DOI: https://doi.org/10.32782/2524-0072/D2026-86-240

UDC 631.15:330.131.7:338.43

DEVELOPMENT AND IMPLEMENTATION OF A MECHANISM FOR ENSURING THE SECURITY OF THE BANKING SYSTEM BASED ON INNOVATIVE METASPACE TECHNOLOGIES: RISKS, THREATS AND STABILITY INSTRUMENTS

РОЗРОБКА ТА ІМПЛЕМЕНТАЦІЯ МЕХАНІЗМУ ЗАБЕЗПЕЧЕННЯ БЕЗПЕКИ БАНКІВСЬКОЇ СИСТЕМИ НА ЗАСАДАХ ІННОВАЦІЙНИХ ТЕХНОЛОГІЙ МЕТАПРОСТОРУ: РИЗИКИ, ЗАГРОЗИ ТА ІНСТРУМЕНТИ СТАБІЛІЗАЦІЇ

Melnyk Oleksii
Postgraduate Student,
Dmytro Motornyi Tavria State Agrotechnological University
ORCID: https://orcid.org/0009-0005-3990-6920

Мельник Олексій Васильович
Таврійський державний агротехнологічний університет
імені Дмитра Моторного

The scientific, methodological and applied aspects of ensuring the security of the banking system based on innovative metaspace technologies have been investigated. In the context of the digitalization of financial services and the introduction of Big Data, Blockchain, FinTech, cloud services and remote banking platforms, the banking sector receives new opportunities to increase the efficiency of risk management and financial monitoring, while cyber threats, fraud and violations of payment systems are increasing. A conceptual metaspace platform with SIEM, XDR, SOAR, Big Data, Blockchain, FinTech, AI, cloud services, API and AML/KYC systems has been proposed. An integrated mechanism for ensuring the security of the banking system has been developed, which includes financial, organizational, technological and institutional tools for its stabilization and contributes to financial stability, continuity of operations, data protection, risk minimization and strengthening of trust in financial institutions of Ukraine.

Keywords: banking system, financial security, cybersecurity, hybrid cyber threats, digital metaspace platform, digitalization of the financial market, Big Data, Blockchain, FinTech, cloud services.

У статті досліджено науково-методичні та прикладні аспекти забезпечення безпеки банківської системи в умовах цифрової трансформації фінансового ринку та розвитку інноваційних технологій метапростору. Обґрунтовано, що цифровізація фінансових послуг, активне впровадження технологій Big Data, Blockchain, FinTech, хмарних сервісів, цифрових платформ і систем дистанційного банкінгу, формують нові можливості для підвищення ефективності фінансового моніторингу, автоматизації банківських операцій та управління ризиками. Встановлено, що цифровізація банківської системи супроводжується посиленням кіберзагроз, ризиків цифрового шахрайства, дестабілізації платіжної інфраструктури та порушення безперервності фінансових операцій. Розроблено концептуальні засади забезпечення безпеки банківської системи в умовах гібридних кіберзагроз та розвитку цифрових технологій метапростору. Запропоновано цифрову платформу метапростору як інтегроване середовище взаємодії банківських установ, державних регуляторів, міжнародних партнерів та систем кіберзахисту. Визначено, що основними складовими цифрової архітектури платформи є системи кіберзахисту SIEM, XDR, SOAR, технології Big Data, Blockchain, FinTech, AI, хмарні сервіси, API-інтеграція, системи фінансового моніторингу AML/KYC, цифрова аналітика ризиків, багатофакторна аутентифікація та центри обробки даних. Систематизовано основні гібридні кіберзагрози банківської системи, серед яких DDoS-атаки, фішингові кампанії, втручання у платіжні системи, інформаційні атаки, маніпуляції з цифровими активами, витік персональних даних та кібервтручання у центри обробки даних. Запропоновано

інтегрований механізм забезпечення безпеки банківської системи в умовах цифрової екосистеми технологій метапростору, який включає фінансові, організаційні, технологічні та інституційні інструменти стабілізації. Імплементація запропонованого механізму забезпечує захист цифрових активів та даних клієнтів, мінімізацію системних ризиків в банківській системі України в умовах цифрової трансформації фінансового ринку.

Ключові слова: банківська система, фінансова безпека, кібербезпека, гібридні кіьерзагрози, цифрова платформа метапростору, цифровізація фінансово ринку, Big Data, Blockchain, FinTech, хмарні сервіси.

