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## BUSINESS DIGITALIZATION AS A STRATEGIC TOOL FOR FINANCIAL AND ECONOMIC SECURITY

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**Abstract.** Introduction. The coronavirus pandemic and the war in Ukraine accelerated the digital transformation of business processes, made adjustments to existing business models and caused a radical redistribution of markets. The introduction of modern innovations in business activity in most cases brought a positive effect, prompting entrepreneurs and scientists to develop new technologies and tools to strengthen it. The digitalization of economic activity has become a catalyst for the technological and economic breakthrough of mankind in a new period of its development, creating at the same time new challenges for the financial and economic security of business.

Problems. While increasing the economic efficiency of business, the implementation of digital technologies simultaneously makes it vulnerable to risks and threats accompanying the digitalization of business processes.

Goal. Identification of the main factors of the impact of digitalization on the financial and economic security of enterprises, determination of priority directions for the use of digital technologies to minimize losses in business activities.

Materials and methods. The research used general scientific and special research methods: the method of critical analysis, scientific abstraction and generalization of scientific experience of modern theoretical studies, SWOT analysis methods, system-complex approach.

Practical importance. The materials presented in the article highlight the strategic impact of Digital restructuring of business on its financial and economic security. They can be applied in practice when developing strategies for digitalization of business activities.

Digitization of business processes inevitably gives rise to new tasks of ensuring financial and economic security. Feedback between economic processes and processes of threat minimization determines the need for digitalization of financial and economic security systems.

**Ключові слова:** financial and economic security, digitization, digitalization, business entities, entrepreneurship, processes, technologies.

## ДІДЖИТАЛІЗАЦІЯ БІЗНЕСУ ЯК СТРАТЕГІЧНИЙ ІНСТРУМЕНТ ФІНАНСОВО-ЕКОНОМІЧНОЇ БЕЗПЕКИ

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**Анотація.** Вступ. Пандемія коронавірусу і війна в Україні прискорили цифрову трансформацію бізнес-процесів, внесли корективи в існуючі бізнес-моделі та викликали кардинальний перерозподіл ринків. Впровадження сучасних інновацій у бізнесову діяльність у більшості випадків приносило позитивний ефект, спонукаючи підприємців і вчених розробляти все нові технології і інструменти для його підсилення. Діджиталізація господарської діяльності стала каталізатором техніко-економічного прориву людства у новий період свого розвитку, створивши водночас нові виклики для фінансово-економічної безпеки бізнесу. Проблематика. Підвищуючи економічну ефективність бізнесу, впровадження цифрових технологій одночасно робить його вразливим до ризиків і загроз, що супроводжують діджиталізацію господарських процесів. Мета. Виявлення основних чинників впливу діджиталізації на фінансово-економічну безпеку підприємств, визначення пріоритетних напрямів використання цифрових технологій для мінімізації збитків бізнесової діяльності. Матеріали й методи. У дослідженні було використано загальнонаукові і спеціальні методи дослідження: метод критичного аналізу, наукової абстракції та узагальнення наукового досвіду сучасних теоретичних досліджень, методи SWOT-аналізу, системно-комплексний підхід. Практична значимість. Наведені у статті матеріали висвітлюють стратегічний вплив Digital-перебудови бізнесу на його фінансово-економічну безпеку. Вони можуть бути застосовані на практиці при розробці стратегій цифровізації підприємницької діяльності. Цифровізація господарських процесів неодмінно породжує нові завдання забезпечення фінансово-економічної безпеки. Зворотній зв'язок між господарськими процесами і процесами мінімізації загроз зумовлює необхідність у діджиталізації систем фінансово-економічної безпеки.

**Keywords:** фінансово-економічна безпека, діджиталізація, цифровізація, суб'єкти господарювання, підприємництво, процеси, технології.

**JEL Classification:** F360, G200.

**Formulation of the problem.** In the modern conditions of repelling military aggression and overcoming the consequences of the COVID-19 pandemic, business entities face two main tasks: the full recovery of economic capacity as soon as possible and the creation of conditions and a resource base for the post-war development of Ukraine's economy. Successful completion of these tasks is possible only with an effective combination of the capabilities of professionals and modern technology. Automation and digitization of business processes make the country's economy less expensive, freeing up funds and resources for social development.

