DOI: 10.26565/2786-4995-2025-3-16
UDC 338.24:004.9:658 (477)

Pyvavar Iryna
PhD in Economics, Associate Professor
State Governance, Public Administration and Economic Policy Department,
Simon Kuznets Kharkiv National University of Economics
Nauky Av., 9A, Kharkiv, 61166, Ukraine
e-mail: pivavariv@ukr.net
ORCID ID: 0000-0002-6115-0200
Lytvynenko Olena
PhD in Economics, Associate Professor
Department of Economics and Business,
State Biotechnology University
44 Alchevskykh St., Kharkiv, 61002, Ukraine
e-mail: o.litvinenko@btu.kharkov.ua
ORCID ID: 0000-0002-8360-4461
Morozova Nadiia
PhD in Economics, Associate Professor
Education and Research Institute "Karazin Banking Institute"
V. N. Karazin Kharkiv National University,
Svobody Sq., 4, Kharkiv, 61022, Ukraine
e-mail: nadya.morozova.26@gmail.com
ORCID ID: 0000-0002-4082-2960
Denchyk Iryna
Senior Lecturer
Education and Research Institute "Karazin Banking Institute"
V. N. Karazin Kharkiv National University,
Svobody Sq., 4, Kharkiv, 61022, Ukraine
e-mail: irina.denchik@karazin.ua
ORCID ID: 0000-0003-1594-1084

Business management in Ukraine in the context of the digital economy and wartime challenges

Abstract. Business management in the context of the digital economy and military challenges is of particular relevance to Ukraine. The object of the study is the transformation of management processes of domestic enterprises under the influence of digitalization and crisis factors.

Problem statement. The problem lies in the significant digital divide between large businesses and small and medium-sized enterprises, the insufficient level of digital competencies of managers and employees, as well as cybersecurity risks and imperfect regulatory frameworks.

Unresolved aspects of the problem. The issues of forming comprehensive models for assessing the effectiveness of digital transformation, taking into account industry-specific features, and integrating public digital services into business processes remain unresolved.

Purpose of the article. The purpose of the article is to study the peculiarities of business management in Ukraine in the context of the digital economy and military challenges, and to identify the key risks and prospects for the digital transformation of enterprises.

Presentation of the main material. The article uses a combined approach that combines the analysis of scientific sources, statistical data and practical cases of Ukrainian and foreign companies. The author examines the impact of digital technologies on management decisions, organizational flexibility and business competitiveness. Particular attention is paid to the role of public policy, development of digital competencies of personnel, and adaptation of international experience to the conditions of the military crisis.

Conclusions. The results show that digitalization helps to increase productivity, optimize business processes, form new models of interaction and integrate Ukrainian enterprises into global markets. The practical significance of the study is to develop recommendations for entrepreneurs and government agencies on digital transformation strategies in times of war.

Keywords*: digital transformation, digital competencies, innovations, innovative business models, small and medium-sized enterprises, state digital policy, global integration.*

Formulas: -, fig.: 1, tabl:. 5, bibl.: 21.

JEL Classification: M15, M21, O32, O33, G18

For citation: Pyvavar I., Lytvynenko O., Morozova N., Denchyk I. Business management in Ukraine in the context of the digital economy and wartime challenges. Financial and Credit Systems: Prospects for Development. №3(18) 2025. P. 204-221. DOI: https://doi.org/10.26565/2786-4995-2025-3-16

Introduction. The digital economy has become a crucial factor in the development of modern national economies, shaping new models of production, communications and business management. It is based on the use of information and communication technologies, e-commerce, and digital services that open up new opportunities for improving the efficiency of enterprises and their integration into the global economic space.

At the same time, digitalization brings new challenges: increased competition, the need for data protection, the rapid pace of technological change, and the need to develop digital competencies of staff. For Ukraine, these problems are exacerbated by the military situation, which creates additional barriers to business development and investment.

One of the main challenges is the digital divide between large companies and small and medium-sized businesses. While large corporations have the resources to implement modern technologies and cybersecurity systems, SMEs are often limited in terms of finances and personnel. An equally significant problem is the low level of digital literacy of managers and employees, which reduces the effectiveness of using new tools. Cybersecurity risks are also a particular threat, exacerbated by the growth of electronic transactions and data turnover.

The existing difficulties are compounded by the imperfection of the regulatory framework, which does not keep pace with technological change. As a result, businesses face legal uncertainty in the areas of e-commerce, personal data protection, and the use of cloud services.

At the same time, digital transformation opens up significant potential for Ukraine to modernize its business environment, increase its innovation potential, attract investment and create new markets. That is why it is important to find effective models of business management in the digital economy and develop strategies that can ensure the sustainability of enterprises and their competitiveness in the face of military challenges.

Literature review. The issue of business management in the context of the digital economy is attracting increasing attention from researchers around the world. Modern scholarly works show that digital transformation is not only a technological but also a strategic process that changes business models, market structure, and enterprise management.

Researchers, such as Yakushko [21], Melnyk and Ruda [9], and Mishchenko [12], emphasize the need to develop comprehensive approaches to the digitalization of management processes in Ukraine. They emphasize that digital transformation is characterized by high dynamics and requires the adaptation of management decisions and new competencies of managers. The works of Hrynko, Gviniashvili, and Kaliberda [5] and Nazarenko [13] note the impact of external challenges, in particular, military operations, on the speed and quality of the introduction of digital tools.

A special place in the scientific literature is occupied by e-commerce research. Its development in Ukraine is analyzed by Ilchuk, Kyrychenko, and Vodnytskyi [6], Berezovska and Kyrychenko [1], and Burka and Shkoda [3], who note that the war and global economic challenges both slow down and stimulate the development of online commerce. Sak [16] emphasizes the strategic guidelines of e-commerce and global trends, focusing on the importance of strategic diagnostics and the formation of new business models.

Foreign studies take a broader view of the digital economy. For example, Ciampi, Faraoni, Ballerini, and Meli [4] show that digitalization directly correlates with organizational flexibility of companies, ensuring their ability to quickly adapt to changes. Van de Wetering, Mikalef, and Pateli [18] confirm this with empirical results that demonstrate the importance of strategic alignment between IT agility and dynamic capabilities of organizations.

