

The object of this study was the digitalization of small and medium-sized enterprises under martial law. The problem being solved was to overcome obstacles that slow down the introduction of digital technologies into the business processes of small and medium-sized enterprises during periods of conflict or war. During the period of martial law, the consequences for small and medium-sized enterprises are instability, material losses, resource limitations, and security threats. Despite the reduction in the number of small and medium-sized enterprises in Ukraine during the military invasion by 29.39 %, most of them continued to function, adapting to the new conditions of the crisis situation. However, neither the crisis conditions nor the increase in Internet users prompted these enterprises to make significant changes in the use of digital technologies. This was due to a number of barriers, including the following. The lack of liquidity and financing, the forced nature of implementation, the need to constantly adapt business processes to external changes are more related to the crisis situation. Inappropriate digital tools, lack of package solutions, lack of sufficient knowledge and skills, low trust in the state, small size of the enterprise, lack of understanding of the need or direction of reformatting business processes do not depend on the state of war. Overcoming the barriers to digitization of small and medium-sized enterprises under martial law is envisaged through interaction and partnership with other stakeholders. Cooperation and partnership are based on financial and informational support, training, platform model, and shared use of resources. The necessity and possibility of applying the developed proposals to overcome the barriers of digitalization of small and medium-sized enterprises under the conditions of martial law predetermines the practical significance of reported results

Keywords: digitalization barriers, small and medium enterprises, martial law, platform model

OVERCOMING BARRIERS TO DIGITALIZATION OF SMALL AND MEDIUM-SIZED ENTERPRISES UNDER MARTIAL LAW

Svitlana Semeniuk

PhD, Associate Professor
Department of Industrial Marketing*

Vitalii Levytskyi

Doctor of Historical Sciences, Associate Professor
Department of Economics and Finance*

Olena Fomina

PhD, Associate Professor
Department Enterprise Economics**

Kostiantyn Fedorchenko

PhD Student
Department of Management and Financial and Economic Security**

Nataliya Yudina

PhD, Associate Professor
Department of Industrial Marketing***

Vadym Ratynskiy

Corresponding author
PhD, Associate Professor
Department of Innovation Activity and Services Management*
E-mail: vadimratynskiy@gmail.com

Olena Shcherbatiuk

PhD, Associate Professor
Department of Economic Theory
Kyiv National Economic University named after Vadym Hetman
Beresteyskyi ave., 54/1, Kyiv, Ukraine, 03057

Vladyslav Bendiuh

PhD, Associate Professor
Department of Mathematical Methods of System Analysis***

Yuliia Zhurakivska

Teacher
Department of Management, Marketing and Public Administration
Higher Educational Institution «Academician Yuriy Bugay International Scientific and Technical University»

Khersonsky lane, 3, Kyiv, Ukraine, 02094

*Ternopil Ivan Puluj National Technical University

Ruska str., 56, Ternopil, Ukraine, 46001

**Donetsk National Technical University

Potebni str., 56, Lutsk, Ukraine, 43003

***National Technical University of Ukraine

“Igor Sikorsky Kyiv Polytechnic Institute”

Beresteyskyi ave., 37, Kyiv, Ukraine, 03056

Received date 21.03.2024

Accepted date 23.05.2024

Published date 28.06.2024

How to Cite: Semeniuk, S., Levytskyi, V., Fomina, O., Fedorchenko, K., Yudina, N., Ratynskiy, V., Shcherbatiuk, O., Bendiuh, V.,

Zhurakivska, Y. (2024). Overcoming barriers to digitalization of small and medium-sized enterprises under martial law.

Eastern-European Journal of Enterprise Technologies, 3 (13 (129)), 57–69. <https://doi.org/10.15587/1729-4061.2024.304997>

1. Introduction

On February 24, 2022, Russia launched a full-scale military invasion of Ukraine. This unprovoked, tragic, and

undeclared war led to serious consequences for the civilian population: interruptions in business processes, devastating effects on people, cities, and infrastructure, and caused great damage to the economy as a whole. As a result, the business

environment was under considerable stress due to the hostilities and their consequences.

Small and medium-sized enterprises are the basis of most economies in the world. For example, according to [1], small and medium-sized enterprises make up 99 % of all enterprises in the European Union and provide approximately two-thirds of total employment. Small and medium-sized enterprises are also the basis of most economies in the countries of the Organization for Economic Cooperation and Development (OECD) [2]. Across the OECD, they account for 99 % of all businesses and produce between 50 % and 60 % of value added. In Ukraine before the military invasion, this segment of enterprises also accounted for 99 % [3]. And although their share decreased after February 24, 2022, these enterprises are still the core of the Ukrainian economy.

The global pandemic of COVID-19 has shown that digitalization has become an effective tool for creating adequate conditions for the functioning of business. It is digitalization that contributes to the sustainable development of the enterprise under conditions of uncertainty by reducing the costs of developing new products and the time to bring them to the market. Thus, it contributes to the implementation of modern approaches to the formation of new qualities of the company and its compliance with the trends of constant acceleration of technology renewal.

In turn, the digitalization of small and medium-sized enterprises is crucial for creating inclusive and sustainable economies and societies. Digitization means the use of digital technologies, data and relationships that lead to the creation of new or changes in existing activities. That is, in the business sector, digitalization should be understood as the introduction of digital technologies with the aim of changing existing business processes [4]. Under the conditions of external shocks, the digitalization of small and medium-sized enterprises is a necessary condition for maintaining the economic stability of the country. Thus, setting up remote work allows enterprises to maintain their activities and avoid mass layoffs during crisis situations. Digital interaction with customers and suppliers, the search for new sales markets allows small and medium-sized enterprises to adapt to new conditions, respond to changes faster and increase their competitiveness. The digital form of interaction and digital partnership makes it possible to quickly create and implement new projects in response to changes in market needs.

Despite the fact that digital technologies generally have a positive effect on the results of enterprises, their implementation and integration into business processes require a fundamental transformation and transformation of corporate culture [4]. For small and medium-sized enterprises, this process is not easy because they very often know little about the benefits of digitalization, and their resources, both financial and human, are insufficient.

Thus, the study of the barriers to digitization of small and medium-sized enterprises under the conditions of martial law is particularly relevant. Determining ways to overcome these barriers will not only contribute to their own survival and development but is also important for the recovery of the country's economy and support for the socio-economic well-being of local communities.

2. Literature review and problem statement

Digitization is an external environmental challenge for small and medium-sized enterprises. Therefore, its implementation is a complex process with many challenges in terms of resources and other barriers that need to be overcome. For example, in work [5], the level of readiness of Romanian small and medium-sized enterprises for the implementation of Industry 4.0 technologies was considered. In the work, a survey of managers of small and medium-sized enterprises was conducted about the driving forces and barriers to the implementation of Industry 4.0 technologies in business development. Based on the survey, it was established that the managers of small and medium-sized businesses in Romania are generally informed about digital technologies. At the same time, the management of small and medium-sized enterprises considers the lack of knowledge about Industry 4.0, lack of standards, and the need to spend additional funds to be significant barriers to digitization. Lack of understanding of the strategic importance of Industry 4.0, the limitation of human resources, and the need for continuous education of employees are also considered as barriers to business digitalization. The disadvantage of work [5] is the survey method used because the opinions and ideas of managers in other countries or other areas may differ, so the results and conclusions may be different.