**Analysis of recent research and publications.** Despite the considerable experience of implementing digitization and a fairly large knowledge base in the subject area, scientists evaluate its role in economic activity in different ways. For example, O.E. Hudz, S.A. Fedyunin, when studying the essence and features of the use of digitalization, enterprises define it as a competitive advantage, considering the prerequisites, opportunities, challenges and problems of digitalization [1]. J. Bugin, K. Tangi, L. Laberge in [2], argue that increased levels of digitization lead to reduced profits and incomes at the industry level, and that the threats of reduced incomes are even greater in industries experiencing the highest levels of digitalization (high tech, media and entertainment, etc.). Josan Hanna in [3] formulates the main directions and spheres of development of digitalization, presents the results of the analysis of the dynamics of the level of digitalization in Ukraine based on a set of key indicators, and in [4] notes its progressive impact on the state of business during the pandemic. Didukh S.M. [5], after reviewing the theoretical foundations of business digitalization in the context of the transition to an inclusive development model, defines the essence and differences of the concepts "digitization", "digitalization" and "digital transformation". In his work, he substantiates the necessity and prospects of key areas of digitization taking into account the COVID-19 pandemic. Lapin A. V., Grinchuk I. O., Olenyuk D. O. in [6], systematizing the constituent elements of digitalization, determining its positive and negative features. The authors in [6] conduct an analysis of the features of digitization in certain areas of the economy, in particular, the banking sector, the financial market, production, noting the increase in productivity and the popularization of "digital enterprises" as well as certain areas of business. Savytska O. M. in [7] states that digitization is a quite popular and necessary process of transition to new business models in the activities of companies, cites the main results and advantages of the process of digital transformation for enterprises, characterizes the forms, directions, stages and obstacles on the way of its implementation. G. Luchko in [8] conducts an analysis of trends in the development of digitization, examines its impact on business activity and other areas of the economy, and determines promising directions for digitization in Ukraine. G. Luchko in [8] points out that fierce competition in the conditions of world globalization, dynamic changes in the external environment, the COVID-19 pandemic challenged all sectors of the economy, forcing them to look for new innovative ways to stay on the market. I. M. Averichev in [9] proves the need for digitalization for a commercial enterprise.

**Separation of previously unresolved parts of the overall problem.** While increasing the economic efficiency of business, the implementation of digital technologies simultaneously makes it vulnerable to risks and threats accompanying the digitalization of business processes.

**The aim of the study** – identification of the main factors of the impact of digitalization on the financial and economic security of enterprises, determination of priority directions for the use of digital technologies to minimize losses in business activities.

**Presenting main material.** The ideas of the Fourth Industrial Revolution, put forward in April 2011 by the "Industrie 4.0" group at the Hannover Fair, fit organically into the general concept of digitization. It is the use of cyber-physical systems and smart factories in combination with the Internet of Things and the Internet of Services that makes digital technologies the hallmark of today (Table 1).

The implementation of digitalization in the activities of business entities can have both positive and negative effects. Therefore, when studying it, you should pay attention to the following aspects.

Table 1

Application of digitization in business

Scope of application	Forms of implementation	Means of digitalization
Emergence of new types of business	Outsourcing, outstaffing, freelance, e-lancing, coworking	Computer equipment, data networks, structured cabling systems, etc

Production of products	Automated production management systems	CNC machines, automated production lines, industrial works, etc.
Accounting and reporting	Software and technical complexes of accounting and reporting	Computer databases and data banks, systems for obtaining and digitizing primary information, software and technical support for production processes and warehouse accounting.
Solving problems of daily management activities	Management decision support systems	Communication-Driven DSS, Data-Driven DSS, Data-oriented DSS, Document-Driven DSS, Knowledge-Driven DSS, Model-Driven DSS
Control and restriction of access to data, property, territories	Access control and management systems	Network ACS, stand-alone ACS, monitoring systems, blocking devices, identifiers, controllers, readers, etc.
Means of identification and elimination of threats	Security and fire alarm systems, alarm notification and evacuation management	Digital indicators, identifiers, annunciators, controllers of fire extinguishing systems, digital means of video surveillance
Transport, communication, logistics	Satellite data transmission systems, mobile communication systems, IR telephony, digital radio communication, video conferencing, automated traffic flow control systems	Data transmission networks, structured cable systems, all-centers, server equipment.

Source: compiled by the author

Digital transformation has led to the appearance of remote work performance format. Outsourcing, outstaffing, freelancing, e-lancing, co-working require qualitatively new relations between workers and employers, on the one hand, expanding the labor market, on the other hand, adding problems of remote communication. According to information [10], about 35% of companies in Ukraine and more than 80% in the USA and Europe use outsourcing services. This allows (especially small firms with limited document flow) to save time and resources for the development and expansion of specialized activities and to save on creating their own jobs. In some cases, the cost of the services of outsourcing companies is lower than the cost of maintaining full-time employees.