International organizations and think tanks make an important contribution to the study of digital transformation. The reports of the OECD [14; 15], World Bank [19], World Economic

Forum [20], McKinsey & Company [8], and the Brookings Institution (Ingram and Vora) [7] note that digitalization is a key factor in increasing the competitiveness of countries and one of the main tools for economic recovery after crisis shocks. In particular, the OECD and World Bank documents emphasize the role of digital policy in economic recovery, while McKinsey analyzes the development of artificial intelligence as a driving force for digital change.

Modern Ukrainian developments also complement the global picture. For example, Sycheva, Osypenko, and Petrishyna [17] study digital marketing as a tool for sustainable business development. The Ministry of Digital Transformation of Ukraine [10; 11] has developed a framework of digital competencies for citizens and presented the results of regional digitalization, which demonstrates the importance of public policy in the development of the digital economy.

Thus, the literature review shows that the digital economy is viewed as a complex process that combines technological innovation, strategic management, and socio-economic aspects of development. Ukrainian and foreign research complement each other: the former focuses on local challenges, including military ones, while the latter forms the theoretical foundations and global approaches to digital business transformation. This creates the basis for further research to improve business management models in the digital economy and crisis situations.

Purpose, objectives and research methods. The purpose of the article is to study the peculiarities of business management in Ukraine in the context of the digital economy and military challenges, to identify the key barriers to digital transformation and to outline the prospects for improving the efficiency of management practices of enterprises.

To achieve this goal, the following tasks are envisaged:

- to analyze modern scientific approaches to business management in the digital economy, taking into account foreign and Ukrainian experience;
- вto identify key challenges and barriers to the introduction of digital technologies into business processes;
- to explore the risks of digitalization and their impact on the effectiveness of management decisions;
- to outline promising areas for improving the efficiency of business management in the digital environment;
- to formulate practical recommendations on digital transformation strategies aimed at increasing the competitiveness and sustainability of enterprises.

The research methodology is based on an integrated approach that combines theoretical, empirical, quantitative and qualitative analysis. Theoretical methods include the systematization and generalization of scientific works of Ukrainian and foreign authors, which allowed us to define conceptual models of digital transformation and identify factors that affect the efficiency of business processes. Empirical methods involve the analysis of official statistics, government reports, industry reviews, and surveys of managers and specialists from various sectors. Quantitative methods include building indicators of the digital maturity of enterprises, using correlation and regression analysis to identify the relationship between the level of digitalization and the effectiveness of management decisions, and clustering enterprises by the degree of digital maturity and organizational flexibility. Qualitative methods include case studies of digital technologies implementation at specific Ukrainian enterprises, interviews with managers on the barriers and results of digitalization, content analysis of regulatory documents and strategic digital development programs.

A distinctive feature of the study is that it takes into account the military context, which affects the availability of resources, market structure, logistics processes, and the level of cyber risks. The study is interdisciplinary in nature, combining economic, managerial, technological, and social aspects, and its results are aimed at both the scientific community and practical managers and government authorities.

Research results. The development of the digital economy is significantly changing approaches to business management, creating new opportunities to improve the effectiveness of management decisions. According to research by international organizations, digital technologies not only optimize operational processes, but also create conditions for the formation of sustainable competitive advantages for enterprises. In particular, business process automation significantly reduces the time spent on data processing, reduces the likelihood of human error, and ensures a faster response to changes in the market environment [2].

Digital data management tools, such as Big Data and Business Intelligence, are shaping a qualitatively new level of decision-making. The use of large data sets in combination with artificial intelligence algorithms enables enterprises to more accurately predict demand, create personalized offers for customers, and optimize logistics chains. For example, Amazon and Alibaba actively use data analytics to improve the customer experience, allowing them to maintain their leading positions in the global market.

In Ukraine, the positive effect of business process digitalization is also evident. Companies that have implemented CRM systems and e-commerce platforms have seen an average sales growth of 15-20% in the first two years after integrating digital solutions. In the banking sector, an example of successful digital transformation is JSC CB PrivatBank, which was one of the first to introduce mobile banking and an online payment system, which reduced customer service costs and ensured high transaction speeds [8].

Digitalization contributes to increased productivity, reduced costs, personalized customer service, and strengthened competitive positions. Ukrainian companies are making significant progress in this area by using mobile applications, online platforms, CRM systems, and logistics process automation. To illustrate the key results, Table 1 summarizes international and Ukrainian experience.

Table 1. Impact of digital solutions on business management efficiency

Country/company	Digital solutions	Result
Amazon (United States)	Big Data and artificial intelligence in logistics	Optimization of deliveries, reduction of delivery costs by 15%
Alibaba (China)	Cloud services and e-commerce platform	Personalization of offers for customers, sales growth by 25%
Siemens (Germany)	Industry 4.0, Internet of Things (IoT)	Automation of production, 20% increase in productivity
PrivatBank JSC (Ukraine)	Mobile banking, online payments	Reduction in maintenance costs, rapid growth of customer base
Rozetka (Ukraine)	CRM system and online sales platform	18% increase in sales in the first 2 years of implementation
Nova Poshta (Ukraine)	Digital applications for customers and warehouse automation	Faster order processing, reduced delivery times

Source: complied by the authors based on [2, 11, 14, 15]

International experience shows that digital technologies are becoming a key tool for ensuring business competitiveness, while examples from Ukrainian companies demonstrate their ability to effectively adapt global practices to local conditions. This confirms that digitalization is not only a requirement of the times, but also an effective mechanism for improving business management efficiency in Ukraine.

In the digital economy, the key factor for business success is not only the introduction of the latest technologies, but also the ability of organizations to adapt to rapid market changes. Organizational flexibility, manifested in the use of agile management methods (Agile, Scrum, Kanban) and the ability of staff to quickly acquire new skills, is the basis for the sustainability of enterprises in times of digital transformation.