The purpose of work [6] is to analyze the role of digital technologies in overcoming the shortcomings of the business model of internationalization of small and medium-sized enterprises. A business model at work refers to the way a company creates, delivers, and sustains value. Digitization means the use of digital technologies to innovate the business model and introduce new opportunities for value generation in industrial ecosystems. Value creation is the proposition a company makes to its customers. The research in work [6] was conducted using the case study method, the objects of which were 29 small and medium-sized enterprises from Finland and Sweden that chose a digital model of internationalization. These companies operate in areas such as energy technology, manufacturing and engineering, digital services for manufacturing enterprises, and manufacturing. Challenges of internationalization for small and medium-sized enterprises to create value turned out to be the lack of knowledge about the international market, complex international marketing conditions and insufficient international value of the offer. As for providing value, the challenges are related to international cooperation, limited resources for business development, and lack of competencies and skilled workers for internationalization. Value retention challenges relate to increasing costs of international operations and volatile revenues from international operations. All of these challenges are being addressed by digital technologies by reducing transaction costs. The shortcoming of work [6] is its review nature.

Work [7] considers determining the relationship between digitalization and innovative productivity of medium and small enterprises. 1,100 enterprises in Germany were surveyed. As a result, it was established that digital diffusion is a significant positive trigger of innovation in small and medium-sized enterprises. Integrating generic efficiency-oriented digital technologies into business processes generally only contributes to the optimization of basic business processes but does not provide a significant mechanism for

creating or sustaining value. The disadvantage of work [7] is the failure to take into account the specificity of enterprises, which is caused by the limited availability of raw data for analysis.

The purpose of paper [8] is to determine the relationship between digitalization and the performance of European small and medium-sized enterprises. To assess the digital maturity and competitiveness of enterprises in the digital world, work [4] used the digital intensity index, which is calculated as the ratio of the company's digital income to its total income. The index of integration of digital technologies in work [8] serves to assess the degree of implementation and use of digital technologies in business activities. The index takes into account such factors as the level of automation, the level of data integration, and the use of analytics. The efficiency of small and medium-sized enterprises in work [8] was evaluated by the indicators of their share in the gross added value and employment. Control variables are gross domestic product (GDP) growth and the share of investment in GDP. The assessment of the relationship in work [8] was performed on the basis of linear regression. The results of the panel data analysis suggest that the integration of digital technologies and the intensity of digitalization significantly improve the performance of small and medium-sized businesses in terms of growth in value added and employment in the European Union (EU-27). The disadvantage of work [8] is that it highlights only the positive results of digitalization. Barriers to digitization and its shortcomings were not considered in the work.

Work [9] examines the concept of Industry 4.0 from the point of view of its perception by enterprise managers, as well as the driving forces and barriers to the implementation of these technologies. The research was conducted by means of semi-structured interviews, as well as by analyzing websites and annual reports of 26 enterprises in Hungary, which were representatives of small, medium, and multinational businesses. Businesses belonging to digital users focus on their managerial aspects, while manufacturers focus on the technological aspect. Expectations of managers are recognized as an important driving force of digitalization of business processes in work [9], as technologies help improve decision-making processes and evaluation of enterprise performance results. Among the barriers to digitalization in work [9], special attention was paid to organizational resistance to changes, standardization of business processes, and creativity of management. Work [9] emphasizes the differences in the factors of digitalization for small and large enterprises. Thus, small businesses care less about their profitability and more about customer satisfaction. It is easier for small businesses to adopt digital technologies due to a simpler organizational structure and more transparent processes. Small and medium-sized enterprises have fewer technological dependences and barriers to cooperation. However, the disadvantage of work [9] is the low reliability of the interview method due to possible bias and subjective interpretation of the survey results.

Paper [10] examines the use of digital technologies in small and medium-sized enterprises to overcome the consequences of extreme events, for example, the COVID-19 pandemic. Extreme circumstances are events that disrupt the normal flow of goods and services within the economic system. Under these circumstances, small and medium-sized enterprises use digital technologies not only to reduce trans-

action costs, but also to restore the supply chain, communicate with employees and customers, and share resources. To this end, enterprises should review their business strategies. At the same time, work [10] is based only on a literature review, which significantly limits the obtained results.

Work [11] considers the issue of how small and medium-sized enterprises can increase productivity through digital platforms. 230 Swedish small and medium-sized manufacturing enterprises were studied by means of a survey. The results of the survey were analyzed by the method of partial least squares (PLS-SEM). The results showed that digital capabilities provided by platforms have a positive effect on network capabilities. Digital platforms are modular architectures that include a core and replacement modules and related governance: a set of rules, standards, and organizational processes to coordinate platform participants. The specificity of platforms is that its participants can share and use shared resources. Applying a platform approach in business requires changing the business model and transforming the value proposition. Platform management makes it possible to manage communication and prevent conflict situations by defining the role of each partner. Network capabilities are dynamic capabilities that create relationships within and outside of an organization. However, work [11] does not consider other operational and dynamic capabilities that are affected by digital platforms. Also, the results of the study were not verified for small and medium-sized enterprises from other countries and other sectors of the economy.

In work [12], the goal was to analyze the digitalization strategy of small and medium-sized enterprises in order to overcome the changes caused by the COVID-19 pandemic. The object of the study was 7 manufacturing small and medium-sized enterprises from Indonesia. As a result, it was established that enterprises with a high level of digital maturity accelerated the transition to a digital business model during the crisis. Small and medium-sized enterprises, which had problems with liquidity and a low level of digital maturity, digitized only the sales function. Small and medium-sized enterprises with a low level of digital maturity, which have a large social capital, have chosen to outsource their digital operations. That is, they cooperate with partners who already have a digital business model, which encourages further digital transition. The disadvantage of work [12] is the use of the case study method and interviews, which subjectivizes the obtained results.

The purpose of study [13] is to determine the role of digital technologies in the profitability of small and medium-sized enterprises. The research was carried out by the case study method, 8 German enterprises that fell under the criteria of small and medium-sized enterprises were examined. Among the barriers to digitization in study [13], the following were identified: insufficient data protection, difficulty in transitioning to new reporting forms and methods, reduction of working hours and wages, lack of additional costs for the implementation of digital technologies. In addition, the possible loss of the emotional component of sales, lack of knowledge to use digital technologies, and uncertainty about the results of technology implementation are also hindering factors. However, the indicated barriers are significant for small and medium-sized enterprises surveyed in study [13], which is a drawback of the cited work.

Paper [14] defines the role of digitalization in overcoming the consequences of the crisis for micro-small and medium-sized enterprises in Romania. To achieve the goal, the behavior of enterprises during the COVID-19 pandemic was investigated. As a result, it was found that the barriers to digitalization for micro-small and medium-sized enterprises are the following: insufficient perception of the usefulness of digital development by entrepreneurs and limited resources of small and medium-sized enterprises. Moreover, it turned out that the decrease in sales volumes of enterprises during the COVID-19 pandemic does not encourage entrepreneurs to switch to a digital business model. The main factor here is the consumer's orientation towards online shopping. However, the results cannot be directly applied to other countries or enterprises due to the applied research methodology.

Work [15] focuses on the search for a relationship between the digitalization of small and medium-sized enterprises in China and their response to the social crisis caused by the COVID-19 pandemic. The study was conducted through an online survey of 518 Chinese small and medium-sized enterprises. As a result, it was established that digitalization has a positive effect on the dynamic capabilities of small and medium-sized enterprises, which makes it possible to overcome the negative consequences of the crisis. Dynamic capabilities are complex capabilities to build, combine, and reconstruct internal and external resources to function in a rapidly changing environment. However, work [15] did not consider digitalization barriers, which is related to the purpose of the study. Also, the results are relevant for China because other countries were not considered in the work.