The use of IT technologies is accompanied by an increase in the profits of enterprises due to a decrease in the cost of goods and services due to the automation of business processes, the release of personnel, and a decrease in associated losses. According to estimates [11] the Nike company increased its revenues by 540% thanks to the use of top technologies and advertising hype, IKEA increased sales due to their digitalization and transfer of transport and production functions to

subcontractors. The agreement on the delegation of IT tasks by the Kodak company to the IVM Corporation is considered the beginning of the development of IT outsourcing.

The implementation of modern digital control and analysis systems leads to an increase in business profitability due to the reduction of the duration of production cycles due to the optimization of production technologies and processes, logistics supply chains, manufacturing and sales of finished products. In addition, losses are reduced due to constant monitoring of the competitive environment, which allows early detection of significant threats and identification of relevant risks. According to the statement [12], in Ukraine only in 2019, 71.6% of the total volume of expenses for innovative activity was directed to the purchase of digital equipment and software, and 87.9% of enterprises used computers during the organization and conduct of business activities.

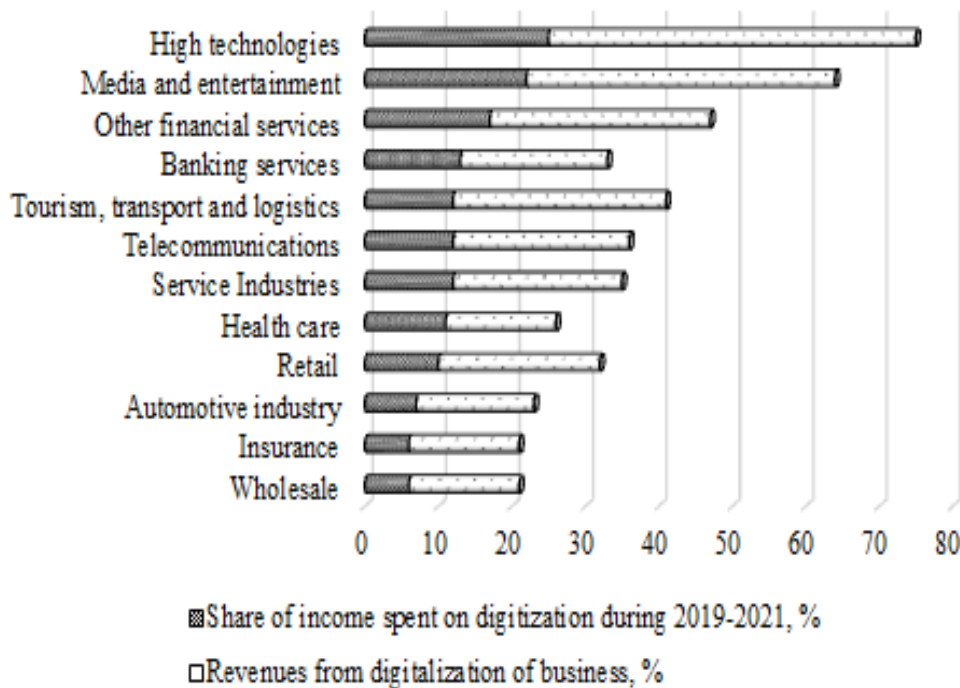


Fig. 1 Ratio of income and expenses for digitization of economic entities

Source: created by the author based on [2]

There was a need to transform existing business models into new, client-oriented forms, to change methods and methods of business management in the period of the sharing economy. This requires the creation and implementation of appropriate systems that will ensure the processes of external communication. The use of project processes in management does not give the necessary effect. Today, Agile and Lean technologies adapted to flexible changes are becoming more popular. The time of transformation depends on many factors, in particular, on the size of the enterprise, its technical equipment, the availability of trained personnel, the possibility of investment or lending, etc. J. Bugin, K. Tangi, L. Laberge in their research [2] prove that the biggest losses from digitization at the stage of re-equipment and model transformation are borne by large enterprises and industries as a whole. Therefore, according to scientists, [2] 62% of companies will apply a combined approach, using traditional and progressive business models, which is confirmed by digitalization costs (Fig. 1).

As can be seen from Fig. 1, the profitability of IT innovations varies depending on the field of their implementation. For example, the profitability of digitization in wholesale trade for the specified period was 50%, in the insurance sector - 65%, in the automotive industry - 68%, in retail trade - 72%, in the telecommunications sector - 50%. The profitability is expected to be the highest in the following industries: mass media and entertainment – 82%, health care – 101%, high

technologies – 237% and the service sector – 247%, the development of which was a powerful stimulus for the COVID-19 pandemic.