According to the World Economic Forum report (Future of Jobs Report, 2023) [13], more than 44% of the core skills required of employees will change over the next five years. At the same time, the demand for digital competencies is growing the most: working with big data, artificial intelligence, cybersecurity, and process automation. A McKinsey study conducted in 2022 confirms that companies with a high level of digital literacy among their staff are 1.5 times more likely to achieve leadership positions in their industry.

In Ukraine, the issue of digital skills is also one of the most important. According to analytics from the Ministry of Digital Transformation of Ukraine for 2023, almost 53% of Ukrainians have basic digital skills, but only 15% have intermediate or advanced skills. This creates risks for businesses, as insufficient human resources can hinder the effective implementation of digital solutions. In response, the state is implementing educational programs based on the "Diia. Digital Education" portal, which has already attracted more than 2 million citizens.

Examples from Ukrainian businesses also demonstrate the importance of investing in staff development. In particular, Nova Poshta has introduced a corporate training program on digital services and logistics technologies, which has reduced operating costs by 12%. Kyivstar is developing competencies in the field of Big Data and analytics, which has enabled the company to increase its revenue from digital services by 27% in just one year.

At the international level, Microsoft is implementing a global initiative to retrain employees (Global Skilling Initiative), through which more than 50 million people have already acquired new digital skills. Similar programs are being implemented by Google and Amazon Web Services, which are creating corporate academies to support internal training [10].

Table 2 shows data on digital competencies and organizational flexibility with examples from Ukrainian and international companies.

Table 2. Level of digital competence and organizational flexibility in business transformation

Company	Approach to staff development and flexibility	Result
Microsoft (USA)	Global Skilling Initiative, corporate courses on digital skills	Over 50 million people acquired new digital skills; increased team productivity
Google (USA)	Corporate academies and training courses on AI and big data	Improved digital literacy and adaptability of employees; rapid implementation of new projects
Amazon Web Services (USA)	Training programs for employees in the field of cloud technologies	Growth in internal competencies, reduction in time to implement new services
Diia. Digital Education (Ukraine)	Massive online courses on digital literacy for citizens	Over 2 million users attracted; improvement in basic digital skills
Nova Poshta (Ukraine)	Internal training courses and Agile programs for staff	12% reduction in operating costs; improvement in service quality
Kyivstar (Ukraine)	Training programs in Big Data and analytics	27% growth in revenue from digital services over the year; improvement in analytical capabilities

Source: complied by the authors based on [2, 11, 14, 15]

Analyzing the data in Table 2, we can conclude that organizational flexibility and the development of digital competencies among staff directly affect the efficiency of business processes and the speed at which companies adapt to market changes. International experience shows that investments in training and retraining staff are strategically important for maintaining competitiveness. Ukrainian companies that actively implement digital skills development programs and apply flexible management methods achieve significant growth in productivity, operational efficiency, and customer satisfaction.

Recent research and practical examples prove that organizational flexibility and digital literacy of personnel are key factors in successful business transformation. Companies that invest in

employee training and development achieve significantly higher productivity, better adaptation to market changes, and strengthen their competitive positions in both domestic and global markets. A high level of employee qualification in digital tools ensures faster adaptation to change, while organizational flexibility allows companies to effectively implement new management models and respond to the challenges of the digital economy [14].

Global technology corporations such as Microsoft, Google, and AWS demonstrate significantly higher levels of digital competence and flexibility, confirming their leadership in the implementation of digital innovations. At the same time, Ukrainian companies and government initiatives, such as Diya. Digital Education, Nova Poshta, and Kyivstar, are gradually closing the gap by developing their own models of digital adaptation. This indicates the growing importance of investment in the development of personnel and organizational structures, which are key factors for successful integration into the global digital space.

It is expected that during 2025-2030, Ukrainian companies will significantly accelerate the pace of digital competence development through the active implementation of training programs, cooperation with international technology partners, and expanded access to IT education initiatives. According to forecasts by OECD and McKinsey analysts, by 2030, more than 70% of work processes in medium and large enterprises in Ukraine could be partially or fully automated. This will contribute to growing demand for specialists in digital analytics, cybersecurity, artificial intelligence, and data management.

Organizational flexibility, in turn, will become a determining factor in business sustainability, as companies with adaptive management models will be able to respond more quickly to global economic crises and technological changes. It is predicted that companies that systematically invest in the digital skills of their employees and the modernization of management practices will achieve 20-30% higher productivity compared to their competitors. Over the next few years, Ukraine has all the prerequisites to reduce the digital divide with developed economies and form its own competitive advantages in the global business environment [15].

Table 3 shows the projected directions for the development of Ukraine's digital economy in the medium term. The focus is on key aspects that determine the effectiveness of business management in the new conditions: the development of employees' digital competencies, the automation of business processes, the transformation of organizational models, increased productivity, and integration into global business networks.

Table 3. Forecast of key trends in Ukraine's digital economy for 2025-2030

Key aspects	Forecast for 2025-2030
Development of digital competencies	Growth to 80-85% coverage of employees by digital education programs
Business process automation	70% of processes in medium and large companies are partially or fully automated
Demand for digital professions	High demand for specialists in AI, Big Data, cybersecurity
Organizational flexibility	Growth in the role of adaptive management models, rapid response to change
Business productivity	20–30% higher performance among companies investing in digitalization
Global integration	Reduction of the digital divide, active participation in global business networks

Source: complied by the authors based on [2, 11, 14, 15]

An analysis of forecast trends shows that by 2030, digitalization will become a determining factor in the development of Ukrainian business. Companies that invest in the development of their staff's digital skills and the automation of business processes will gain significant competitive advantages and will be able to integrate into global markets. At the same time, organizational flexibility is becoming an equally important condition for success, as the ability to quickly adapt to technological and market changes will determine the level of productivity and sustainability of

companies. Business management in Ukraine in the digital economy should be based on a balance between technological innovation and human capital development.

Fig. 1 summarizes the main trends in the development of Ukraine's digital economy for the period 2025-2030, reflecting the key vectors of change and opportunities for their practical implementation.