Statement of the problem. The modern development of the global financial system is accompanied by the rapid digitalization of banking services, the active implementation of cloud services, blockchain technologies, Big Data and other innovative metaspace platforms. Banking institutions are increasingly integrating digital ecosystems into their own activities, providing remote customer service, virtual financial services, digital identification and automation of financial transactions. In such conditions, there is a need to form a new mechanism for ensuring the security of the banking system, which would allow for an effective response to cyber threats, risks of information interference, fraud and destabilization of the financial environment. The problem of ensuring the security of the banking system becomes particularly relevant in conditions of martial law, economic instability and the growth of hybrid threats. The Ukrainian banking system during 2022-2025. operated in conditions of increased risks associated with cyber attacks on financial infrastructure, disruption of payment chains, currency fluctuations and threats of loss of public confidence in financial institutions. At the same time, the digitalization of banking and the integration of metaspace technologies create new opportunities to improve the efficiency of financial monitoring, risk management, and ensure the stability of the banking system.

The need to develop a modern mechanism for ensuring the security of the banking system based on innovative metaspace technologies is also due to the transformation of the structure of financial risks. Traditional banking supervision tools no longer provide the proper level of protection in the digital economy, which requires the formation of a comprehensive stabilization system focused on the integration of digital platforms, intelligent data management systems, cyber defense and adaptive regulation. In this regard, a relevant scientific direction is the development of a modern mechanism for ensuring the security of the banking system based on metaspace technologies, taking into account risks, threats and stabilization tools.

Analysis of recent research and publications. The issues of ensuring the security of the banking system, digital transformation of the financial sector and the introduction of innovative technologies have been studied by many domestic and foreign scientists. A significant contribution to the formation of theoretical and methodological approaches to financial risk management and digitalization of banking activities was made by O. Kopylok, N. Zhygar, A. Petryniak, who substantiated the need to strengthen the financial stability of the banking sector in the context of digitalization of the economy and [4]. V. Kovalenko paid attention to the issues of financial security of banks, mechanisms for regulating banking risks and digital tools for monitoring financial stability [5]. N. Versal and Yu. Dudnyk analyzed the features of the functioning of the banking system in the context of global financial crises and digital transformation [12]. G. Kryshtal considered the issue of ensuring the financial security of the banking system of Ukraine under martial law, and the author's main attention is focused on the systematization and classification of threats that affect the stability of the banking sector under conditions of military operations and macroeconomic instability, which caused financial, currency and credit risks, cyber threats and information attacks on the banking sector, risks of loss of bank liquidity, problems of reducing public confidence in financial institutions, mechanisms of state regulation and stabilization of the banking system. The author argues that under martial law, the financial security of the banking system should be based on an integrated approach that combines monetary policy instruments, financial monitoring mechanisms, cyber protection and state support for the banking sector [7]. S. Kavunenko and N. Ukhnal studied the problems of ensuring the security of banking services for individuals in the context of digitalization of the financial sector by assessing the main threats associated with the development of electronic banking services, in particular phishing attacks, leakage of confidential information, unauthorized access to accounts and the risks of digital fraud, biometric

identification of clients and the use of financial transaction monitoring systems [3].

Highlighting previously unresolved parts of the overall problem. Highlighting previously unresolved parts of the overall problem. Despite a significant number of scientific works devoted to the issues of financial security of the banking system, digitalization of banking activities and the introduction of financial innovations, aspects of integrating innovative metaspace technologies into the banking sector security system remain insufficiently studied. In today's conditions of increasing cyber threats, hybrid attacks, military risks and high volatility of financial markets, traditional banking security management mechanisms do not provide the proper level of adaptability and prompt response to destabilizing factors. The issues of forming a single digital environment for protecting the banking system based on Big Data, Blockchain, Fintech solutions and cybersecurity tools, as well as mechanisms for their integration into the processes of financial monitoring, risk management and stabilization of the banking sector, remain insufficiently studied. Methodological approaches to assessing the level of security of the banking system in the context of the functioning of the digital economy and the development of metaspace, as well as the formation of adaptive models of response to internal and external shocks, require further scientific substantiation, which necessitates the need for comprehensive research in this area.