There is a sectoral difference in the number of employees involved in digitization processes. The highest percentage of those involved is observed in the fields of high technologies – 50%, mass media and entertainment – 42% [2].

The rapid development of digitalization of business causes the appearance of imperfect tools and products, the use of which allows the possibility of illegal actions and operations that can cause significant losses to business entities. According to [13] in 2022, 82% of business losses due to digital systems are caused by subjective factors: staff abuse, incompetence and industrial espionage. Verizon specialists claim that in 2022, the number of hacking applications is 13% higher than in all five previous years, and the losses from them exceeded 4.37 million US dollars.

As indicated in [14, 15], in Ukraine only 4% of owners, managers and workers of enterprises favorably regard the total digitization of business processes and are ready for progressive transformations. The main part (88%) expresses their negative attitude towards changes and wishes to continue working according to established business models. There is an urgent need to train new and retrain existing specialists to meet the needs of digitalization.

The above-mentioned aspects of business digitalization make adjustments to its financial and economic security, changing strategic priorities and areas of its protection.

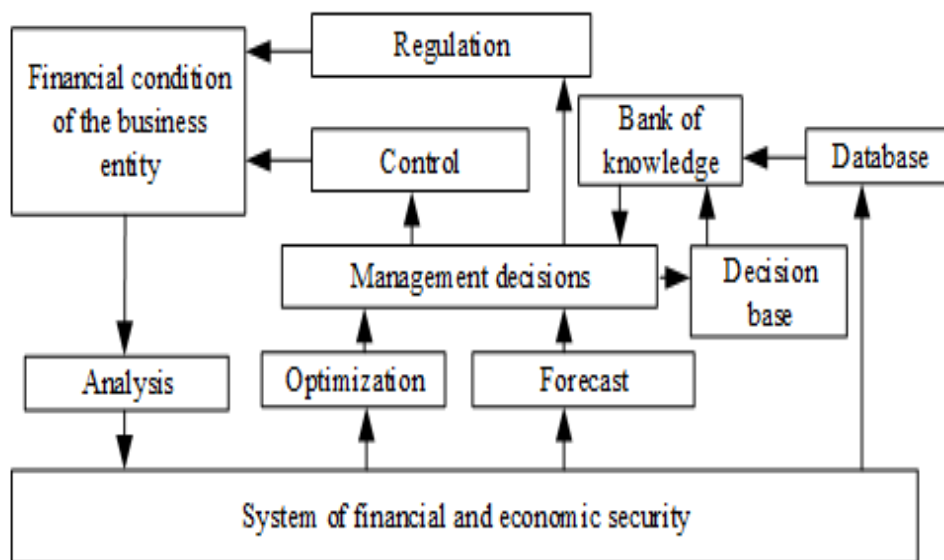


Fig. 2. Functions of the financial and economic security system of the business entity

Source: compiled by the authors

The process of ensuring the financial and economic security of enterprises involves the coordinated use of means, methods and tools of protection combined into a single system. This system performs indicator, regulatory, analytical and forecasting functions and has feedback with financial status (Fig. 2).

Digitization of the process of ensuring financial and economic security will allow the system to qualitatively improve the performance of its functions. However, there are also its weaknesses (table 2).

The SWOT analysis presented in Table 2 allows one to form an adequate opinion about the expediency and strategic prospects of digitalization of enterprises and its impact on the operation of the financial and economic security system.