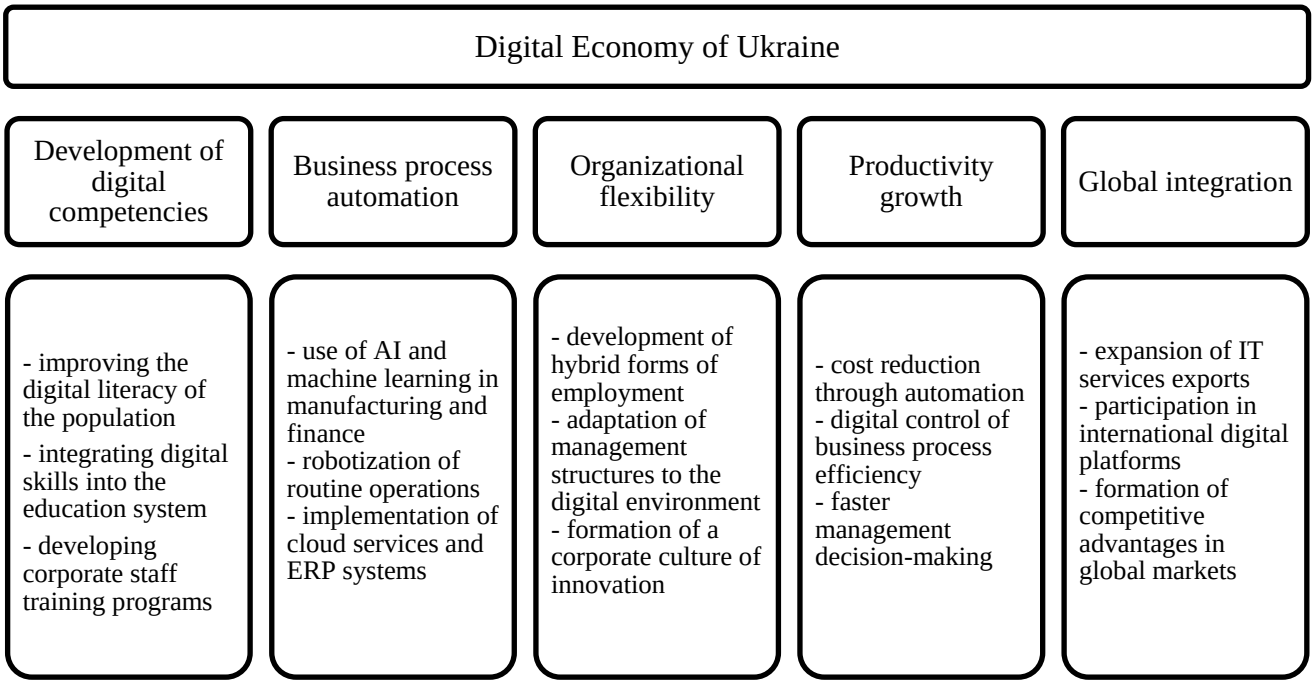

Figure 1. Trends in the development of Ukraine's digital economy
Source: complied by the authors based on [2, 11, 14, 15]

Small and medium-sized enterprises (SMEs) remain a key element of the Ukrainian economy: they account for over 99% of all companies, provide around 80% of jobs in the business sector, and generate over 68% of added value. Despite this contribution, most SMEs are concentrated in traditional sectors with low levels of innovation, such as trade and services, although there has been some growth in the share of enterprises in industry and IT in recent years [19].

The full-scale invasion has caused significant damage to the country's economic environment. Key challenges include the destruction of critical infrastructure, labour losses due to internal and external migration, supply and logistics disruptions, reduced exports and falling budget revenues. It is estimated that more than 60% of SMEs temporarily suspended operations in the first months of the war. However, about 80% of companies were able to resume operations within six months, although constant shelling, power shortages, and logistics problems continue to create obstacles to stable functioning.

Against this backdrop, the information and communication technology (ICT) sector is showing significant growth, providing new opportunities for economic growth and supporting business recovery. Digitalization contributes to improving business efficiency, reducing vulnerability to crises, and developing innovative services. Thanks to government initiatives such as the expansion of electronic services within the Diya platform and the introduction of electronic construction, digital technologies have become a tool not only for short-term recovery but also for long-term modernization of the economy.

Digital transformation has particularly great potential for SMEs, as limited resources make them more vulnerable to external shocks. Currently, Ukrainian small and medium-sized enterprises have not yet fully taken advantage of digital solutions: only half of medium-sized companies and

about a third of small companies have their own websites, while this figure reaches almost 70% for large enterprises. In addition, the level of use of modern digital tools and automation remains below average European standards, creating additional challenges for improving competitiveness.

During the war, the Ukrainian government continues to work actively on developing the SME sector and strengthening digitalization, in particular through the upcoming SME Strategy for 2024-2027. The Organisation for Economic Co-operation and Development supports Ukraine in shaping policies aimed at fully exploiting the potential of digital technologies for economic growth and recovery, offering analytical findings and recommendations for inclusion in government programmes and initiatives [20]. In this context, the key areas of action can be grouped into three main components:

1. Formation of an effective ecosystem for the digitalization of SMEs at the national and regional levels. Digital transformation is a priority for the government, which is being implemented through a number of strategic documents, including the National Economic Strategy until 2030 and the Global Innovation Vision of Ukraine 2030. However, there are not enough provisions specifically targeting SMEs. The optimal step would be to integrate measures for the digitalization of SMEs into a single coordinated policy document—a future SME Strategy or a special National Digital Strategy—with clear goals, measures, budget, and performance indicators. Significant efforts have already been made to build the institutional framework, including the creation of the Ministry of Digital Transformation of Ukraine in 2019 and the development of the Diya. Business platform and a network of Support Centers both in Ukraine and in Warsaw. At the same time, it is important to strengthen the role of Chief Digital Transformation Officers (CDTOs) at the local level and ensure regular information exchange between the public and private sectors, as well as raise awareness of digital services in small towns and villages.