Formation of the objectives of the article (task statement). The purpose of the research is to develop and implement a mechanism for ensuring the security of the banking system based on innovative metaspace technologies, taking into account modern risks, threats and stabilization tools, which, unlike existing mechanisms, allows integrating digital technologies Big Data, Blockchain, Fintech and cyber protection systems into a single adaptive financial security platform, ensuring the prompt detection and neutralization of hybrid cyber threats, increasing the level of resilience of the banking system to external and internal shocks, as well as forming a comprehensive approach to stabilizing the banking sector in the context of digital transformation of the financial market and the development of metaspace innovations. To achieve the goal, the article defines the following tasks: to investigate the theoretical principles of ensuring the security of the banking system in the context of the digital transformation of the financial sector; to systematize modern risks and threats to the functioning of the banking system, in particular cyber risks, information threats and risks of digital fraud; to analyze the impact of innovative technologies of metaspace, Big Data, Blockchain, Fintech on the development of financial security mechanisms of banks; to assess the current state of the functioning of the banking system of Ukraine in the context of martial law and digitalization of the financial market; to develop a comprehensive mechanism for ensuring the security of the banking system based on the integration of innovative digital technologies; to substantiate the directions of increasing the resilience of the banking sector to internal and external shocks through the use of adaptive tools of financial monitoring, cyber protection and digital regulation.

Summary of the main research material. The security of the banking system is one of the important components of the financial security of the state and determines the level of resilience of the financial sector to internal and external threats. In modern conditions, the security of the banking system is considered as a comprehensive state of protection of financial institutions from the risks of destabilization, which ensures the continuity of the functioning of banks, the stability of the payment system, the protection of customer funds and the efficiency of financial intermediation.

Under martial law, the risks of destabilization of the banking system increase significantly due to the information and psychological impact on the population. The spread of panic can cause mass withdrawal of deposits, currency fluctuations and deterioration of bank liquidity.

During 2018-2025, the banking system of Ukraine went through a difficult stage of transformation associated with the reform of the financial sector, the consequences of the COVID-19 pandemic, military challenges and the digitalization of the economy [9; 10]. Despite significant risks, the banking sector demonstrated a high level of adaptability and financial stability. According to the NBU, during 2018-2021, there was a gradual improvement in the financial indicators of the banking system, an increase in assets, a reduction in the share of problem loans, and an increase in the level of capitalization. In 2022, the full-scale invasion of the aggressor country caused a significant deterioration in the macroeconomic situation, but thanks to the operational measures of the NBU, it was possible to ensure the continuity of the functioning of the banking system [9; 10]. In 2018-2025, there was a gradual reduction in the number of banking institutions in the banking sector due to the

tightening of requirements for bank capitalization [9; 10]. In 2018, 77 banks operated in Ukraine, and in 2025, only 60 institutions remained. The assets of the banking system demonstrated a steady growth trend [9; 10]. In 2018, their volume was UAH 1,359 billion, while in 2025 it was UAH 3,485 billion, which indicates their growth by more than 2.5 times. This dynamics is explained by the expansion of digital banking services, an increase in the volume of non-cash transactions, and increased state support for the financial sector.

The net profit of the banking system also had positive dynamics, with the exception of 2022, when the profitability of banks significantly decreased due to military risks and the deterioration of the economic situation. In 2023-2025, the profitability of the banking sector was restored. The share of problem loans (NPL) in 2018 exceeded 52%, in 2025 it decreased to 28.1%, which indicates an improvement in the quality of the bank's loan portfolio and the effectiveness of financial recovery measures [9; 10].

A positive trend is also the increase in the level of capital adequacy of banks [9; 10]. In 2025, the indicator exceeded 23%, which is significantly higher than regulatory requirements and indicates a sufficient margin of financial stability of the banking system. An important factor in stabilizing the banking system from 2018-2025 was the introduction of digital technologies. The active use of remote banking, mobile financial services, digital platforms and electronic identification allowed to ensure the continuity of banking operations even under martial law. In 2023-2025, Ukrainian banks significantly intensified the implementation of digital technologies and automated risk monitoring systems, which contributed to reducing the level of fraud, increasing the speed of processing financial transactions and optimizing liquidity management. A significant role in ensuring the stability of the banking system was played by the NBU policy on supporting bank liquidity, currency regulation and conducting stress testing. Regular assessments of the stability of the banking system allowed for timely identification of potential risks and development of mechanisms to minimize them.

Stabilization of the banking system in the context of digital transformation of the financial market should be based on the development of digital financial infrastructure, strengthening cyber protection, improving the financial monitoring system, integrating innovative metaspace technologies into risk management processes, developing digital literacy of the population, implementing adaptive banking regulation, expanding international cooperation in the field of cybersecurity. In the context of digitalization of the financial market, traditional approaches to ensuring the security of the banking system are significantly transformed [1]. If earlier the main attention was paid to bank liquidity, capitalization and credit risk control, now cybersecurity, information infrastructure protection, digital customer identification, artificial intelligence technologies and digital asset management are gaining priority [6].