The results of our review of the literature [5–15] indicate the presence of unresolved issues regarding the barriers to digitization of small and medium-sized enterprises. In particular, the barriers that are reinforced during crisis events are understudied. There is also a lack of systematization of ways to overcome these barriers when the crisis situation continues for a long time. All this allows us to state that it is appropriate to conduct a study aimed at overcoming the barriers to digitization of small and medium-sized enterprises under the conditions of martial law.

3. The aim and objectives of the study

The purpose of the study is to substantiate the directions for overcoming obstacles that slow down the implementation of digital technologies in the business processes of small and medium-sized enterprises during periods of conflict or war. This will provide an opportunity to take into account the identified key issues and challenges when developing strategies to support small and medium-sized businesses in order to facilitate the successful implementation of digital technologies during military conflict.

To achieve the goal, the following tasks were set:

- to determine the main factors that accompany the functioning of small and medium-sized enterprises under the conditions of martial law;
- to justify barriers that complicate the digitalization of small and medium-sized enterprises under the conditions of martial law;
- to identify ways to support the capability of small and medium-sized enterprises to implement digital technologies during martial law.

4. The study materials and methods

The object of our study is the digitization of small and medium-sized enterprises under martial law.

The main hypothesis of the study: under the conditions of a military conflict, the obstacles that small and medium-sized enterprises face when implementing digital technologies can be successfully overcome with the appropriate approach and application of effective strategies. This can help increase the stability and competitiveness of enterprises, as well as help support economic growth and development in crisis situations.

Research methods: when determining the main factors of the functioning of small and medium-sized enterprises under the conditions of martial law and digitalization barriers, the methods of analysis, synthesis, structural logic, systematization, and generalization were used.

Analysis of the barriers to digitalization of small and medium-sized enterprises under the conditions of martial law was carried out by an expert method, the description of which is given below in accordance with [16]. The implementation of the specified direction involved the following steps:

- 1) determination of the set of digitalization barriers by analyzing data provided in scientific and analytical sources;
- 2) evaluation of the importance of each defined barrier by experts on a scale from 0 to 10 points;
- 3) processing of collective expert assessment materials by means of standardization and ranking;
- 4) determination of statistical indicators of the sum of ranks, average rank, indicator of the frequency of maximum ratings, activity of experts and scope according to formulas (1) to (5):

$$S_j = \sum_{i=1}^m R_{ij}, \quad (1)$$

where S_j is the sum of ranks;

R_{ij} is the rank determined according to the evaluations provided by the i -th expert of the j -th factor (barrier);
 m – number of experts;

$$\bar{S}_j = \frac{S_j}{m}, \quad (2)$$

where \bar{S}_j – average rank for each factor (barrier);

$$K_{\max j} = \frac{m_{\max j}}{m_j}, \quad (3)$$

where $K_{\max j}$ is the frequency indicator of the maximum possible estimates;

$m_{\max j}$ – the number of maximum evaluations of the j -th factor (barrier);

m_j is the total number of evaluations of the j -th factor (barrier).

The $K_{\max j}$ indicator can take values from 0 to 1. The importance of the j th factor increases as $K_{\max j}$ approaches 1. Preference should be given to one or another factor depending on the average values of the rank or points. And only with the same ranks, the factor can be considered the most important for the maximum value of $K_{\max j}$:

$$K_{\text{avg } j} = \frac{m_j}{m}, \quad (4)$$

where K_{aej} is the activity coefficient of experts on the j -th factor;
 m_j – the number of experts who evaluated the j th factor;
 m is the total number of experts:

$$L_j = R_{jmax} - R_{jmin}, \tag{5}$$

where L_j is the range of evaluations, in points, given by experts of the j -th factor;

R_{jmax}, R_{jmin} – respectively, the maximum and minimum evaluations given by experts of the j th factor;

5) assessment of agreement of experts' opinions according to the concordance coefficient (6) and determination of its statistical significance based on the Pearson test (8):

$$W = \frac{12}{m^2(n^3 - n) - m \sum_{j=1}^m T_j} \sum_{j=1}^m \left(\sum_{i=1}^n R_{ij} - \frac{m(n+1)}{2} \right)^2, \tag{6}$$

where m is the number of experts;

n – number of factors (barriers);

R_{ij} – the rank of the i -th factor, evaluated by the j -th expert;

T_j is the index of connected ranks in the ranking of the j -th expert, calculated according to formula (7):

$$T_j = \sum_{k=1}^{H_j} (t_k^3 - t_k), \tag{7}$$

where H_j is the number of groups that are the same in the ranking of the j -th expert;

t_k is the number of identical ranks in the k -th group of connected ranks when ranked by the j -th expert:

$$\chi^2 = m(n-1)W. \tag{8}$$

Identification of directions for overcoming barriers to digitalization of small and medium-sized enterprises during martial law is carried out using a system analysis.

5. Results of investigating barriers to the implementation of digital technologies in small and medium-sized enterprises during martial law

5.1. Determining the factors in the activity of small and medium-sized enterprises under the conditions of martial law

According to [17], martial law is a special legal regime that is introduced in the event of armed aggression or threat of attack, danger to the state independence of Ukraine, its territorial integrity. For enterprises, regardless of their size, this legal regime provides for the limitation of their rights and legitimate interests. Thus, during the operation of the wartime legal regime, if necessary, restrictions related to the withdrawal of enterprise resources (labor and material), restrictions or bans on the movement of citizens and vehicles may be introduced [18]. In addition, armed aggression creates increased risks of destruction of property, loss of health and lives of citizens. Declared or undeclared war is a

force majeure circumstance that objectively makes it impossible to fulfill contractual obligations and obligations stipulated by legislative and other state normative legal acts [19, 20]. Therefore, the expected consequences for the functioning of small and medium-sized enterprises under the conditions of martial law are instability, material losses from military operations, resource limitations, and security threats.

These consequences are confirmed by empirical data (Table 1).

So, as evidenced by the data given in Table 1, the number of small and medium-sized enterprises, the number of employees and the volume of sales reacted negatively to the Russian invasion and military actions in Ukraine. At the same time, the decrease of these indicators is determined by the heterogeneity of the reaction of small and medium-sized enterprises to the crisis situation. On the other hand, under the conditions of martial law, despite the general decrease in business activity, the majority of small and medium-sized enterprises in Ukraine continued to function. That is, these enterprises are adapting to the new conditions of the crisis situation, and changes in the structure of the number of enterprises by types of economic activity demonstrate the important role of the service sector. This allows us to conclude that under the conditions of such a crisis as martial law, increasing the stability and efficiency of small and medium-sized enterprises is an important step to support the economy as a whole.

Fig. 1 shows factors in the functioning of small and medium-sized enterprises, which are directly related to the martial law.

Fig. 1 shows that the state of war provoked the disruption of the stability of business processes in SMEs. Changes in the supply of raw materials, restrictions on the movement of workers and goods, and the destruction of infrastructure have led to reduced productivity and increased costs. Decreased consumer demand, losses from destruction of property and deterioration of lending conditions led to a decrease in turnover and losses. As a result, SMEs experienced financial difficulties. In addition, the military conflict led to personnel losses: workers were forced to leave their workplaces due to security threats or mobilization. The increase in the risks of terrorist acts and military actions requires changes in fire prevention measures and ensuring the safety of employees from enterprises. Solving these problems requires a change in strategies for the development of small and medium-sized enterprises, aimed at restoring their stability under the conditions of a military conflict.

Table 1
 Performance indicators of medium and small enterprises in Ukraine during 2018–2022

Year	Quantity, units	Growth rate, %	Number of employees, thousand persons	Growth rate, %	Sales volume, mln. USD	Growth rate, %
2018	355,431	5.20	4385.2	3.13	209,195.1	16.44
2019	380,079	6.93	4799.2	9.44	232,469.7	11.13
2020	373,310	-1.78	4791.5	-0.16	238,281.6	2.50
2021	370,224	-0.83	4743.0	-1.01	310,649.0	30.37
2022	261,430	-29.39	4012.5	-15.40	216,705.4	-30.24

Note: compiled by Authors according to [3].