2. Developing comprehensive programs to support the digitalization of SMEs. Despite existing measures, small and medium-sized enterprises often lack information about existing digital tools, the necessary skills, or available support services. Limited financial resources further hinder their digital transformation. To overcome these barriers, the government, through Diya and EEPO, offers a range of online services, but this is not enough to meet the diverse needs of SMEs. A smart move would be to develop a comprehensive support program that includes online digital maturity self-assessment tools, support for sectoral initiatives, and interaction with private consultants. In terms of financing, even with a limited budget for digitalization, it is possible to use co-financing mechanisms, vouchers, grants, and long-term incentives for investments in digital technologies.

3. Using digital technologies to overcome the consequences of war and restore the economy. Digital tools help SMEs adapt to trade disruptions, and e-commerce is growing, but its adoption among small businesses remains low, with only about 4–5% selling online. Targeted support, including logistics optimization, market awareness, and compliance with legislation, can significantly improve the situation. In addition, SMEs remain vulnerable to digital risks and cyberattacks, particularly due to the use of outdated or insecure software. Ukraine could strengthen cybersecurity measures, expand cooperation between stakeholders, and strengthen the regulatory framework to improve business resilience in the long term.

The table presents the main policy directions, recommendations, and proposed measures, divided into short-, medium-, and long-term actions.

Ukraine began actively developing centralized and regional digital policies even before the full-scale invasion began. These efforts became particularly important during the war, when digitalization became a key factor in the country's resilience. Innovative approaches aimed at ensuring uninterrupted service to citizens and countering cyber threats attracted the attention of the international community.

Table 4. Recommendations for digitization and increasing the resilience of SMEs in wartime

Policy area	Recommendation	Proposed measures	Term	Implementation
SME digitalization ecosystem	Optimize SME digitalization policy	Integrate measures into a single strategic document	Short-term	Preparation of the draft SME Strategy 2024-27
			Medium-term	Development of a National Digital Strategy for SMEs
			Long-term	Continuous monitoring, updating of documents, and budget planning
Institutional framework	Improve coordination and awareness	Strengthen the role of CDTO, raise awareness in small towns	Short-term	Conducting training seminars and campaigns
			Medium-term	Expanding the network of "Diia. Business" support centers
			Long-term	Ensuring stable public-private information exchange
Support for SME digitalization	Provide comprehensive support services	Online digital maturity assessment tool, consultations	Short-term	Launching online resources and self-assessment
			Medium-term	Sectoral support programs, cooperation with private consultants
			Long-term	Creation of a sustainable digital transformation program with budgetary support
Financing digitalization	Ensure access to finance	Vouchers, grants, co-financing	Short-term	Introduction of short-term incentives
			Medium-term	Creation of a co-financing system for SMEs
			Long-term	Long-term incentives for investment in digital technologies
Use of digital technologies	Overcome the effects of war and increase resilience	E-commerce, cybersecurity	Short-term	Support for SMEs in launching online sales, raising cyber awareness
			Medium-term	Optimization of logistics and adaptation to changes in legislation
			Long-term	Strengthening cyber resilience, long-term integration of digital solutions into business processes
Challenges of wartime	Improve SME resilience to crises	Business continuity, relocation, asset protection	Short-term	Providing information and advice on crisis management, operational support
			Medium-term	Creating a system for monitoring risks and responding to emergencies
			Long-term	Long-term sustainability planning, integration of anti-crisis mechanisms into SME strategies

Source: complied by the authors based on [2, 11, 14, 15]

Ukraine's digital economy, especially the ICT sector, remained a key driver of development before the war, and its resilience was largely due to the coordination of actions following the

creation of the Ministry of Digital Transformation (MDT) in 2019. The MDT was tasked with streamlining the fragmented strategy of previous years and creating a unified approach with an authorized body to monitor implementation, respond to new needs, and digitize government operations, processes, and services.

Developing a comprehensive digital strategy requires clearly defined high-level goals and principles that will serve as the basis for planning in all areas of public policy. For Ukraine, the desire to integrate into the European Union has become a key factor in shaping national strategies and action plans.

After the full-scale invasion, EU support for Ukraine's digitalization has intensified [2]. Efforts are focused on ensuring uninterrupted digital communications and electronic services for citizens and authorities, which has become critically important in the context of cyberattacks on Internet infrastructure. The EU is also providing technical assistance to the Ministry of Digital Transformation in developing a National Strategy for Broadband Internet Access, which includes the rollout of high-speed fiber-optic networks and 5G technology.

The approach to the digitalisation of small and medium-sized enterprises (SMEs) must take into account the interests of all participants in the ecosystem in order to avoid duplication of efforts and make the most effective use of existing support readiness. Currently, a significant part of the funding for SME initiatives comes from international programmes and private funds, as the state budget is mainly directed towards wartime needs. Increasing the availability of domestic financing to support SMEs will remain critical in the long term.

Leading initiatives and institutions supporting SMEs reflect the influence of key international partners such as USAID, GIZ, and the EU. Among the largest donors are USAID and UKAID, which support the Prozorro and Trembita platforms; the Swiss Development Agency directs resources towards the digitization of public services and e-democracy, including tools for petitions and local budgets; the EU focuses on strengthening Ukraine's administrative capacity [10].

The US government was the main partner of the ICU initiative “Diia,” allocating $25 million for the initial development of the platform with the prospect of further funding through the state budget. USAID programs supported about 4,700 SMEs, providing grants and assistance worth $64 million under the Advantage Ukraine initiative. The EEPO budget for 2021 was €1.3 million, part of which came from the state and part from donors. After the start of the full-scale invasion, international funding increased, with state funds amounting to €900,000 and donor funding exceeding €1 million.

There are few direct investment funds in Ukraine, but those that do exist have a long history and play a key role in supporting SMEs. The Western NIS Enterprise Fund (WNISEF) has been operating for over 29 years, collaborating with the SME Center on projects for SMEs, providing financing and information support on government platforms. Horizon Capital has also been active in the country for over 29 years, providing financial support for SME development. Since the start of the war, WNISEF has raised over $250 million to support small and medium-sized businesses, becoming the first large fund of this scale to be approved by the President of Ukraine [15].