The development of metaspace technologies contributes to the formation of new models of banking activity. Virtual bank offices, digital consultants, integrated payment services and financial platforms create new opportunities for interaction between banks and customers [10]. At the same time, the digitalization of the banking sector requires strengthening regulatory policy and improving financial monitoring mechanisms. An important task is to create an adaptive cyber defense system capable of responding promptly to new types of digital threats [9; 2].

In our opinion, metaspace in the financial sector is an integrated digital environment within which financial transactions, communication, asset management and information exchange are carried out in real time. Such technologies provide the opportunity to create virtual bank offices, digital financial ecosystems, smart contracts and integrated financial monitoring systems. Along with the advantages of digitalization, a significant number of new risks arise. The main threats to the banking system in the context of the development of metaspace technologies are cyberattacks on banking information systems, unauthorized access to personal data, digital fraud, manipulation of virtual assets, risks of loss of liquidity due to digital crises, information attacks on the financial sector, risks of destabilization of the payment infrastructure.

Given the growing scale of digital risks and the transformation of the nature of modern cyberthreats, there is a need to form a comprehensive approach to developing a mechanism for ensuring the security of the banking system, which would take into account the relationship between sources of threats, tools of digital influence, areas of destabilization of the financial sector and stabilization measures. In modern conditions, the effective functioning of the banking system depends on the integration of

digital technologies of cyber protection, financial monitoring, risk analysis and mechanisms for stabilizing the banking system, which constitute the conceptual architecture of the metaspace platform. The central component of the metaspace platform reflects digital technologies and services. The basis of the technological architecture of the metaspace platform is cyber protection and threat detection systems, financial monitoring and risk analysis using Big Data, Blockchain and FinTech, as well as information security mechanisms and cloud technologies. Big Data, Blockchain and FinTech technologies allow banks to conduct in-depth analysis of customer behavior, assess creditworthiness and form adaptive risk management models. Cloud technologies provide flexibility in managing information resources and increase the efficiency of the functioning of the digital banking infrastructure. At the same time, digital technologies provide automated analysis of large amounts of financial data and allow for the prompt detection of suspicious transactions, forecast risks and optimize banking processes [12; 11].

Blockchain and FinTech technologies help to increase the transparency of financial transactions, reduce the risk of fraud and ensure the protection of digital assets [8]. The cyber defense component includes SIEM, XDR and SOAR systems, which provide real-time collection, analysis and automated response to cyber incidents. The use of such systems allows you to detect anomalies in digital traffic, block unauthorized access attempts and carry out continuous monitoring of the digital infrastructure of banks. The financial monitoring and risk analysis system provides control of financial transactions, detection of suspicious transactions, assessment of business reputation risks and analysis of customer behavior. The platform uses AML/KYC technologies, which contribute to the fight against money laundering and financing of illegal activities.

A separate place in the metaspace platform is occupied by the digital data analytics block, namely machine learning technologies for identifying patterns of suspicious transactions, signs of fraud, atypical customer behavior, risks of cyberattacks, anomalous financial transactions, potential threats to the bank's liquidity. AI and Big Data technologies form the basis for predicting risks and crisis phenomena in the banking system. With the help of these technologies, banks are able to analyze large amounts of information, identify hidden patterns, model crisis scenarios and automatically assess the level of financial risks. Blockchain, FinTech and digital registry technologies ensure transparency of financial transactions, data integrity and protection against unauthorized interference. Smart contracts automate the execution of financial transactions and minimize the risk of fraud. The use of distributed registries also contributes to increasing trust in the banking system.

The infrastructure level of the platform includes data centers, communication networks, backup power systems and physical mechanisms for protecting the information infrastructure, which provides the technical basis for the functioning of the digital banking ecosystem and guarantees the continuity of banking processes. Accordingly, the digital metaspace platform allows for the introduction and implementation of mechanisms for stabilizing and supporting the banking system, which support the liquidity of banks, diversification of funding sources, risk management, ensuring the continuity of business processes, increasing the cyber literacy of personnel and international cooperation in the field of cybersecurity.

The result of the functioning of the metaspace platform is the formation of a secure banking ecosystem, characterized by resilience to cyber threats, continuity of financial transactions, protection of assets and customer data, a high level of public trust and the ability to respond promptly to crisis phenomena. That is, a modern banking system should function as an integrated digital ecosystem, which combines financial monitoring technologies, cybersecurity and institutional regulation to ensure the long-term financial stability of the state.

Hybrid cyber threats, which combine technological and information methods of influencing the banking system, pose a particular danger, which, under martial law, increased pressure on the financial infrastructure of Ukraine and caused targeted disruptions to banking services by interfering with payment systems and destabilizing the foreign exchange market. We recommend systematizing the main hybrid cyber threats and their areas of influence on the banking system (Fig. 1).