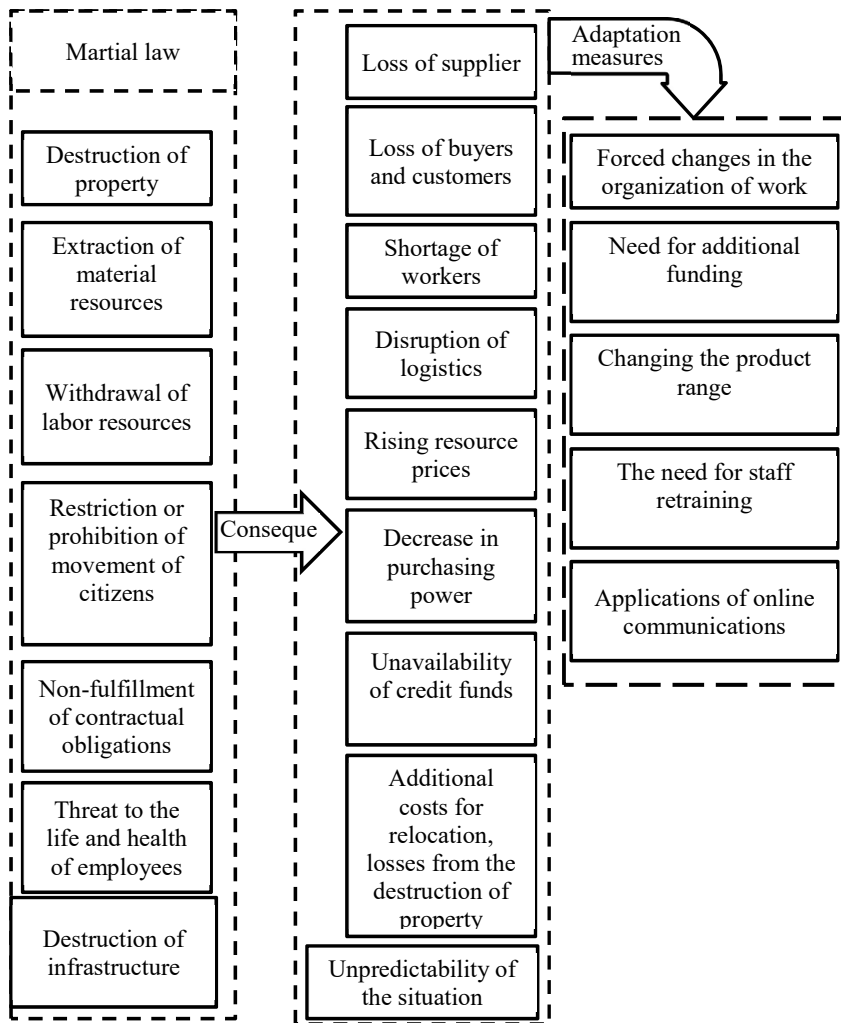


Fig. 1. Factors that most affected the activities of small and medium-sized enterprises in Ukraine due to the military invasion in 2022
 Note: compiled by Authors from sources [21–24]

The experience of the functioning of enterprises under the conditions of the COVID-19 pandemic has shown the expediency of digitalization to overcome the crisis. This is evidenced by the number of Internet users in the world. Thus, according to data [25], in 2023 there was 5.4 billion people using the Internet, which is 67 % of the world population. The growth rate of Internet users in 2023 was 4.7 %, while in 2021 and 2022 this indicator was 3.5 %. In Ukraine, the number of Internet users grew even faster by 2022. Thus, according to the data given in [26, 27] for 2019–2020, the increase was 25.3 %. Therefore, the largest increase in the use of the Internet occurred during the lockdowns during the COVID-19 pandemic, I. The purpose of these measures was to slow down the spread of a dangerous situation, preserve the lives and health of citizens, as well as reduce the pressure on the medical system. It should be noted that during the full-scale military invasion of

Ukraine, a situation of mass lockdown actually took place. However, the increase in Internet users did not occur due to a physical reduction in their number by 21.7 % [28].

However, neither the crisis conditions nor the increase in Internet users prompted small and medium-sized enterprises in Ukraine to make significant changes in the use of digital technologies (Table 2).

Table 2 demonstrates that the main technologies used by SMEs are social media and the Internet to search for information and exchange information with regulatory bodies and counterparts. Despite the significant share (almost 40 %) of trade enterprises in the structure of SMEs, only a little more than 3 % of them use e-commerce. Cloud computing is used by SMEs as a replacement for a physical server, so further growth in the use of this technology is expected in martial law.

In summary, small and medium-sized enterprises in Ukraine continued to function under the changed conditions of the martial law, but there was no breakthrough in digitalization as a key tool for overcoming the negative consequences of the crisis. At the same time, the processes of implementing relevant technologies, regardless of such a motivating factor as the state of war, are hampered by the presence of certain barriers, which predetermines the need for their analysis.

Table 2
 Use of digital technologies by small and medium-sized enterprises in Ukraine in 2018–2022

Year	Share of SMEs engaged in e-commerce, %	Share of SMEs with access to the Internet, %	Share of SMEs that used social media, %	Share of SMEs using cloud computing, %
2018	3.57	65.68	29.32	9.57
2019	3.30	62.39	29.89	10.1
2020	3.44	n/a	n/a	n/a
2021	3.45	64.52	n/a	10.31
2022	n/a	73.65	29.12	9.8

Note: compiled by Authors according to [29, 30].

5. 2. Justification of barriers to digitalization of small and medium-sized enterprises under the conditions of martial law

Determining the most important barriers to digitization is a critical stage in the process of preparing and implementing digital initiatives. For small and medium-sized enterprises, these barriers are summarized in Table 3.

Listed in Table 3, the barriers are seen as factors that inherently affect the digitalization process in such a way that

