D. Matten & J. Moon (2004) define corporate social responsibility as a concept that defines the interaction of an enterprise with society and nature, which goes beyond its main function of making a profit and note that it involves the company's active participation in solving social, environmental, and economic problems. A managerial approach to business activity, according to which a company should show interest and willingness to support society and the environment, as well as to be concerned about the impact of its products on people and nature while focusing on making a profit, was formed by A. Lindgreen & V. Swaen (2010)

concerning corporate social responsibility of companies. In general, corporate social responsibility management, similarly to other management processes, is carried out in the paradigm of functional management systems, such as planning, organisation, motivation, and control (Hohnen & Potts, 2007).

The process of corporate social responsibility management involves the implementation of measures aimed primarily at planning this component of business activities. This involves analysing the company's internal resources, competencies, and capabilities, as well as social and environmental challenges that affect the business and vice versa. At this stage, specific, preferably measurable goals are set to be achieved in the area of social responsibility, and accordingly, priority areas are identified where the company can have the greatest impact. The next step is to develop a social responsibility strategy that reflects the company's mission, values, and long-term goals in the form of specific initiatives and projects to implement the strategy. At the same time, it is crucial to ensure that various stakeholders (employees, customers, non-governmental organisations, investors, government authorities) are involved in the planning process, as this allows for the opinions and ideas of other parties to be incorporated into the social responsibility planning priorities. Identification of specific structural units and responsible persons for the implementation of social initiatives is an integral part of planning, as it involves the use of resources for project implementation, including financial, human, material, and technological resources. And, of course, at the planning stage, mechanisms for measuring the impact of social initiatives are developed and a monitoring and reporting system is formed to track progress in achieving corporate social responsibility goals.

The organisational component of the corporate social responsibility management process involves a clear division into two elements. These are corporate responsibility itself, which requires the formation of internal structures and divisions of the organisation to implement CSR strategies, division of responsibilities, ensuring internal understanding and support of social initiatives among employees, organisation of special training and seminars, and social responsibility, i.e. the creation of forms of interaction with public organisations, volunteers and other stakeholders that will use the results of social, environmental or other business initiatives. The implementation of initiatives and projects that demonstrate the company's corporate social responsibility requires their organic integration with the main business processes of the enterprise, and it is also necessary to ensure that CSR concepts are embedded in the organisational structure and are part of the corporate culture of the company's employees.

Control, as a management process in the context of corporate social responsibility, should include a system of mechanisms, methods and tools that help the company ensure the effective implementation of its social and environ-

mental obligations following the developed strategies and plans. Implementation of the CSR control system requires the calculation of key performance indicators that help to measure the impact of CSR initiatives and monitor the achievement of the set goals. In other words, it is necessary to regularly evaluate the impact of CSR projects, considering environmental, social, and economic aspects, based on which segments can be identified to improve and optimise the chosen strategies and approaches (Ahmad *et al.*, 2023). The internal control and monitoring system can be distinguished, which aims to monitor the compliance of internal processes and results with the goals of the company's CSR initiatives, as well as external audit, i.e. engagement of external experts for objective assessment of CSR activities. The external component of control is implemented through regular publication of reports, which should reflect the results and shortcomings, and clear and open communication with stakeholders on the results and prospects of development of projects related to corporate social responsibility. The motivational component of corporate social responsibility is determined by various factors that may be unique to each company, but in general, they may include creating a positive image among consumers, the public, authorities, and mostly local governments, as businesses usually implement projects with a social and environmental component directly where their main production facilities are located, except for large companies that operate at the national level.

A brand or a company that is actively engaged in CSR projects can position itself as more value-oriented and modern, which affects the behaviour of consumers who increasingly choose the goods and services of companies that demonstrate their social responsibility (Carroll, 2021). Furthermore, investors are increasingly considering social and environmental aspects when choosing investment targets, so CSR initiatives can be considered an indicator of a company's sustainability and long-term success. Thus, this may be one of the motives for implementing CSR projects. Moreover, socially responsible companies may be more attractive to qualified personnel, as potential and current employees may be more satisfied with their work if they feel that their values are aligned with the company's goals in this area and that their work also contributes to the development of society and the environment. This is especially true for the younger generation, which, according to a study conducted in Ukraine in 2021 with the support of UNICEF, knows what corporate social responsibility is (How young people..., 2021). In addition, a certain proportion of them identify business social responsibility as a key aspect when choosing a potential place of employment. In addition, almost half of the youth surveyed would like to join corporate volunteering, which is a sign of a high degree of awareness among young people of the importance of corporate social responsibility and thus should encourage businesses to conduct socially responsible business activities (Figs. 1, 2).