Civil society organizations play an important role in SME support initiatives, providing strategic and policy input and filling financial gaps. The recovery and development of SMEs after the war will require close coordination among partners on a large scale and the effective combination of public, international, and private resources.

The private sector plays a key role in the digitalization of SMEs, but interaction between different participants in the ecosystem needs to be further strengthened. The Ukrainian digitalization ecosystem benefits from the active participation of private companies and initiatives that promote the development of business support infrastructure, including incubators and accelerators. For example, Digital Boost Hub and the recently opened TechAdvance innovation accelerator provide entrepreneurs with expert support and training programs to accelerate digital transformation.

Business associations play a significant role in shaping policy and implementing SME digitalization projects. The Ukrainian Innovation Alliance (UIA), for example, brings together more than 1,500 companies in 45 clusters across various sectors, from engineering and IT to agribusiness, medicine, textiles, and construction. Some of these clusters also support defense and territorial initiatives. To provide financial support to SMEs, the UIA provides access to Horizon Europe programs and other international grant mechanisms, and promotes the development of international partnerships to create export opportunities and training programs for professional development [19].

The innovative models developed by the alliance envisage the phased development of infrastructure: the creation of support zones and value chains, innovation centers and laboratories, incubators, and experience zones. The UIA actively cooperates with international organizations such as the European Cluster Alliance and EIT Manufacturing to integrate Ukrainian SMEs into global innovation networks. In addition, there are a number of private innovation parks operating in Ukraine, including UNIT.City and UNIT.Kharkiv, which include research centers, educational institutions, and high-tech enterprises.

Despite these efforts, there are still limitations: the number of incubators, accelerators, and experience zones is still insufficient, and innovation parks face problems with supporting infrastructure, regulatory barriers, and a lack of sufficient investment incentives. Cooperation between the public and private sectors requires coordination, particularly with regard to the development of joint KPIs and tools to support the digital development of SMEs.

The Ukrainian government has identified digitalization as a priority policy area and has already developed a number of national strategies and documents outlining the state's ambitions for digital development.

An analysis of existing support services for SMEs in Ukraine has shown that digital centers in Ukraine already have a foundation in the form of Diya.Business and regional hubs, but they need to be scaled up and integrated. In the context of war, the key task is to develop mobile and offline formats that can operate with limited internet access.

Digital maturity self-assessment tools are still in their infancy, but their unification and adaptation to economic sectors will enable SMEs to develop realistic transformation plans. Military challenges require simple, flexible solutions that are accessible even without stable electricity and internet access.

Sectoral digital plans in Ukraine remain fragmented. There is a need for a unified methodology and coordination between industries. This is particularly relevant in wartime, as supply chains are disrupted and businesses relocate, changing the priorities of digitalization [8].

The development of digital skills and staff capacity has seen some success through Diia.Education and donor programs, but fragmentation remains the norm. It is important to introduce short distance learning courses and voucher programs to compensate for staff losses caused by evacuation and mobilization.

Financial support for the digitalization of SMEs is limited to grant and loan programs. In wartime, this is particularly problematic due to increased risks and a shortage of public resources. It is advisable to develop vouchers and co-financed grants that reduce the financial burden on businesses.

Overall, the analysis shows that Ukraine has already created basic mechanisms to support the digital transformation of SMEs, but their effectiveness is hampered by both systemic gaps (fragmentation, lack of coordination, limited funding) and specific challenges of wartime. This necessitates the adaptation of international practices to crisis conditions, a focus on flexible support instruments, and a strengthening of the state's role as a coordinator of business digital transformation.

Adapting international experience in digital transformation cannot be achieved by directly copying ready-made models. It is necessary to take into account the Ukrainian context, especially in the context of the military crisis. For example, the practice of creating “single window” digital

centers, which is widespread in EU countries, must be transformed into a format of mobile or online hubs capable of operating under conditions of limited infrastructure. Digital maturity self-assessment tools need to be simplified to be accessible to small businesses without the involvement of expensive consultants. It is also important to take into account the needs of relocated companies and regional differences in the level of digital infrastructure.

A key element of successful adaptation is the use of flexible tools that can be quickly scaled or transformed depending on the situation. These include:

- mobile digital hubs in safe regions;
- grant and voucher programs with minimal bureaucratic procedures;
- modular training programs on digital skills in online, offline, or blended learning formats;
- sectoral roadmaps for digitalization for the most affected industries (agriculture, logistics, manufacturing).
- Such tools enable businesses not only to survive but also to adapt to new conditions while remaining competitive.
- International experience shows that successful digitalization of SMEs in crisis conditions is only possible with clear coordination from the state. In Ukraine, this should be achieved through:
- the development of a unified national strategy for digital support of SMEs;
- the creation of a centralized platform with information on all assistance programs available to businesses;
- the introduction of mechanisms for co-financing digital projects;
- the simplification of regulatory procedures and the accelerated adaptation of the legislative framework.

Particular attention should be paid to creating backup digital solutions, such as cloud services and cyber security systems, which help reduce the risks of infrastructure loss. The development of public-private partnerships and continuous monitoring of program effectiveness will ensure rapid adjustment of support in line with business needs.

The adaptation of international practices in the field of digital transformation to Ukrainian crisis conditions should be based on flexible and easy-to-use tools (Table 5). The state plays a key role as a coordinator, combining the resources of business, international organizations, and the public sector. This approach not only allows overcoming the current challenges of wartime, but also lays the foundation for sustainable economic recovery through digitalization.