Table 3

Barriers to digitalization of small and medium-sized enterprises*

Digitalization barrier	Designation
Insufficient digital skills of staff, management, and entrepreneurs	<i>d</i>
Insufficient development of management and technical skills of personnel	<i>d</i> ₁
The difficulty of finding and retaining employees with the necessary digital skills	<i>d</i> ₂
Lack of skills necessary to adapt to the digital environment	<i>d</i> ₃
Dependence on external consultants to compensate for weak internal capabilities	<i>d</i> ₄
Internal resistance to change, fear of change caused by prejudice and conservatism (for example, fear of management and company owners to lose/open/describe all business processes of the company, fear of employees to be out of a job, etc.)	<i>d</i> ₅
Managers and entrepreneurs lack sufficient knowledge and organizational skills to rethink the digitalization of the enterprise	<i>d</i> ₆
Lack of knowledge of the regulatory framework of management in the digital environment	<i>d</i> ₇
Strategic barriers	<i>s</i>
Lack of understanding of the need or direction of reformatting business processes	<i>s</i> ₁
The impossibility of rethinking the internal organization of the enterprise's work as a whole, as well as supply and distribution chains	<i>s</i> ₂
Rigid organizational structures, lack of a clear vision of the organization for the transformation of operational business models	<i>s</i> ₃
The forced nature of the implementation of digital technologies without a well-thought-out strategy and the availability of the necessary funding	<i>s</i> ₄
Lack of a worked-out digitalization strategy	<i>s</i> ₅
Failure to adapt traditional business models and processes to digital ones	<i>s</i> ₆
Lack of interest of enterprises in the implementation of software products	<i>s</i> ₇
Technical barriers	<i>t</i>
Lack of access to broadband Internet connection infrastructure	<i>t</i> ₁
A narrow framework for technology updates, limited to a single business function	<i>t</i> ₂
Lack of access to the Internet among employees of the enterprise	<i>t</i> ₃
Lack of technical readiness for remote work with clients and creation of conditions for remote work of employees	<i>t</i> ₄
Lack of technical support	<i>t</i> ₅
Lack of physical infrastructure	<i>t</i> ₆
Lack of ready-made (packaged) technological solutions corresponding to the specifics of business processes	<i>t</i> ₇
Financial barriers	<i>f</i>
Liquidity deficit due to a sharp drop in demand and income	<i>f</i> ₁
Internal budgetary constraints associated with a lack of funds for the implementation of technologies	<i>f</i> ₂
Difficulty attracting investments to finance intangible assets since these assets cannot be used to secure a loan	<i>f</i> ₃
The payback period for digitalization investments is unclear	<i>f</i> ₄
The absence of a clear economic effect from digitization, the impossibility of calculating it	<i>f</i> ₅
Lack of financial resources to continuously support the use of technologies	<i>f</i> ₅
Low or no return on digital adoption	<i>f</i> ₆
The cost of digitization projects is too high	<i>f</i> ₇
Barriers related to digitalization risks	<i>r</i>
Choosing the wrong digital tools	<i>r</i> ₁
Lack of time to improve digital skills	<i>r</i> ₂
Lack of effective information protection and security measures	<i>r</i> ₃
The need to constantly adapt to external changes, frequent or permanent restructuring of business processes	<i>r</i> ₄
The strategic monopoly of digital platforms can lead to the loss of sales channels and complete dependence on platform owners	<i>r</i> ₅
Low trust in the state, a high level of corruption contributes to the lack of motivation for transparent financial and economic transactions	<i>r</i> ₆
Too little turnover, staff or number of clients	<i>r</i> ₇

Note: summarized by Authors on the basis of sources [2, 4, 5, 6, 9, 31].

it slows down or even stops. It is proposed to assess the degree of influence by determining the importance of the barriers listed in Table 3 by the method of expert evaluations. 10 scientists were chosen as experts, studying the problems of digitization under the conditions of non-distribution of their personal data.

The results of processing the evaluations received from experts are given in Table 4.

Analysis of indicators of the sum of the ranks and the average rank listed in Table 4 allow us to conclude that the first ten barriers are the most important, and those in the last ten are the least important. The expert activity indicator indicates that the selected barriers are quite reasonable, as all experts rated them. The indicator of the frequency of the maximum possible evaluations shows that the experts gave the maximum score to the first five barriers, and the eighth barrier. Thus, from the totality of all analyzed barriers, it is possible to work on them in the first place. The size of the range indicates the ambiguous agreement of the experts, because for some barriers the differences between the ranks exceed the value of the average rank. This indicates the need for additional substantiation of the degree of consistency of experts' opinions.

To determine the adequacy of the level of agreement of experts' opinions, the concordance coefficient was determined, which was 0.803. Since its value is in the range from 0.7 to 1, it indicates a high consistency of experts' opinions. The statistical significance of the concordance coefficient was tested by the Pearson test. According to the results of the calculations, its value is 299.62, which is greater than the theoretical value of this criterion for the significance level of 0.99, which is 57.3. That is, the obtained value of agreement of experts' opinions is statistically significant, and the results of expert evaluation can be used as justified.

Table 4

Indicators of the comparative importance of digitalization barriers

Barrier: No. of entry	Factor (barrier)	Sum of ranks	Average ranking	Frequency of the highest possible ratings	Spread	Expert activity rate
1	f_1	341.5	34.15	0.6	3.5	1
2	s_4	335.5	33.55	0.6	7	1
3	r_4	325	32.5	0.3	8	1
4	f_2	309.5	30.95	0.4	14.5	1
5	r_1	306.5	30.65	0.1	8.5	1
6	t_7	305	30.5	0	13.5	1
7	d_6	293	29.3	0	9	1
8	r_6	280.5	28.05	0.1	12	1
9	r_7	255.5	25.55	0	11.5	1
10	s_1	243.5	24.35	0	21.5	1
11	r_3	238	23.8	0	16	1
12	t_4	230.5	23.05	0	17	1
13	d_2	219.5	21.95	0	22	1
14	s_2	217.5	21.75	0	21	1
15	s_7	213.5	21.35	0	23	1
16	t_2	208	20.8	0	11	1
17	s_5	206.5	20.65	0	16.5	1
18	d_7	181	18.1	0	19.5	1
19	f_5	180.5	18.05	0	15	1
20	s_6	162	16.2	0	12.5	1
21	d_1	159.5	15.95	0	15	1
22	f_7	156	15.6	0	23.5	1
23	f_5	154.5	15.45	0	16.5	1
24	t_5	154	15.4	0	12.5	1
25	f_4	135.5	13.55	0	11.5	1
26	s_3	113.5	11.35	0	15	1
27	r_2	100	10	0	4.5	1
28	f_6	86.5	8.65	0	24	1
29	t_6	85	8.5	0	17	1
30	r_5	80	8	0	13	1
31	d_4	71.5	7.15	0	11	1
32	t_3	70	7	0	9.5	1
33	t_1	69	6.9	0	9	1
34	f_3	66	6.6	0	8	1
35	d_5	23.5	2.35	0	4	1
36	d_3	22	2.2	0	4	1

Thus, the most significant barriers to digitalization for small and medium-sized enterprises under the conditions of martial law are the following:

- liquidity deficit due to a sharp drop in demand and income (f_1);
- the forced nature of the introduction of digital technologies without a well-thought-out strategy and the availability of the necessary funding (s_4);
- the need to constantly adapt to external changes, frequent or permanent restructuring of business processes (r_4);
- internal budget restrictions related to the lack of funds for the implementation of technologies (f_2);
- selection of inappropriate digital tools (r_1);
- lack of ready-made (packaged) technological solutions that correspond to the specificity of business processes (t_7);
- managers and entrepreneurs lack sufficient knowledge and organizational skills to rethink the digitalization of the enterprise (d_6);

- low trust in the state, a high level of corruption contributes to the lack of motivation for transparent financial and economic operations (r_6);
- too little turnover, staff or number of clients (r_7);
- lack of understanding of the necessity or direction of reformatting business processes (s_1).

5. 3. Directions for overcoming the barriers to digitalization of small and medium-sized enterprises under the conditions of martial law

Overcoming the barriers to digitization of small and medium-sized enterprises under the conditions of martial law is assumed through the interaction of the latter with interested parties (Fig. 2). Such parties can be other partner enterprises, state and international organizations, IT enterprises, financial institutions, research and educational institutions.

Liquidity deficit includes cash gaps and lack of savings to cover even operating expenses. In such circumstances, the enterprise will rather consider the issue of closure than the implementation of digital technologies, which require additional investments. Also, those enterprises that will be able to overcome the liquidity deficit on their own under the conditions of martial law may face the consequences of the forced nature of the implementation of digital technologies without a well-thought-out strategy and the availability of the necessary financing. Overcoming these barriers requires external support. Such support is provided by the state or financial institutions in the form of loans, subsidies for enterprises that carry out digitization. The development of financial aid programs and loyal lending conditions can also be effective. In order for the financial support to have an effect, it is advisable to develop an information campaign, to introduce a training program

on writing applications for receiving funding, as well as on choosing a digitalization strategy and tools.