Methods of influence of hybrid cyber threats on the banking system are distinguished through DDoS attacks on banking services and payment systems, phishing campaigns, the use of malicious software, interference in international payment systems, manipulative information attacks and cyber interference in data processing centers.

An important feature of modern attacks is their complexity and coordination, when several mechanisms of influence are used simultaneously. Thus, a massive cyberattack may be accompanied by an information campaign to spread panic among the population, which provokes an outflow of deposits and increases currency instability.

The central place among hybrid cyber threats focuses on the goals of attacks on the banking system, namely disruption of banking services, interference in payment transactions, theft of financial resources and personal data, destabilization of the foreign exchange market, formation of public distrust in financial institutions and growth of systemic risks.

he central element of hybrid cyber threats are banking institutions, which symbolize the core of the financial system, around which all areas of cyber and information influence are concentrated.

The effectiveness of the functioning of the digital ecosystem is achieved provided that banking institutions adapt to the dynamic risks of the metaspace and the formation of long-term stability of the financial market through tools for preventing hybrid cyber threats, which is implemented through an integrated mechanism for ensuring the security of the banking system on the basis of the development of digital technologies of the metaspace (Fig. 2).

A comprehensive approach to the development and implementation of an integrated mechanism for ensuring the security of the banking system in the conditions of the digital ecosystem of metaspace technologies has a structural structure and logic of the relationship between sources of threats, methods of influence of hybrid cyberattacks and tools for their elimination in order to stabilize the financial sector. The central idea of developing the mechanism is that modern banking security can no longer be ensured exclusively by traditional financial or regulatory methods, but requires the integration of digital technologies, cyber protection, institutional regulation and intelligent risk analysis systems.

The proposed integrated mechanism is formed from a structure of four interrelated instruments:

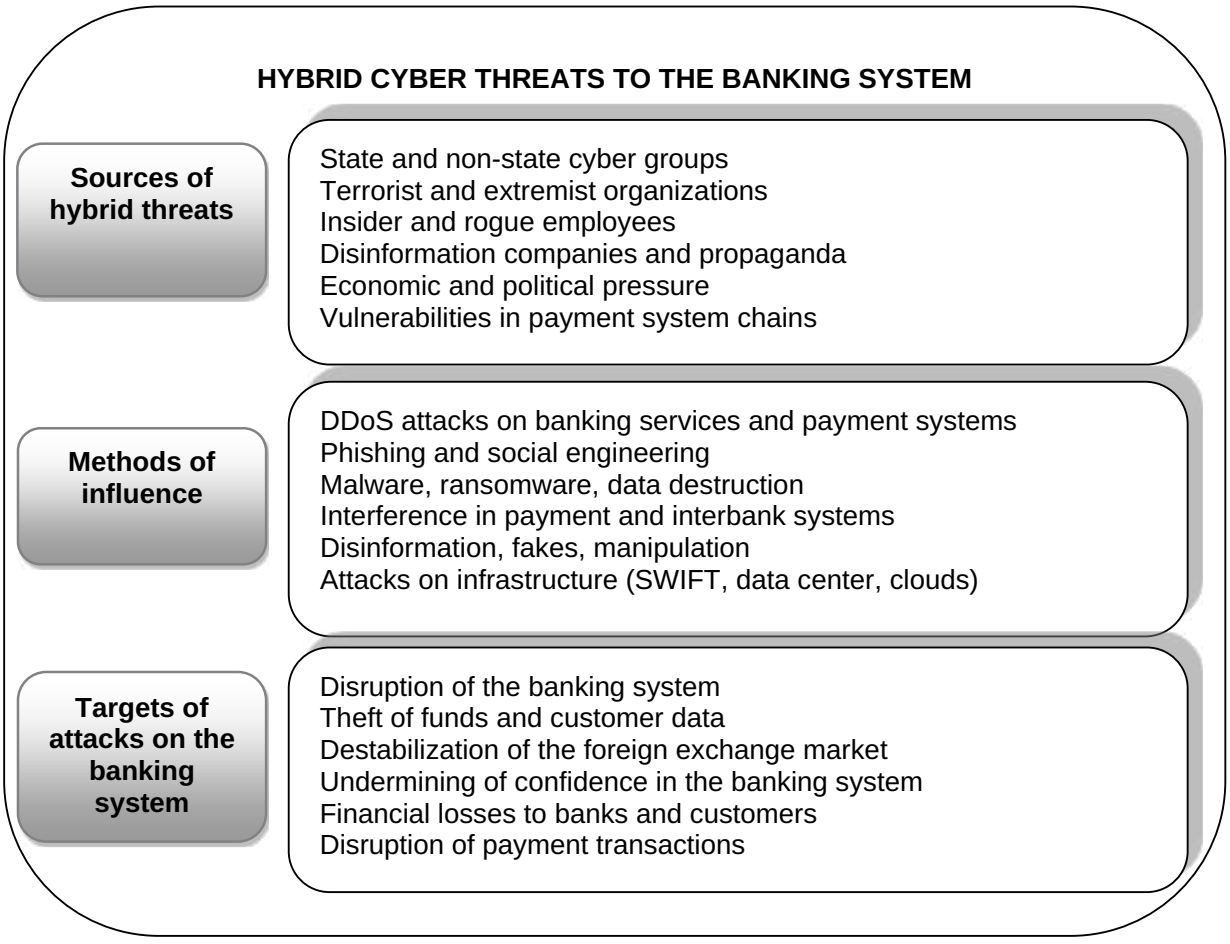

Figure 1. Hybrid cyber threats to the banking system

Source: formed by the author

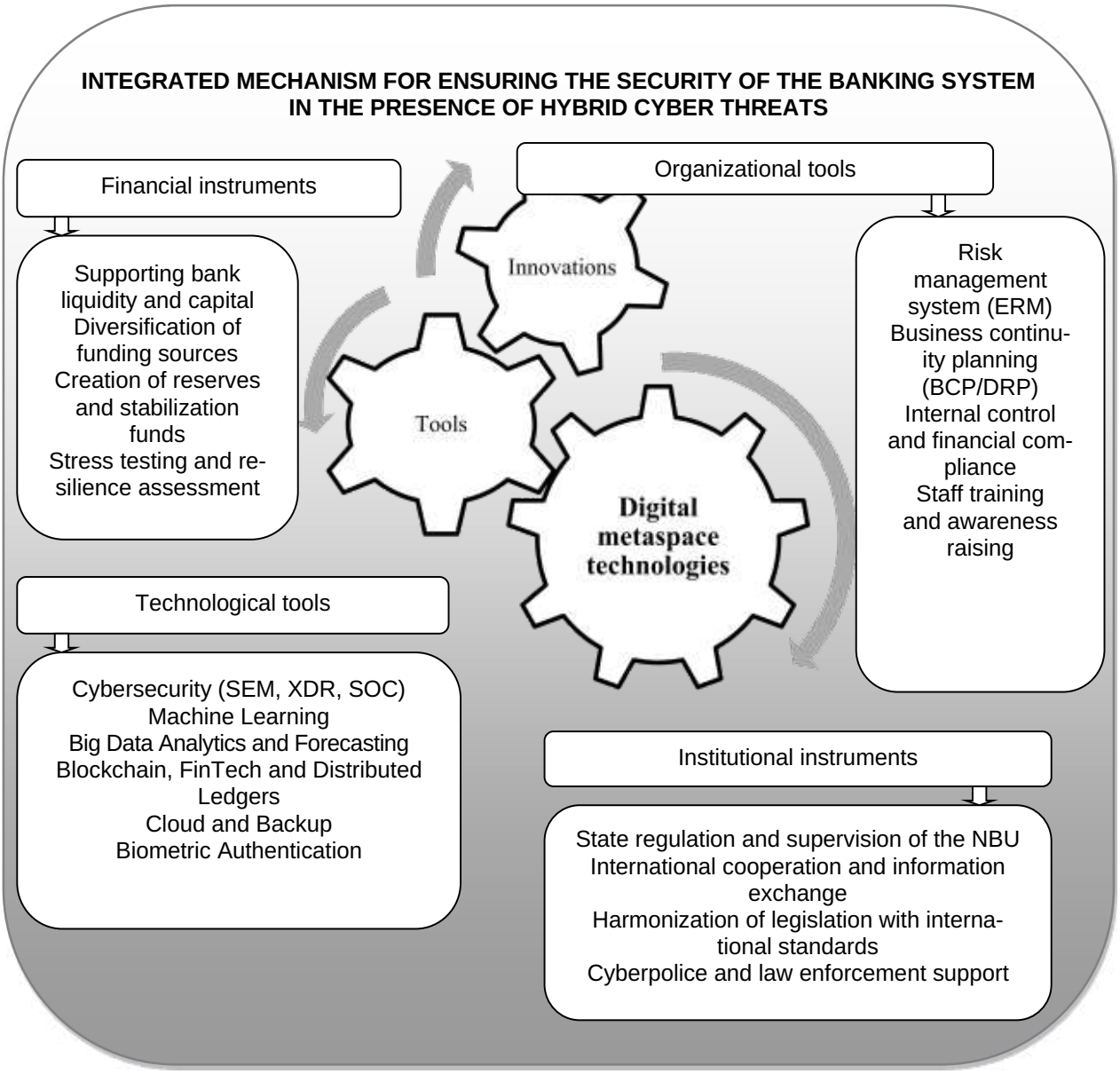

Figure 2. Integrated mechanism for ensuring the security of the banking system in the conditions of the digital ecosystem of metaspace technologies