Table 5. Adaptation of international digital transformation practices to the conditions of war in Ukraine

International practice	Ukrainian adaptation during the war	Expected effect
One-stop shops for business digitalization	Online platforms and mobile hubs in safe regions	Accessibility of information and support for SMEs even with limited infrastructure
Digital maturity self-assessment (online tools, consultations)	Simplified questionnaires and digital calculators with basic recommendations	Quick assessment of the state of the enterprise without significant costs
Sectoral digitalization roadmaps	Focus on priority sectors (agriculture, logistics, industry, IT)	Targeted assistance and concentration of resources on critical areas
Programs to improve staff digital skills	Short online courses, microlearning, modular programs with practical elements	Mass coverage of employees even in wartime conditions
Financial support (grants, loans, incentives)	Voucher systems, grant competitions with minimal bureaucracy, co-financing from the state	Operational access of businesses to resources for digitalization

Source: complied by the authors based on [2, 11, 14, 15]

The study demonstrates that the adaptation of international digital transformation practices to the conditions of war in Ukraine is based on flexibility, accessibility, and resource prioritization. International tools such as one-stop shops, digital maturity self-assessment, sectoral roadmaps, training programs, and financial support are taking on specific forms in line with Ukrainian realities, where online centers and mobile hubs provide access to information and advice even in regions with limited infrastructure, Shortened questionnaires and digital calculators allow for quick assessment of the state of enterprises without significant time and resource costs, and a focus on critical sectors of the economy, such as agriculture, industry, logistics, and IT, contributes to the efficient use of limited resources. At the same time, short online courses and modular training programs ensure mass training of personnel even in wartime, while voucher systems, grants with minimal bureaucracy, and state co-financing allow businesses to quickly obtain resources for digitalization, emphasizing the speed, efficiency, and continuity of the digital transformation process.

As a result, the flexibility and adaptability of international practices allows businesses to operate in difficult conditions of war and limited infrastructure, digitization through online tools and mobile hubs provides equal access to information and training for small and medium-sized businesses, priority support for critical sectors of the economy increases the effectiveness of public policy, mass and rapid training of personnel strengthens digital literacy and business resilience, and state coordination and simplified financial support are key factors in the successful adaptation of international experience. Thus, the study confirms that the comprehensive adaptation of international digital transformation practices in wartime contributes to the resilience and competitiveness of Ukrainian businesses, ensuring the efficient use of resources and rapid response to wartime challenges.

Discussion. The results of the study confirm the key hypothesis that digitalization is a determining factor in improving business management efficiency and enterprise sustainability in the face of military challenges. In particular, the integration of solutions such as CRM systems, mobile banking, and logistics process automation leads to increased productivity and reduced operating costs for Ukrainian companies. This is consistent with the findings of Ciampi, Faraoni, Ballerini, and Meli, who emphasize that digitalization is directly related to the organizational flexibility of a business [4].

A comparison of international and Ukrainian cases (Amazon, Alibaba, Siemens, PrivatBank, Rozetka, Nova Poshta) shows that, despite differences in scale and resources, the basic trends are common: digital tools enable faster decision-making, deeper data analysis, and personalized customer interactions. This confirms the global thesis that digital transformation changes not only operational processes but also companies' business models [16].

The development of digital competencies among staff deserves special attention. Ukrainian examples (Nova Poshta, Kyivstar, the Diia. Digital Education initiative) show that investments in employee training and retraining directly affect the efficiency of business processes and the competitive position of enterprises. This is consistent with data from the World Economic Forum (2023), according to which more than 44% of employee skills will undergo transformation in the next five years [20].

At the same time, the results also indicate the existence of significant barriers. These include the digital divide between large businesses and SMEs, a lack of financial resources for innovation, low digital skills among some employees, and insufficient readiness of enterprises to implement cyber security systems. Similar challenges are described in studies by Berezovska and Kyrychenko [1] and Burka and Shkoda [3], which emphasize the vulnerability of small businesses to crisis shocks.

The war context increases the complexity of digital transformation, but at the same time creates momentum for more active implementation of digital solutions. For example, government e-services and the Diya platform have become tools for ensuring business and service continuity even

in wartime. This is consistent with the conclusions of the OECD [14; 15] and the World Bank [19], which emphasize the strategic role of digital policy in rebuilding the economy after crises.

The results obtained also demonstrate ambiguity: although digital solutions significantly improve management efficiency, their implementation does not always produce the expected results due to personnel and infrastructure constraints. This points to the need to adapt international practices to Ukrainian realities by creating mobile digital hubs, simplified digital maturity assessment tools, and flexible training programs for SMEs.

The limitations of the study lie in the dependence on the availability of statistical data and the difficulties of collecting quality information during martial law. In further scientific research, it is advisable to study in more detail the economic return on investment in digital competencies and organizational flexibility, as well as to assess the long-term impact of digitalization on the sustainability of Ukrainian enterprises.

Thus, the discussion confirms that digitalization is not only a technological but also a strategic factor in business development. Its success in Ukraine will depend on a combination of innovative technologies, human capital development, and active state support, which will ensure competitiveness in the global market even in the face of military challenges.

Conclusions. The development of the digital economy is radically changing approaches to business management, creating new opportunities to improve the effectiveness of management decisions and form sustainable competitive advantages for enterprises. Research by international organizations, including the World Economic Forum and the OECD, confirms that digital technologies not only optimize operational processes but also pave the way for more effective forecasting of market changes and adaptation of business models. Business process automation significantly reduces the time required to process information, lowers the likelihood of human error, and speeds up responses to fluctuations in supply and demand. The use of Big Data and Business Intelligence tools creates a new level of management decisions, providing the possibility of a personalized approach to customers and optimization of logistics chains, as proven by examples of global companies that actively use data analytics to increase efficiency and competitiveness.

In Ukraine, digitalization is also having a positive impact on business. Companies that have implemented CRM systems and e-commerce platforms are showing significant sales growth, and examples such as PrivatBank, Rozetka, and Nova Poshta demonstrate the effectiveness of mobile banking, online platforms, and logistics process automation. Digital tools make it possible to reduce costs, increase productivity, and strengthen competitive positions, while ensuring a quick response to changes in the market environment. This underscores the importance not only of technological innovation, but also of the ability of companies to adapt to market dynamics using flexible management methods such as Agile, Scrum, and Kanban.

Particular attention is paid to developing the digital skills of personnel. Analytics show that investments in training and retraining employees significantly increase productivity and the ability of companies to quickly implement innovations. More than 44% of core skills will undergo changes in the next five years, requiring active improvement of digital literacy. International corporations, including Microsoft, Google, and Amazon Web Services, are implementing global training programs, while Ukrainian initiatives such as Diia. Digital Education, Nova Poshta, and Kyivstar are showing positive results in improving digital skills and operational efficiency. This indicates a direct link between the level of digital competence and the speed at which businesses adapt to market changes.