The need to constantly adapt to external changes, frequent or constant restructuring of business processes under conditions of martial law requires the development of a flexible digitalization model, which is «Platform as a Service» (Platform as a Service, PaaS). This model facilitates a quick response to changes in market conditions and makes it possible to effectively rebuild business processes in accordance with new requirements. Within this model, enterprises can jointly use the resources they need in order to save costs. Thus, they have access to high-speed communication channels, network resources and can regulate the scale of their activities without incurring the costs of maintaining their own infrastructure. It is precisely because of the possibility of joint use under the terms of the lease that enterprises can quickly receive various infrastructure services, which helps to quickly adapt to the market parameters of demand and supply.

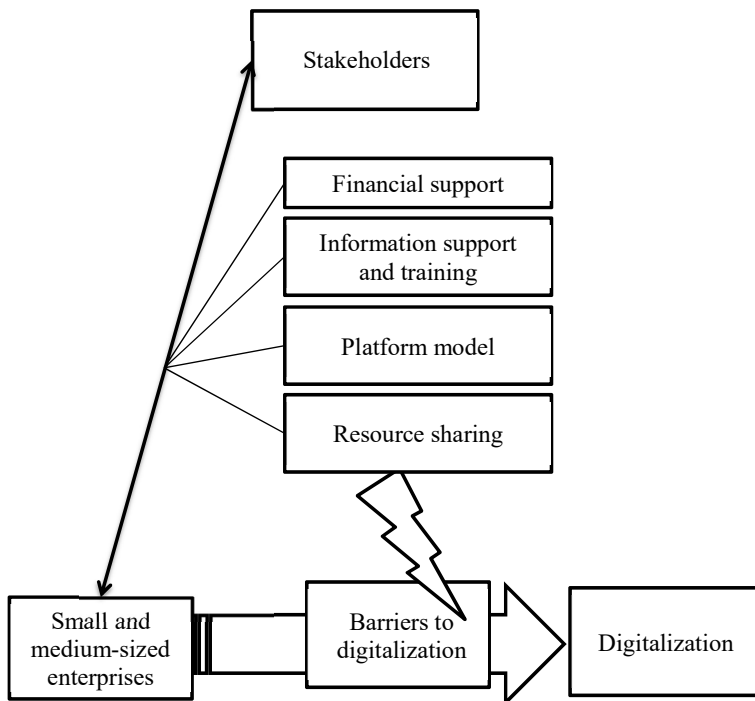


Fig. 2. Scheme for overcoming barriers to digitalization transformation of small and medium-sized enterprises under martial law

Also, the barrier associated with adaptation to changes and constant restructuring of business processes can be overcome by implementing the following digitalization strategy.

At the first stage, digital modernization of marketing activities is carried out. Processes such as customer experience, collection and processing of information about competitors and their products, and digital integration of communication channels become targeted. The target performance indicators at this stage are the increase in the number of customers and the return effect from the digital channel.

At the second stage, the goal is to increase competitive advantages by improving internal information technologies and business processes, improving the cyber security system. These measures enable the creation of new value through cost reduction and risk management and enable the diversification of product and service structures by creating new digital products and services.

The last stage of the digitalization of the company's activities is the corresponding improvement of value chains, partnerships in digital ecosystems, data analytics and competitive intelligence are applied, and digital platforms are created.

Therefore, under the conditions of constant changes and restructuring of business processes, the digital business model "Platform as a service" can become an effective tool for adapting enterprises to changing conditions, which allows maintaining flexibility and competitiveness.

Overcoming the internal budget limitation can be difficult for small and medium-sized enterprises due to the need to develop a detailed digitalization project.

A digitalization project is a planned sequence of related actions to achieve a business goal related to the introduction of digital technologies into the enterprise's business processes. That is, such a project may involve the development of a new information system, or the improvement or replacement of an existing information system. Information

systems are designed to collect, process, and transmit information needed to make decisions, control operations, analyze problems, and create new products or services. In the process of implementing such projects, enterprises change not only individual business processes or areas of operation, but even the entire business model. This is one of the reasons why the implementation of the digitalization project requires careful analysis and preparation. In addition, a feature of digitalization projects is the lack of understanding of the final result of the entire process at the beginning of the project, as well as the need to adjust it directly during the implementation process. Therefore, the system of financing digitalization projects also requires a flexible approach, when both the deadlines for the implementation of individual project stages and the amount of financing may change [32]. This requires the development of a step-by-step plan for the implementation of digitization with gradual allocation of funds, aimed at critical aspects of the business. At the same time, special attention is required to control costs and project implementation, which means constant monitoring and analysis of costs in order to control and optimize the budget. One of the options for overcoming this limitation is cooperation with

other enterprises on the joint implementation of projects or the creation of partnerships for joint financing and development of digital solutions. In this context, it will be useful to establish cooperation with universities, research centers or startups that can provide access to the latest technologies and ideas for project implementation. In addition, under internal budget constraints, it is possible to choose digital tools and technologies that have affordable pricing options, for example, Software as a Service (SaaS) or open sources (Open Source).

The risk of choosing the wrong digital tools is that SMEs do not have enough information and knowledge about the digital products available. This concerns their cost and the tasks they can solve, as well as the methods of determining the quality of such products. Therefore, most often these enterprises tend to use a limited list of digital solutions that are most often used by colleagues. Along with this barrier, it was not by chance that there was a lack of ready-made package solutions. This is due to the fact that software packages for small and medium-sized businesses do not take into account industry specificity. In this case, they need either modification or the use of other industry packages, which may not be compatible in terms of exchanging information about business processes.

To solve the problem of choosing inappropriate digital tools and the lack of ready-made package solutions for small and medium-sized enterprises under the conditions of martial law, it is necessary to conduct an analysis of the available digital solutions on the market. In this context, a comparison of functionality, cost and user feedback is made to select the most suitable solutions. It is also possible to take advantage of test versions, enter into agreements for short-term and trial periods of use of these solutions to evaluate their effectiveness and suitability before full scaling.

The lack of sufficient knowledge and organizational skills among managers and entrepreneurs, their lack of

understanding of the need or direction of reformatting business processes are quite destructive factors of digitalization. This is due to the fact that usually, and especially under the conditions of martial law, management thinks in a linear fashion and for him it is unacceptable to invest in an indirect or delayed effect after a year or more. At the same time, such thinking is unlikely to enable the enterprise to function during hostilities. Therefore, in the event of a decision to continue operations, the company will look for opportunities to establish at least remote work with customers and suppliers. Overcoming this barrier requires external assistance in the form of specialized trainings and courses for managers and staff on digitalization issues. Such trainings are conducted either by state bodies or proactive IT companies. Expert and consulting support with a focus on practical aspects of technology implementation for small and medium-sized enterprises can even be a component of the marketing strategy of IT companies that develop relevant digital solutions or platforms. The directions of such a strategy could be the provision of expert assistance for the development of a digitalization strategy and support during implementation. Offering small pilot projects to gain experience and evaluate performance, as well as emphasizing the short-term benefits and outcomes of digitalization, will strengthen management buy-in.

Too little turnover, staff or number of customers at first glance may indicate that the digitization of certain processes is impractical. On the other hand, at least the need to keep records and work with clients requires a focus on automating routine processes. These include financial and inventory accounting, customer relationship management (CRM), and the use of social media and internet marketing to promote products and services. In such cases, it is appropriate to inform entrepreneurs about the possibilities of using cloud technologies and SaaS products to reduce equipment and infrastructure costs, as well as about the direct effects of the implementation of these technologies.