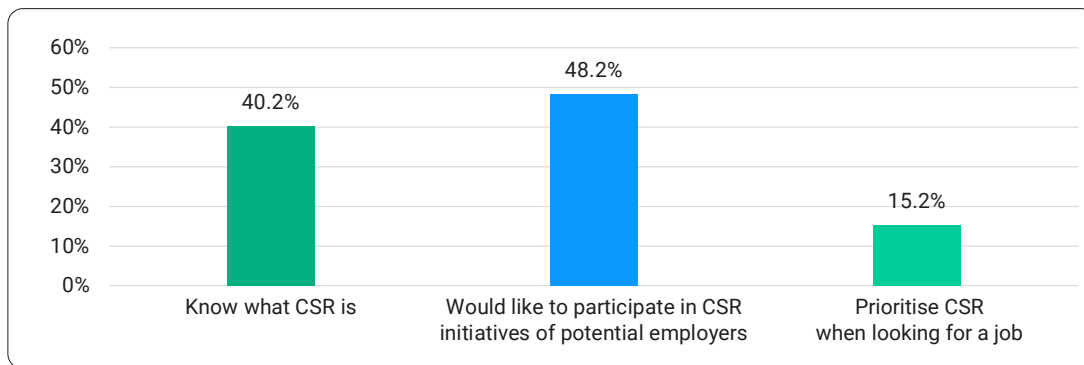


Figure 1. Awareness and importance of corporate social responsibility for young people when choosing a job in Ukraine
Source: compiled by the authors based on How young people respond to corporate social responsibility – Results of a national survey (2021)

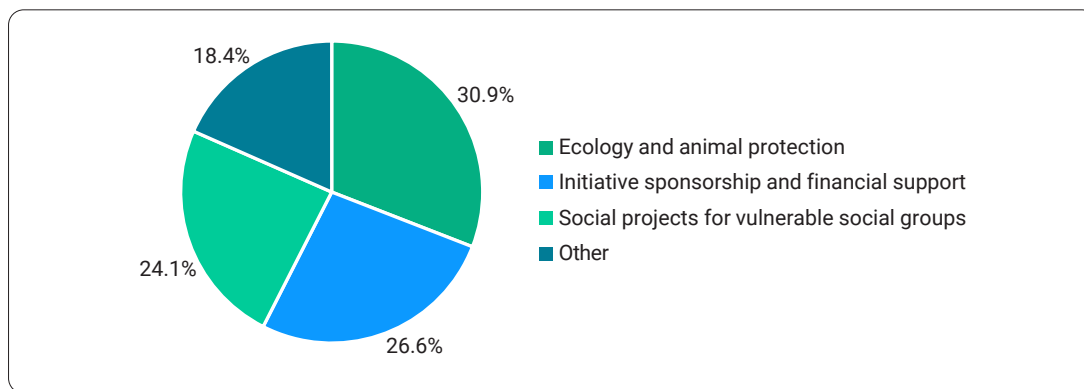


Figure 2. How a business should engage in CSR

Source: compiled by the authors based on How young people respond to corporate social responsibility – Results of a national survey (2021)

Despite the genuine desire to realise moral qualities through the provision of certain assistance, for the owners and management of enterprises, the main task and result of management activities is to make a profit, and the implementation of projects that demonstrate corporate and social responsibility is a tool that shapes the company's image, which can be transformed into specific economic benefits (Chakroun *et al.*, 2022). Therefore, in this context, the communication system of the management process plays a key role.

From a strategic perspective, the greatest effect can be achieved through projects whose ideas and values are harmonised with the objectives and values of business and society. Therefore, an important aspect of achieving goals that meet the values and expectations of specific categories of stakeholders through communication activities is to improve the company's reputation profile, which will help improve the reputational status of the business and help create positive value from cooperation and interaction with it. The communication system should be carefully planned and organised. The process of sharing information on CSR projects should be commensurate in scale with the amount of investment in social and environmental support.