Forecast studies indicate a significant acceleration of digitalization in Ukraine during 2025-2030. It is expected that more than 70% of work processes in medium and large enterprises can be partially or fully automated, which will stimulate demand for specialists in data analytics, artificial intelligence, cybersecurity, and information flow management. At the same time, organizational flexibility will become a key factor in the sustainability of enterprises, allowing them to respond quickly to technological and economic challenges, including crisis situations related to war and

infrastructure disruptions. Investments in employees' digital skills and the modernization of management practices are expected to increase productivity by 20-30% compared to competitors, facilitating the integration of Ukrainian companies into global business networks.

The SME sector plays an important role in the development of Ukraine's digital economy, accounting for over 99% of all enterprises, providing about 80% of jobs, and generating over 68% of added value. Despite their significant contribution, SMEs are often concentrated in traditional sectors with low innovation and underutilize digital solutions. In the context of war and limited resources, the state and international partners are implementing measures to support SMEs by creating a comprehensive digitalization ecosystem through the Diia platform, support centers, incubators, and accelerators. Cooperation with international donors such as USAID, the EU, and WNISEF provides financial and expert support for the implementation of digital technologies and the development of competencies. At the same time, there is a need for further coordination between the public, private, and civil sectors to avoid duplication of efforts and ensure the effective integration of SMEs into the digital economy [14, 15].

Prospects for further research in this area are related to studying optimal models of digital transformation for SMEs, assessing the effectiveness of investments in the development of digital competencies, and identifying mechanisms for increasing organizational flexibility in crisis situations. Another important area is research into the impact of digitalization on the integration of Ukrainian businesses into global economic networks and the formation of sustainable competitive advantages. Taking these aspects into account will provide a strategic basis for the development of the digital economy and the long-term sustainability of Ukrainian enterprises.

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The article was received by the editors 28.06.2025
The article is recommended for printing 15.08.2025

Authors Contribution: *All authors have contributed equally to this work*
Conflict of Interest: *The authors declare no conflict of interest*

Пивавар Ірина
кандидат економічних наук, доцент
кафедра державного управління, публічного адміністрування та економічної політики
Харківський національний економічний університет імені Семена Кузнеця
проспект Науки, 9А, Харків, 61166, Україна
e-mail: pivavariv@ukr.net
ORCID ID: 0000-0002-6115-0200
Литвиненко Олена
кандидат економічних наук, доцент
кафедра економіки та бізнесу
Державний біотехнологічний університет
вулиця Алчевських, 44, Харків, 61002, Україна
e-mail: o.litvinenko@btu.kharkov.ua
ORCID ID: 0000-0002-8360-4461
Морозова Надія
кандидат економічних наук, доцент
навчально-науковий інститут "Каразінський банківський інститут"
Харківський національний університет імені В.Н. Каразіна
площа Свободи, 4, Харків, 61022, Україна
e-mail: nadya.morozova.26@gmail.com
ORCID ID: 0000-0002-4082-2960
Денчик Ірина
старший викладач
навчально-науковий інститут "Каразінський банківський інститут"
Харківський національний університет імені В.Н. Каразіна
площа Свободи, 4, Харків, 61022, Україна
e-mail: irina.denchik@karazin.ua
ORCID ID: 0000-0003-1594-1084

Управління бізнесом в Україні в контексті цифрової економіки та викликів воєнного часу

Анотація. Управління бізнесом в умовах цифрової економіки та воєнних викликів набуває особливої актуальності для України. Об'єктом дослідження виступає трансформація управлінських процесів вітчизняних підприємств під впливом цифровізації та кризових факторів.

Постановка проблеми. Проблема полягає у наявності суттєвої цифрової нерівності між великим бізнесом та малими і середніми підприємствами, недостатньому рівні цифрових компетенцій управлінців і працівників, а також у ризиках кібербезпеки та недосконалості нормативно-правової бази.

Нерозв'язані аспекти. Нерозв'язаними залишаються питання формування комплексних моделей оцінювання ефективності цифрової трансформації, урахування галузевих особливостей та інтеграції державних цифрових сервісів у бізнес-процеси.

Мета статті. Метою статті є дослідження особливостей управління бізнесом в Україні в умовах цифрової економіки та воєнних викликів, визначення ключових ризиків і перспектив цифрової трансформації підприємств.

Основний матеріал. У статті використано комбінований підхід, що поєднує аналіз наукових джерел, статистичних даних та практичних кейсів українських і зарубіжних компаній. Досліджено вплив цифрових технологій на управлінські рішення, організаційну гнучкість і конкурентоспроможність бізнесу. Особлива увага приділяється ролі державної політики, розвитку цифрових компетенцій персоналу та адаптації міжнародного досвіду до умов воєнної кризи.

Висновки. Результати свідчать, що цифровізація сприяє підвищенню продуктивності, оптимізації бізнес-процесів, формуванню нових моделей взаємодії та інтеграції українських підприємств у глобальні ринки. Практичне значення дослідження полягає у виробленні рекомендацій для підприємців і державних органів щодо стратегій цифрової трансформації в умовах війни.

Ключові слова*: цифрова трансформація, цифрові компетенції, інновації, інноваційні бізнес-моделі, малі та середні підприємства, державна цифрова політика, глобальна інтеграція.*

Формули: -, рис.: 1, табл.: 5, бібл.: 21.

Для цитування: Pyvavar I., Lytvynenko O., Morozova N., Denchyk I. Business management in Ukraine in the context of the digital economy and wartime challenges. Фінансово-кредитні системи: перспективи розвитку. №3(18) 2025. С. 204-221. DOI: https://doi.org/10.26565/2786-4995-2025-3-16

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Стаття надійшла до редакції 28.06.2025
Статтю рекомендовано до друку 15.08.2025

Внесок авторів: *всі автори зробили рівний внесок у цю роботу*
Конфлікт інтересів: *автори повідомляють про відсутність конфлікту інтересів*