Source: formed by the author

financial, organizational, technological and institutional. Financial instruments include supporting bank liquidity, forming reserves, capitalizing financial institutions, diversifying funding sources and conducting stress testing. Their main function is to ensure the financial stability of the banking system and minimize the risk of crisis events. Organizational tools are focused on forming a risk management system, ensuring the continuity of business processes, conducting internal audits and increasing the level of digital literacy of personnel. In modern conditions, the human factor is one of the elements of cybersecurity, since a significant part of cyberattacks is implemented through social engineering and manipulation by bank employees. The technological block of the mechanism is the basis of the digital stability of the banking system, which takes into account biometric authentication and cloud technologies. It is these tools that provide automation of financial monitoring processes, prompt detection of suspicious transactions, forecasting crisis events and the formation of an adaptive cyber defense system. Institutional tools include state regulation, international coordination in

the field of cybersecurity, harmonization of legislation with international standards, as well as interaction between the central bank, law enforcement agencies and international financial organizations.

In modern conditions, ensuring the security of the banking system is impossible without integration into global cyber defense systems and international exchange of information about cyber incidents. Therefore, the role of digital metaspace technologies in the process of monitoring, analyzing and forecasting risks based on the use of Big Data, Blockchain and FinTech technologies allows banks to analyze large amounts of financial information in real time, identify anomalous transactions and predict liquidity risks and model scenarios for the development of crisis situations. Automation of financial monitoring ensures the promptness of response to threats and increases the adaptability of the banking system to external shocks. The implementation of an integrated mechanism for ensuring the security of the banking system is based on the results of financial stability, continuity of banking operations, protection of assets and personal data of clients, increasing public confidence in financial institutions, resilience to external and internal shocks, as well as supporting the digital transformation of the financial market.

Conclusions. Thus, the results of the study show that the modern development of the banking system takes place in conditions of rapid digitalization of the financial sector and active implementation of innovative technologies of metaspace, which creates new opportunities for the development of banking services, increasing the efficiency of financial monitoring and optimizing risk management, but at the same time is accompanied by an increase in cyber threats, information risks and digital fraud.

Ensuring the security of the banking system requires a comprehensive mechanism that will combine technological, financial, institutional and regulatory stabilization tools. The analysis showed that the banking system of Ukraine in 2018-2025 demonstrated a high level of adaptability and financial stability even in conditions of martial law. The reduction in the share of problem loans, the growth of bank assets and the increase in the level of capital adequacy indicate positive trends in the development of the banking sector. At the same time, priority areas for ensuring the security of the banking system in Ukraine should form a platform for strengthening adaptive models of digital banking regulation, improving cyber protection mechanisms, and integrating innovative metaspace technologies into the financial risk management system.

REFERENCES:

1. Hanziuk, S. M., Kalinichenko, T. O. (2023). Tsyfrova transformatsiia v bankivskomu biznesi [Digital transformation in banking business]. *Ekonomichnyi visnyk Dniprovskoho derzhavnoho tekhnichnoho universytetu*, no. 2(7), pp. 70-76.

2. Basel Committee on Banking Supervision. (2021). Principles for Operational Resilience. Basel: BIS, 12 p. Available at: https://www.bis.org/bcbs/publ/d516.htm?utm_source=chatgpt.com (accessed May 8, 2026)

3. Kavunenko. S., Ukhnal. N. (2024). Security in the digitalization of banking services for individuals. *Scientific works of the National Institute of Physics and Technology*, no. 4, pp. 150-162.

4. Kopylyuk, O., Zhyhar, N., Petrynyak, A. (2024).Threats to the financial security of Ukrainian banking institutions under the conditions of digitalization. *Economic Journal of Lesya Ukrainka Volyn National University*, no. 2(38), pp. 61-68.

5. Kovalenko, V. (2020). Marketing Banking Communications in the Conditions of Digitalization of Economy of Ukraine. *Modern Economics*, no. 21, pp. 125-131.

6. Kovalenko, V., Sheludko, S., Cherkashyna, K. (2023). Digital transformation of banking business: present and future. *Socio-Economic Relations in the Digital Society*, no. 4(50), pp. 25-40.