Overcoming the low trust of small and medium-sized businesses in the state due to the high level of corruption is their involvement in state and public initiatives. Such measures include the following:

- creation of special digital tools (platforms) that will directly allow interaction with state bodies, especially local authorities;
- stimulating the creation of associations and associations of small and medium-sized enterprises, which jointly advocate for their rights and interests before state bodies;
- stimulation of participation in public initiatives and work with non-profit organizations aimed at fighting corruption;
- conducting educational campaigns, information events, trainings on corporate ethics and responsible management;
- involvement of small and medium-sized enterprises in public discussions of draft laws and decisions related to business;
- conducting consultations with representatives of SMEs regarding policies and programs aimed at business support;
- creation of financial instruments that allow SMEs to receive financial support directly through digital platforms;
- involvement of representatives of small and medium-sized enterprises in working groups and committees for the development of anti-corruption policy;
- conducting consultations and dialog between the authorities and the business community regarding corruption problems and ways to solve them;

- providing advantages and benefits for companies that adhere to transparent financial standards and open reporting;
- creation of incentive systems, for example, tax discounts for enterprises that implement the values of transparency and anti-corruption policies with the use of digital technologies.

Under the conditions of martial law, the proposed directions for overcoming digitalization barriers are aimed at stimulating the development of small and medium-sized enterprises, which play an important role in supporting the country's economy.

6. Discussion of results of investigating obstacles to the implementation of digital technologies in small and medium-sized enterprises during martial law

A full-scale military invasion provoked a sharp violation of the stability of the functioning of small and medium-sized enterprises. By the nature of the impact, it can be compared to a complete lockdown with the introduction of restrictions on the movement and activities of citizens. Therefore, it can be assumed that the work of small and medium-sized enterprises under the conditions of war in Ukraine is the result of adaptive abilities and the need for socially important services (Fig. 1). It should be noted that for enterprises that have decided to work under martial law, individual adaptation measures listed in Fig. 1 are implemented very quickly, and the process of adjusting the strategy occurs continuously during their operation. On the other hand, the results of the analysis of the number of SMEs by type of economic activity, as well as the analysis of the offer on the market of digital technologies within Ukraine, allow us to predict which business processes have most likely already undergone digitalization. For example, the service sector, especially those businesses related to online communications, e-commerce, remote work, and other digital tools, have been able to quickly adapt to new conditions. The restoration of the functioning of enterprises under the conditions of martial law is associated with changes in the organization of their work and the need to find new sales markets or diversification. This requires relevant information that can be obtained through the use of Internet information technologies, e-mail, messengers, social media, electronic trading platforms, Internet tools for promotion. Management and accounting processes, warehouse operations are performed in electronic enterprise resource planning systems (ERP systems). Today, solutions for small businesses increasingly include the use of the cloud, which significantly reduces acquisition costs. Electronic document circulation under the conditions of military operations is becoming more and more widespread. Internet of things, RFID technologies are actively used by logistics companies. Thus, those businesses that are already digital and ready for rapid change have an advantage in times of crisis, allowing them to more effectively deal with challenges and remain competitive. In this context, empirical data on the use of digital technologies by small and medium-sized enterprises in Ukraine during 2018–2022 (Table 2) at first glance contradict these statements. However, the main reason for this is the presence of barriers to digitization, which can become more acute during crisis events. This conclusion generally coincides with the results of the analyzed literary sources [5–15], but it is based on the analysis of the conditions of the martial law itself.

According to the results of expert evaluations, the most important barriers to digitalization of small and medium-sized enterprises were determined (Table 4). They served as the basis for the further determination of a number of measures aimed at intensifying digitalization processes. The resulting list of barriers is justified by the consistency of experts' opinions and can be explained not only by the consequences of ongoing military operations, but also by insufficient competence of personnel, management, and entrepreneurs.

The peculiarity of this research is that overcoming the identified barriers is proposed through the mechanisms of interaction and partnership on issues of financial and informational support, training, and shared use of resources. The technological basis of such interaction is a platform model. It is this approach that can create the necessary conditions for rethinking the principles of doing business and will contribute to the creation of a more sustainable, efficient, and competitive business environment under the conditions of martial law.

The proposals made to overcome the barriers to digitization of small and medium-sized enterprises under the conditions of martial law can be applied by state bodies and non-governmental organizations for the development of enterprise support programs. Also, enterprises can use the results of this study to implement their own digitalization strategies. This determines the practical significance of our results.

The limitations of this study are that its results are adequate in relation to small and medium-sized enterprises. In addition, the work explored the peculiarities of the functioning of enterprises in Ukraine, which also narrows practical and theoretical expectations.

The development of this study consists in the development of digitization strategies under the conditions of martial law, taking into account the identified barriers and proposed ways to overcome them. It is also advisable to conduct an industry analysis to take into account this specificity in the relevant strategies.

7. Conclusions

1. It was determined that during the period of martial law, the consequences for small and medium-sized enterprises are instability, material losses, resource limitations, and non-pecuniary threats. The military actions in Ukraine led to a reduction in the number of these enterprises by 29.39 %, while the number of employed persons decreased by 15.4 %, sales volume by 30.24 %. On the other hand, the majority of small and medium-sized enterprises continued to function, adapting to the new conditions of the crisis situation. A full-scale military invasion of Ukraine can be considered a mass knockdown situation, so it was expected that digitalization would become a tool that would ensure their functioning. However, neither the crisis conditions nor the increase in Internet users prompted these enterprises in Ukraine to make significant changes in the use of digital technologies.

2. Barriers to the digitization of small and medium-sized enterprises are seen as factors that inherently affect this process in such a way that it slows down or even stops. According to the results of expert assessments, the most important barriers were identified, which include:

- shortage of liquidity due to a sharp drop in demand and income;
- the forced nature of the introduction of digital technologies without a well-thought-out strategy and the availability of the necessary funding;
- the need to constantly adapt to external changes, frequent or permanent restructuring of business processes;
- internal budget restrictions related to the lack of funds for the implementation of technologies;
- selection of inappropriate digital tools;
- lack of ready-made (packaged) technological solutions that correspond to the specificity of business processes;
- managers and entrepreneurs lack sufficient knowledge and organizational skills to rethink the digitalization of the enterprise;
- low trust in the state, a high level of corruption contributes to the lack of motivation for transparent financial and economic transactions;
- too little turnover, staff or number of clients;
- misunderstanding of the necessity or direction of reformatting of business processes.

3. Overcoming the barriers to digitization of small and medium-sized enterprises in martial law is envisaged through interaction and partnership with other interested parties. Such parties can be other partner enterprises, state and international organizations, IT enterprises, financial institutions, research and educational institutions. Cooperation and partnership under military conditions are based on financial and informational support, training, platform model, and sharing of resources.

Conflicts of interest

The authors declare that they have no conflicts of interest in relation to the current study, including financial, personal, authorship, or any other, that could affect the study and the results reported in this paper.

Funding

The study was conducted without financial support.