Table 2

## SWOT analysis of enterprise digitalization as a tool of financial and economic security

Internal environment	Strengths	Weakness
	<ul style="list-style-type: none"> <li>– rapid detection and identification of threats, instant verification of information sources;</li> <li>– continuous exchange of information between all functional components in online mode;</li> <li>– formation of a bank of knowledge about the financial state of the enterprise, economic situations and management decisions made with instant access;</li> <li>– extended possibilities of planning and forecasting;</li> <li>– significantly reducing the time of collecting, transmitting, analyzing information and issuing recommendations;</li> <li>- making managerial decisions both on the basis of previous experience and in situations with incomplete and asymmetric information;</li> <li>– an increase in the number of business risks and threats that are being processed at the same time;</li> <li>– increasing the possibilities of preventing losses due to theft and abuse of office;</li> <li>- improving the quality of personnel and production discipline;</li> <li>– simplifying communication between employees, speeding up document preparation time, improving the quality of reports and visualization of activity results.</li> </ul>	<ul style="list-style-type: none"> <li>– high cost of software and technical support;</li> <li>– a limited number of experienced specialists in the subject area;</li> <li>– the need to develop specialized software;</li> <li>– dependence on uninterrupted power supply;</li> <li>– the need for high-speed internal and external communication lines.</li> </ul>
External environment	Opportunities	Threats
	<ul style="list-style-type: none"> <li>- multitasking;</li> <li>– rapid internal and external expansion;</li> <li>– high capacity of the financial and economic security system for learning and self-learning;</li> <li>– wide possibilities for adaptation and integration;</li> <li>– smooth operation with similar systems;</li> <li>- autonomous work;</li> <li>- self-healing ability.</li> </ul>	<ul style="list-style-type: none"> <li>– cybernetic attacks;</li> <li>– military threats;</li> <li>- the appearance of new means and tools for causing damage;</li> <li>– system errors of the first and second levels.</li> </ul>

*Source: compiled by the author*

Scales of digitalization of business, composition, order and terms of preparation and implementation of progressive changes should be determined separately for each specific case, taking into account the specifics of conducting business activities. Digital restructuring of the financial and economic security system should be carried out for the following reasons.

When indicating the total prevented loss due to  $\overline{W}$ , and prevention of the realization of the i-th threat through  $\overline{\omega}_i$ , where  $\overline{W} = f(\overline{\omega})$  it is possible to formulate the task of digitalization in a general way: it is necessary to choose an option for implementing the functions of the financial and economic security system  $V_{\overline{\omega}_i}$ , which provides the maximum amount of prevented damage from the action of threats with acceptable costs of the enterprise for digitization:

$$V_{\overline{\omega}_i} = \arg V(\overline{W}_{\max}) = \arg V(\overline{N}_{\phi i})$$

$$\text{at } \text{cod}C(V) \leq C_{\overline{\omega}_i}$$

here V is a vector that characterizes the option of implementing the functions of the financial and economic security system;

$C_{\overline{\omega}_i}$  - allowable expenses of the enterprise for digitization.

Solving the task of digitalizing the financial and economic security system requires the formation of an indicator of the effectiveness of the digitalization process  $V(\overline{W})$ , that is, the definition of the vector of the total prevented loss  $\overline{W}$ .

A formula describing the anticipated loss  $\overline{\omega}_i$  from the realization of the i-th threat during the implementation of digitalization has the form:

$$\overline{\omega}_i = P_{\overline{\omega}_i} * q_{\overline{\omega}_i} * P_{\overline{\omega}_i}^{\text{prevention}}$$

here  $q_{\overline{\omega}_i}$  – losses from the realization of the i-th threat;

$P_{\overline{\omega}_i}^{\text{prevention}}$  - the probability of preventing the realization of the ith threat.

The probability of the appearance of the i-th threat  $P_{\overline{\omega}_i}$  is determined statistically and corresponds to the relative frequency of its occurrence:

$$P_{\overline{\omega}_i} = \frac{\lambda_i}{\sum_{i=1}^n \lambda_i} = \overline{\lambda}_i$$

here  $\lambda_i$  - the frequency of the appearance of the ith threat of losses.

Determination of the efficiency index of the digitalization of the process of ensuring financial and economic security  $V(\overline{W})$  possible by using the method of fuzzy sets:

$$V(\overline{W}) = \sum_{i=1}^n \sum_{j=1}^k \overline{\lambda}_i \cdot q_i \cdot \alpha_j \cdot \overline{x}_j + \sum_{i=1}^n \sum_{j=k+1}^m \overline{\lambda}_i \cdot q_i \cdot \alpha_j \cdot \mu(x_j)$$

$$\alpha_j = \frac{\partial P_{\overline{\omega}_i}^{\text{prevention}}}{\partial x_j}; \quad \overline{x}_j$$

here  $\alpha_j$  ;  $\overline{x}_j$  – the degree of fulfillment of the jth requirement to eliminate the ith threat.

The integral indicator of the financial and economic security of the enterprise must be adjusted taking into account the impact of the results of business digitalization.

During the period of military aggression, for objective reasons, large masses of the population are forced to move to regions not affected by the war and beyond the borders of Ukraine. There is a decline in production, the number of business entities is decreasing. Digitalization of business opens wide prospects not only for its preservation or restoration, but also for expanding the client

and partner base, increasing the range of goods and services. At the same time, entrepreneurs face new challenges that force them to change their business models, use modern methods and methods of enterprise management in the period of the sharing economy.

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