Accordingly, the more CSR-related something is, the more frequently and intensively it should be communicated. Of course, it is necessary to consider the peculiarities of how business is perceived by various layers and audiences, which carries the corresponding possible reputational risks, so as not to turn the information message about socially important actions into a reputational crisis. The tools at the stage of communication planning are a step-by-step algorithm of actions and an information message that should clearly and understandably outline the stages of implementation and the main messages. The emphasis should be on what has already been done. The balance of messages should be 80% to 20%, with the largest share of information about the steps already taken and the smallest share about what is planned to be done.

Internal stakeholders, in particular employees who are actively involved in such projects, are essential for disseminating information about the company's CSR. This helps increase their motivation based on shared values with the company. Another focus is on reaching out to external audiences. The information exchange strategy should define to whom and how often it is advisable to communicate the

project results that form a positive background for CSR. As a rule, a considerable number of projects require establishing interaction and forming a permanent dialogue with state authorities, local authorities, and charitable organisations, so participation in conferences, round tables and other formats for solving social problems is important (Matala, 2022). A successful information campaign also requires the involvement of traditional media and involves funding media appearances or finding alternative formats of interaction with the media. The use of interviews and public speeches as an opportunity to promote CSR initiatives and incorporate them into the company's communication is a very important aspect. Depending on the scale of the project and the amount of support, it is advisable to create a separate information block on the organisation's website dedicated to social projects and assistance provided by the business.

As a result of the war, in 2022-2023, certain peculiarities of managing the areas of activity that determine the corporate social responsibility of companies operating in the Ukrainian market were formed. In 2023, CSR Ukraine (an expert association in Ukraine that covers more than forty large enterprises, together with which it has been working for more than 15 years to promote the principles of sustainable entrepreneurship and ensure the social responsibility of companies), together with the information and analytical portal The Page, surveyed national business (30 large companies in various fields), according to which 5 main components can be identified in the context of the factors of corporate social responsibility formation, which are most relevant in modern, wartime conditions these components include business continuity, which is the basis that determines the ability of companies to implement social projects and pay taxes (Sustainability of Ukrainian..., 2023). This component involves the development and approval of a strategic plan to ensure business continuity, its modification and adaptation to the realities of a full-scale invasion, taking into account the specifics of employees' work, modifying business processes and resource use, as well as paying taxes, including through advance payments, i.e. in advance. According to the survey, the vast majority of companies had developed and adapted business plans (Fig. 3).

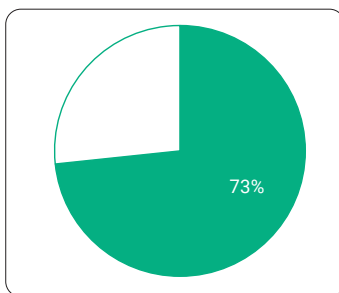


Figure 3. Share of companies that had a business continuity plan in place in 2023

Source: compiled by the authors based on Sustainability of Ukrainian business during the war: What the "CSR Index 2023" showed (2023)

It is worth noting that among the most common points of the strategy for ensuring stable business operations related to business processes is the formation of a structured, step-by-step procedure for employees to perform a specific task or solve a specific problem, a priority algorithm for restoring these business processes, ensuring the security of production and administrative buildings of enterprises, and data protection and storage, their transfer to cloud services or foreign servers, removal of the most valuable equipment to safer regions, ensuring uninterrupted access to the Internet (including the purchase of equipment for Starlink) and creation of an autonomous power supply system (Lopez *et al.*, 2022; Teymurova *et al.*, 2023). As for the advance payment of tax payments, almost half of the companies engaged in such actions (Fig. 4).

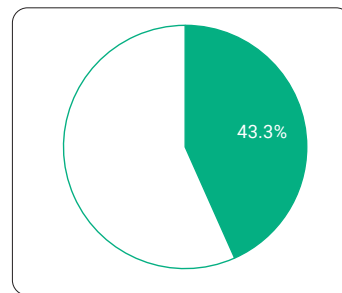


Figure 4. Share of companies that paid taxes in advance in 2023

Source: compiled by the authors based on Sustainability of Ukrainian business during the war: What the "CSR Index 2023" showed (2023)

The second, but no less important, component of management in the current environment is ensuring the safety of company employees. In this respect, the vast majority of companies (over 83%) have ensured the relocation of employees and their families to safer areas of the country, mainly in the Western part of Ukraine, or abroad. The companies organised transportation and accommodation, and provided some financial support to such employees, including advance salary payments, money for household arrangements, and rental payments. Another area in this component is the installation of shelters in offices and production facilities, which was done by more than 66% of enterprises. The next component is unity and cooperation. An illustrative example in this regard is the Power Banking project, which was initiated by the National Bank of Ukraine to synergise the capabilities of banking institutions and the country's financial system to ensure that households and businesses have constant access to financial services, even in the face of power outages. In addition, the IT sector can be mentioned, which provided free internet services to bomb shelters, educational institutions, and local "resilience centres".