7. Kryshtal, H. (2023). Financial security of the banking system of Ukraine under the conditions of martial state: classification of possible threats. *Management and Entrepreneurship: Trends of Development*, no. 4(26), pp. 29-39.

8. Mishkin, F. (2021). The Economics of Money, Banking and Financial Markets. 13th ed. New York: Pearson Education, 718 p. Available at: https://www.pearson.com/en-gb/subject-catalog/p/economics-of-money-banking-and-financial-markets-the-global-edition/P200000005052/9781292409580 (accessed May 8, 2026)

9. National Bank of Ukraine. (2025). Financial Stability Report. Available at: https://bank.gov.ua/en/news/all/zvit-pro-finansovu-stabilnist-cherven-2025-roku?utm_source=chatgpt.com (accessed May 8, 2026)

10. National Bank of Ukraine. (2025). Banking Sector Review. Available at: https://aub.org.ua/en/nbu-opryliudnyv-ohliad-nebankivskoho-finansovoho-sektoru-za-iii-kvartal-2025-roku-2/?utm_source=chatgpt.com (accessed May 8, 2026)

11. Tapscott, D., Tapscott, A. (2019). Blockchain Revolution. New York: Penguin Books, 368 p. Available at: https://openlibrary.org/books/OL27105211M/The_Blockchain_Revolution (accessed May 8, 2026)

12. Versal, N., Dudnyk, Y. (2024). Digital transformation of banking in Ukraine. *Economic Journal of Lesya Ukrainka Volyn National University*, no. 1(37), pp 68-77.

СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ:

1. Ганзюк С. М., Калініченко Т. О. Цифрова трансформація в банківському бізнесі. *Економічний вісник Дніпровського державного технічного університету*. 2023. № 2(7). С. 70-76.

2. Basel Committee on Banking Supervision. Principles for Operational Resilience. Basel: BIS, 2021. 12 p. URL: https://www.bis.org/bcbs/publ/d516.htm?utm_source=chatgpt.com (дата звернення 8 травня 2026 р.)

3. Kavunenko S., Ukhnal N. Security in the digitalization of banking services for individuals. *Scientific works of the National Institute of Physics and Technology*. 2024. Vol. 4. P. 150-162.

4. Kopylyuk O., Zhyhar N., Petrynyak A. Threats to the financial security of Ukrainian banking institutions under the conditions of digitalization. *Economic Journal of Lesya Ukrainka Volyn National University*. 2024. Vol. 2(38). P. 61-68.

5. Kovalenko V. Marketing Banking Communications in the Conditions of Digitalization of Economy of Ukraine. *Modern Economics*. 2020. Vol. 21. P. 125-131.

6. Kovalenko V., Sheludko S., Cherkashyna K. Digital transformation of banking business: present and future. *Socio-Economic Relations in the Digital Society*. 2023. Vol. 4(50). P. 25-40.

7. Kryshtal H. Financial security of the banking system of Ukraine under the conditions of martial state: classification of possible threats. *Management and Entrepreneurship: Trends of Development*. 2023. Vol. 4(26). P. 29-39.

8. Mishkin F. The Economics of Money, Banking and Financial Markets. 13th ed. New York: Pearson Education, 2021. 718 p. URL: https://www.pearson.com/en-gb/subject-catalog/p/economics-of-money-banking-and-financial-markets-the-global-edition/P200000005052/9781292409580 (дата звернення 8 травня 2026 р.)

9. National Bank of Ukraine. Financial Stability Report in 2025. URL: https://bank.gov.ua/en/news/all/zvit-pro-finansovu-stabilnist-cherven-2025-roku?utm_source=chatgpt.com (дата звернення 8 травня 2026 р.)

10. National Bank of Ukraine. Banking Sector Review in 2025. URL: https://aub.org.ua/en/nbu-opryliudnyv-ohliad-nebankivskoho-finansovoho-sektoru-za-iii-kvartal-2025-roku-2/?utm_source=chatgpt.com (дата звернення 8 травня 2026 р.)

11. Tapscott D., Tapscott A. Blockchain Revolution. New York: Penguin Books, 2019. 368 p. URL: https://openlibrary.org/books/OL27105211M/The_Blockchain_Revolution (дата звернення 8 травня 2026 р.)

12. Versal N., Dudnyk Y. Digital transformation of banking in Ukraine. *Economic Journal of Lesya Ukrainka Volyn National University*. 2024. Vol. 1(37). P. 68-77.

Дата надходження статті: 17.04.2026
Дата прийняття статті: 15.05.2026
Дата публікації статті: 27.05.2026