Data availability

All data are available in the main text of the manuscript.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

References

1. Di Bella, L., Katsinis, A., Lagüera-González, J., Odenthal, L., Hell, M., Lozar, B. (2023). Annual Report on European SMEs 2022/2023. European Commission. <https://doi.org/10.2760/028705>
2. SME digitalisation to "Build Back Better" (2021). OECD SME and Entrepreneurship Papers. <https://doi.org/10.1787/50193089-en>

3. Indicators activity of large, medium, small and micro-entrepreneurship entities in 2010-2022. Derzhavna sluzhba statystyky Ukrainy. Available at: https://www.ukrstat.gov.ua/operativ/operativ2022/fin/pssg/pds_vsmm_2010-2021.xlsx
4. Beyond COVID-19 Advancing Digital Business Transformation in the Eastern Partner Countries (2021). OECD. Available at: <https://t4.oecd.org/eurasia/Beyond%20COVID-19%20Advancing%20Digital%20Transformation%20in%20the%20Eastern%20Partner%20Countries%20.pdf>
5. Türkeş, M., Oncioiu, I., Aslam, H., Marin-Pantelescu, A., Topor, D., Căpuşeanu, S. (2019). Drivers and Barriers in Using Industry 4.0: A Perspective of SMEs in Romania. *Processes*, 7 (3), 153. <https://doi.org/10.3390/pr7030153>
6. Reim, W., Yli-Viitala, P., Arrasvuori, J., Parida, V. (2022). Tackling business model challenges in SME internationalization through digitalization. *Journal of Innovation & Knowledge*, 7 (3), 100199. <https://doi.org/10.1016/j.jik.2022.100199>
7. Hassan, S. S., Meisner, K., Krause, K., Bzhalava, L., Moog, P. (2023). Is digitalization a source of innovation? Exploring the role of digital diffusion in SME innovation performance. *Small Business Economics*, 62 (4), 1469–1491. <https://doi.org/10.1007/s11187-023-00826-7>
8. Kádárová, J., Lachvajderová, L., Sukopová, D. (2023). Impact of Digitalization on SME Performance of the EU27: Panel Data Analysis. *Sustainability*, 15 (13), 9973. <https://doi.org/10.3390/su15139973>
9. Horváth, D., Szabó, R. Zs. (2019). Driving forces and barriers of Industry 4.0: Do multinational and small and medium-sized companies have equal opportunities? *Technological Forecasting and Social Change*, 146, 119–132. <https://doi.org/10.1016/j.techfore.2019.05.021>
10. Papadopoulou, T., Baltas, K. N., Balta, M. E. (2020). The use of digital technologies by small and medium enterprises during COVID-19: Implications for theory and practice. *International Journal of Information Management*, 55, 102192. <https://doi.org/10.1016/j.ijinfomgt.2020.102192>
11. Cenamor, J., Parida, V., Wincent, J. (2019). How entrepreneurial SMEs compete through digital platforms: The roles of digital platform capability, network capability and ambidexterity. *Journal of Business Research*, 100, 196–206. <https://doi.org/10.1016/j.jbusres.2019.03.035>
12. Priyono, A., Moin, A., Putri, V. N. A. O. (2020). Identifying Digital Transformation Paths in the Business Model of SMEs during the COVID-19 Pandemic. *Journal of Open Innovation: Technology, Market, and Complexity*, 6 (4), 104. <https://doi.org/10.3390/joitmc6040104>
13. Pfister, P., Lehmann, C. (2023). Measuring the Success of Digital Transformation in German SMEs. *Journal of Small Business Strategy*, 33 (1). <https://doi.org/10.53703/001c.39679>
14. Vuță, D. R., Nichifor, E., Chițu, I. B., Brătucu, G. (2022). Digital Transformation – Top Priority in Difficult Times: The Case Study of Romanian Micro-Enterprises and SMEs. *Sustainability*, 14 (17), 10741. <https://doi.org/10.3390/su141710741>
15. Guo, H., Yang, Z., Huang, R., Guo, A. (2020). The digitalization and public crisis responses of small and medium enterprises: Implications from a COVID-19 survey. *Frontiers of Business Research in China*, 14 (1). <https://doi.org/10.1186/s11782-020-00087-1>
16. Hrabovetskyi, B. Ye. (2010). Metody ekspertnykh otsinok: teoriya, metodolohiya, napriamky vykorystannia. Vinnytsia. Available at: <https://press.vntu.edu.ua/index.php/vntu/catalog/download/324/612/651-1?inline=1>
17. Pro pravovyi rezhym voiennoho stanu (2015). Zakon No. 389-VIII. Available at: <https://zakon.rada.gov.ua/laws/show/389-19>
18. Pro vvedennia voiennoho stanu v Ukraini (2022). Ukaz Prezydenta Ukrainy No. 64/2022. Available at: <https://zakon.rada.gov.ua/laws/show/64/2022#Text>
19. United Nations Convention on Contracts for the International Sale of Goods (1980). Vienna. Available at: https://treaties.un.org/doc/Treaties/1988/01/19880101%2003-03%20AM/Ch_X_10p.pdf
20. Pro torhovo-promyslovi palaty v Ukraini (1997). Zakon No. 671/97-VR. Available at: <https://zakon.rada.gov.ua/laws/show/671/97-bp#Text>
21. Diyalnist vitchyznianskykh pidpriemstv pid chas viyny v Ukraini: doslidzhennia realnoho stanu ta potreb (2022). Tsentr resursoefektyvnoho ta chystoho vyrobnytstva. Available at: http://www.recpc.org/wp-content/uploads/2022/11/National_businesses_during-war_2022.pdf
22. Doslidzhennia stanu ukraïnskoho biznesu pid chas viyny: yak sebe pochuvaiut seredni, mali ta velyki kompaniyi (2022). Kyivstar Business Hub. Available at: <https://hub.kyivstar.ua/articles/doslidzhennya-stanu-ukrayinskogo-biznesu-pid-chas-vijny-yak-sebe-pochuvayut-seredni-mali-ta-velyki-kompaniyi>
23. Doslidzhennia stanu biznesu v Ukraini. Berezen-kviten 2023. Available at: https://business.diaa.gov.ua/uploads/6/30910-doslidzenna_stanu_ta_potreb_biznesu_za_rik_povnomasstabnoi_vijni.pdf
24. Ekspres-otsinka vplyvu viyny na mikro-, mali ta seredni pidpriemstva v Ukraini (2022). Prohrama rozvytku OON v Ukraini. Available at: https://www.undp.org/sites/g/files/zskgke326/files/2022-10/UA_Rapid_Assessment_of_War_on_MSMEs_in_Ukraine_0.pdf

25. Measuring Digital Development – Facts and Figures 2023. Available at: https://www.itu.int/hub/publication/d-ind-ict_mdd-2023-1/
26. Kilkist abonentiv zviazku na 1 sichnia 2019 roku. Available at: https://www.ukrstat.gov.ua/operativ/operativ2019/zv/az/xls/az0119_u.xlsx
27. Dostup domohospodarstv Ukrainy do Internetu (za danymy vybirkovoho opytuvannia domohospodarstv, provedenoho u sichni 2022 roku) (2022). Kyiv. Available at: https://ukrstat.gov.ua/druk/publicat/kat_u/2022/zb/07/zb_dd_internet_21.pdf
28. gemiusAudience: June summary for Ukraine (2023). Gemius. Available at: <https://gemius.com/blog/gemiusaudience-june-summary-for-ukraine/>
29. Number of enterprises which have made e-commerce and value of the turnover of e-commerce sales by type of economic activity, with a breakdown by number of employed in 2018-2021. Available at: https://www.ukrstat.gov.ua/operativ/operativ2021/zv/ikt/vikpt_3D_18-22.xlsx
30. Use of information and communication technologies at enterprises: use of internet network, social media, cloud calculation. Available at: https://www.ukrstat.gov.ua/operativ/operativ2021/zv/ikt/vikpt_18-22.xlsx
31. Akpan, I. J., Udoh, E. A. P., Adebisi, B. (2020). Small business awareness and adoption of state-of-the-art technologies in emerging and developing markets, and lessons from the COVID-19 pandemic. *Journal of Small Business & Entrepreneurship*, 34 (2), 123–140. <https://doi.org/10.1080/08276331.2020.1820185>
32. Laudon, K. C., Laudon, J. P. (2019). *Management Information Systems: Managing the Digital Firm*. Pearson. Available at: <https://www.pearson.com/en-gb/subject-catalog/p/management-information-systems-managing-the-digital-firm-global-edition/P200000008841/9781292296708>