Another component of modern corporate social responsibility management in Ukraine is business support for defence capability. It is worth noting that almost all

large enterprises (93%) help the Armed Forces of Ukraine. Only two large business companies (with foreign capital) are unable to assist the military due to their corporate restrictions. National businesses provide significant financial, material, and humanitarian aid to the military. According to the survey, more than 50% of companies cooperate with many volunteer organisations to help the military. In addition, the majority of companies (83%) assisted communities where their structural units are located and operate within such communities. This was mainly in the form of financial payments, equipment for hospitals and educational institutions, and supply of goods and free services. In addition, many companies (26 out of 30) provided support to internally displaced persons (IDPs), such as food, medicine, personal hygiene products, housing for IDPs, and training courses.

Discussion

Study results suggest that enterprises need to form the concept of not just social, but corporate social responsibility, as the implementation of social projects or projects of other directions, such as environmental, is possible only if the core business is successful, which is also confirmed in the study by P. Hohnen & J. Potts (2007), which formulated a clear algorithm for implementing and managing CSR business.

Survey results show that companies that adhere to the concept of corporate social responsibility in their operations mostly implement projects in several basic vectors. Four main types of activity demonstrate corporate social responsibility. The first area is social and philanthropic responsibility, which essentially involves providing free, irrevocable assistance in various forms to those in difficulty and need. Businesses can invest in certain projects that contribute to the development of education, healthcare, or other areas. In this way, businesses have the opportunity to contribute to charity, make monetary donations or implement volunteer initiatives, involving their staff to support various social or environmental activities. Crucially, philanthropy should not only be symbolic but also meet real needs and principles, so that it can have a real impact on improving living conditions and the environment. The next type of corporate social responsibility is social and ethical responsibility. Companies that are guided by the principles of ethical responsibility maintain a fair attitude towards all stakeholders – managers, investors, employees, and customers' counterparties, and firms guarantee that they do not manufacture products that were produced as a result of child labour (Khilukha, 2023). Environmental responsibility is another area of focus. Taking care of the environment is one of the most common forms of corporate social responsibility in business structures. In this way, companies can significantly reduce the level of environmental pollution, use natural resources sparingly, use recycled materials, compensate for negative environmental impacts caused by planting trees, or implement investment projects to finance research on ecosystem conservation.

Similar results were obtained in the study by A.B. Carroll (2021). However, it should be noted that companies should consider their impact on the environment and comply with environmental standards in their activities by directly implementing the management process, which should include functional management subsystems. The final type, which is synergistic in nature, is economic responsibility, i.e. an approach according to which a business combines all its financial and economic decisions with the obligation to make a significant contribution to the development of the social and environmental areas mentioned above. Thus, following this business concept, the ultimate goal is not only to maximise economic benefits but also to ensure a positive impact of business activities and other initiatives on the environment, society, and the state.

Since business social responsibility management is a systematic approach to the integration of social and environmental aspects into the strategy and operations of an enterprise, it is therefore implemented following the classical components of management, such as planning, organisation, motivation, and control. The same conclusion is reached by M. Nadeyko (2021) and K. Su *et al.* (2024), who studied the optimisation of corporate social responsibility management systems. The results of the study show that corporate social responsibility planning requires analysis of the internal and external environment, determination of goals and priorities of social and environmental initiatives, creation of a strategy for interaction with stakeholders, determination of responsibilities and resources to be allocated to social projects, as well as the establishment of a system for monitoring and evaluation of the results obtained. Business social responsibility planning is a key stage for the successful and efficient implementation of social initiatives. Defining a clear strategy and goals allows the company to effectively direct its efforts to address specific social issues. Social responsibility planning should be integrated into the strategic business management process to ensure the long-term social impact and sustainability of such initiatives. Organisation, as a management function, in the context of corporate social responsibility, should be an important component of ensuring systematic and targeted management aimed at achieving a positive impact on society and the environment, as it requires a systematic approach to the effective distribution of responsibilities that will help the company achieve the set results from the implementation of projects of impact on social, environmental, or any other non-business area (González-Ramos *et al.*, 2023).

The survey results show that motivation in corporate social responsibility management can be very diverse and determined by many factors. It is important to understand that these factors may vary depending on a particular company and its strategic goals that motivate companies to adopt and implement socially responsible initiatives. Such factors include reputational opportunities, and competitive advantages, including attracting a new and maintaining an existing customer base, positioning as a value-based brand, creating investment attractiveness, attracting new and

retaining existing professional and highly qualified personnel who want to share social responsibility with the company by contributing to the development and support of society, nature, and other areas (Konstantynovskyi & Zmicerevska, 2023).

Corporate social responsibility control should include a range of actions and strategies to ensure effective implementation and compliance with the defined standards and goals. This involves the use of a monitoring system, internal and external audits, performance and impact assessments, feedback and reporting systems, and the involvement of employees at various levels in the monitoring process so that they can express their ideas and observations. In addition, to continuously improve CSR strategies, this component involves continuous improvement and adaptability, i.e. responding to changes in the environment, new standards, and stakeholder requirements. Therefore, it is possible to state that in modern conditions the general purpose of control is not only to identify deviations and shortcomings but also to continuously improve and ensure that the company's activities meet the established CSR standards.

Based on the analysis of the interpretations of the concept of corporate social responsibility and the above information, it is possible to form an understanding of the concept of corporate social responsibility management, which should be understood as a multicomponent management system (planning, organisation, motivation, control, communication) in close integration with the main business processes, which allows implementing initiatives aimed at protecting and developing society or the environment while achieving the main goal of doing business. Along with the above-mentioned systemic components of corporate social responsibility management, the communication component, especially its focus on the external environment, plays an extremely important role. W.T. Coombs & S.J. Holladay (2011), in their study on corporate social responsibility management from the standpoint of the communication approach, conclude that business, by implementing social projects, not only demonstrates its altruism and concern for social development but also aims to obtain real economic benefits from such initiatives by building a positive reputation. The results of this study confirm this, and therefore, it is possible to conclude that informing about social projects of business is an important element of corporate social responsibility. Providing clear and understandable messages about social initiatives, as well as regularly informing the public and stakeholders about the implementation of these initiatives, will help maintain a positive perception of the company and its efforts in the sector.

Despite the size of the company and the scale of assistance, social responsibility requires professionally developed and organised communication with all stakeholders, including partners, employees, clients (consumers), and the public administration sector, as stated in the study by S.D. Dmytriiev *et al.* (2021). However, as the results of the study show, in the context of managing the communication component, it is necessary not only to clearly define the

target audiences but also to determine in what forms they will be informed about CSR projects. Here it is possible to state that it should be directed both to the internal audience, i.e. the one concentrated in the ecosystem of business processes of the enterprise, and to the external audience – mass media, partners, potential consumers, clients, state authorities and other contractors (Gahramanova, 2019). Thus, according to the results of the study, informing about planned or ongoing corporate social responsibility projects, and especially about their results, is an integral element of the information exchange mechanism.

In the first months of the full-scale invasion, Ukrainian companies were haphazardly involved in the process of assisting society, the state, and the Armed Forces of Ukraine, due to the significant uncertainty of further developments, but in 2023, such activities became more planned, and for several companies, this turned out to be one of the strategically important areas of business. In general, it is safe to say that the conditions of war in Ukraine pose complex ethical and social challenges to businesses. In these conditions, business CSR management becomes even more relevant and important, as companies have an impact on the social sphere and can help in the context of the humanitarian crisis. As the results of the study show, in Ukraine, as a result of the war, the key area of CSR activities is direct humanitarian assistance, when companies can implement humanitarian programmes to help those affected by the war, including the supply of essential goods, medical equipment, and housing. Another important aspect for Ukrainian businesses is social support and security for employees both in the vicinity of the war zone and in other regions of the country. Another vector of corporate social responsibility in the current environment is direct support of the Armed Forces of Ukraine, both through existing volunteer organisations and public associations, and the implementation of initiatives. It is important to develop partnerships with non-profit organisations, government agencies and other civil society organisations to jointly solve problems and provide effective assistance.

Thus, corporate social responsibility management is a key element of a strategic approach to modern business management. It is important to define clear goals, develop effective plans and implement actions that will contribute to their achievement. This is especially relevant in the current war situation, as Ukrainian enterprises, including large businesses, can play a significant role in supporting society, addressing humanitarian issues and economic recovery in the affected regions, both by creating jobs and investing in social infrastructure.

Conclusions

Corporate social responsibility of business is manifested in the implementation of initiatives, programmes, projects, and activities aimed at two main areas, in particular the social sphere and the environment. It is implemented mainly through social and philanthropic, social, and ethical, environmental and economic activities. However, for

companies operating in the Ukrainian market, the focus, and priorities in the area of corporate social responsibility have changed somewhat as a result of the war. The need to ensure business continuity and the safety of employees, support for defence capabilities, unity and cooperation with volunteers and non-governmental organisations, and diverse support for local communities are now top priorities.

It is advisable to understand corporate social responsibility management as a process integrated into the general management mechanism of the enterprise, which allows implementing social or environmental measures in parallel with achieving profitability as the main goal of business activity. In general, corporate social responsibility management should be an integral part of both strategic and operational management of an enterprise and should be carried out in the context of the main functional systems such as planning, organisation, motivation, and control. However, since a business, implementing initiatives that characterise its CSR, not only contributes to solving social or environmental problems but also shapes its image, the communication subsystem should play a key role in the management system. With the help of communication tools, corporate social responsibility projects can be converted into real economic benefits, such as the loyalty of existing and attracting new customers, increased investment attractiveness, and employment of highly qualified personnel. The

effectiveness of communication management in terms of corporate social responsibility is determined by the company's ability to effectively inform both internal audiences and external stakeholders (partners, society, customers, and government authorities) about its goals, values, initiatives, and results.

In general, the management of corporate social responsibility of business in times of war requires a strategic approach and the need to consider corporate social responsibility as an integral part of business management to achieve its own goals, as well as to support society and the future recovery of the country. Further research should be directed at developing a conceptual framework for managing the communication system in the implementation of CSR projects, depending on the areas they are aimed at. In addition, a promising area of research is the development of scientifically based models of the relationship between the implementation of CSR projects and their impact on the image of the enterprise in the context of its transformation into additional economic benefits for business.

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Conflict of Interest

None.

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Основні принципи управління корпоративною соціальною відповідальністю в умовах воєнного стану

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Анотація. Корпоративна соціальна відповідальність є невід'ємним елементом сучасної бізнес-моделі, особливо для великих компаній. Ефективне управління цим процесом забезпечує позитивний результат як для суспільства, так і для самого бізнесу. Тому метою дослідження є обґрунтування теоретичних засад процесу управління в контексті корпоративної соціальної відповідальності з урахуванням воєнних умов, в яких функціонує український бізнес. Для досягнення поставленої мети використано системний підхід та методи аналізу, порівняння, дедукції, декомпозиції, зіставлення, декомпозиції. У дослідженні проаналізовано сучасні підходи до розуміння корпоративної соціальної відповідальності бізнесу. Виділено основні вектори, в яких реалізується корпоративна соціальна відповідальність підприємств. Сформовано авторське трактування поняття управління корпоративною соціальною відповідальністю. Сформовано та аргументовано основні принципи реалізації комунікаційної політики як для внутрішньої аудиторії (працівники компанії), так і для зовнішніх стейкхолдерів (партнери, клієнти, суспільство, держава). Досліджено та виокремлено особливості та основні напрями реалізації ініціатив корпоративної соціальної відповідальності українського бізнесу в умовах війни. Досліджено особливості та виокремлено основні напрями реалізації ініціатив корпоративної соціальної відповідальності українського бізнесу в умовах війни. Встановлено, що пріоритетом корпоративної соціальної відповідальності компаній в Україні є забезпечення безперервності бізнесу (що дозволяє виплачувати заробітну плату та податки), забезпечення безпеки персоналу (облаштування бомбосховищ, переселення працівників та їхніх сімей), підтримка обороноздатності (різноманітна допомога Збройним силам України) та допомога територіальним громадам. Результати дослідження можуть бути використані бізнес-середовищем для формування управлінського механізму реалізації ініціатив корпоративної соціальної відповідальності, а також академічною спільнотою, яка вивчає цю проблематику

Ключові слова: соціальні цінності; підприємництво; суспільство; організаційний менеджмент; гуманітарна допомога; благодійність

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