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Mechanism for Modernization of the Payment System of Ukraine

Abstract. Introduction. *The article presents a comprehensive study of the directions of modernization of payment systems of Ukraine in the context of innovations and risks. It is substantiated that payment systems are a key infrastructure element of the state's financial system, ensuring the continuity of monetary circulation, the efficiency of interbank settlements and the implementation of financial relationships between economic agents at both the national and global levels.*

Purpose. *The study aims to substantiate the implementation of a modernization mechanism for Ukraine's payment system based on innovative financial technologies, as well as improving risk management measures within the operating environment, with the ultimate goal of enhancing the efficiency, security, and stability of the payment infrastructure.*

Results. *It is determined that, in the context of deepening international financial integration and the active digitalization of the economy, the effectiveness with which the payment infrastructure functions directly affects the stability of the banking system, the speed of settlements, the level of trust in financial institutions, and the country's overall economic development. It is proven that an effective risk management system is an important element of the mechanism for modernizing Ukraine's payment system, as it allows for the timely identification, assessment and minimization of the impact of internal and external threats on the functioning of the payment infrastructure. It is proven that implementing payment system oversight tools, which are widely used by international financial organizations, increases their reliability, transparency and financial stability.*

Conclusions. *An approach to developing a mechanism for modernizing the payment system within the operating environment of banking institutions has been devised. This approach involves integrating interrelated technical, technological, spatial-reactive, reactive-adaptive, control-monitoring and post-operational support elements. It has been established that using these elements together optimizes payment flows, increases the liquidity of banking institutions and reduces the level of operational and financial risks. It also enables the banking system to adapt to changes in the external environment. The development of digital technologies contributes to reducing operating costs and increasing the efficiency of payment systems. However, it also creates new challenges in the field of cybersecurity, requiring the implementation of modern information protection tools.*

Keywords: *payment systems, operating environment, banking institutions, digitalization, cybersecurity, risk management, liquidity, payment infrastructure, money circulation, interbank settlements.*

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Механізм модернізації платіжної системи України

Анотація. *У статті здійснено комплексне дослідження напрямів модернізації платіжних систем України в умовах інновацій та ризиків. Обґрунтовано, що платіжні системи виступають ключовим інфраструктурним елементом фінансової системи держави, забезпечуючи безперервність грошового обігу, ефективність міжбанківських розрахунків та реалізацію фінансових взаємозв'язків між економічними агентами як на національному, так і на глобальному рівнях. Визначено, що в умовах поглиблення міжнародної фінансової інтеграції та активної цифровізації економіки ефективність функціонування платіжної інфраструктури безпосередньо впливає на стабільність банківської системи, швидкість проведення розрахунків, рівень довіри до фінансових інститутів і загальний економічний розвиток країни. Доведено, що важливим елементом механізму модернізації платіжної системи*

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Україні є ефективна система управ-ління ризиками, яка дозволяє своєчасно ідентифікувати, оцінювати та мінімізувати вплив внутрішніх і зовнішніх загроз на функціонування платіжної ін-фраструктури. Обґрунтовано, що впровадження інструментів оверсайту пла-тіжних систем, які активно застосовуються міжнародними фінансовими орга-нізаціями, сприяє підвищенню їх надійності, прозорості та фінансової стійкос-ті. Сформовано підхід до побудови механізму модернізації платіжної системи в операційному середовищі банківських установ, який передбачає інтеграцію взаємопов'язаних елементів: техніко-технологічного, просторово-реакційного, реакційно-адаптивного, контрольного-моніторингового та після-пераційного забезпечення. Встановлено, що їх комплексне використання за-безпечує оптимізацію платіжних потоків, підвищення ліквідності банківських установ, зниження рівня операційних і фінансових ризиків, а також адаптацію банківської системи до змін зовнішнього середовища. Обґрунтовано, що роз-виток цифрових технологій, з одного боку, сприяє зниженню операційних ви-трат і підвищенню ефективності платіжних систем, а з іншого – формує нові виклики у сфері кібербезпеки, які потребують впровадження сучасних ін-струментів захисту інформації.

Ключові слова: платіжні системи; операційне середовище; банківські установи; цифровізація; кібербезпека; управління ризиками; ліквідність; пла-тіжна інфраструктура; грошовий обіг; міжбанківські розрахунки.

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Formulation of the problem. The payment system of Ukraine is an important indicator of the level of development of the national economy and the efficiency of the functioning of the financial market. In the context of transforming economic relations, modernizing the payment infrastructure and improving financial instruments that ensure the implemen-tation of non-cash payments is one of the directions of its development. The grow-ing role of the payment market in ensuring market economic stability necessitates introducing alternative payment methods since traditional cash forms no longer ful-ly meet modern economic entities' needs in their financial interactions.

Digitalization and globalization processes influence the development of money, causing changes in its functional characteristics and forms of existence. This contributes to the emergence of more effective instruments for making pay-ments and settlements within banking payment systems, transforming the organiza-tion of money circulation and increasing the role of banking institutions, payment service providers, and financial intermediaries in the digital economy.

The rapid digital transformation of the world economy is an objective result of globalization and a determining factor in the development of the financial sector. This development is based on the introduction of innovative technologies, digital products, and new business models. Electronic payment services that provide real-time transfers via the internet have become commonplace and an integral part of the modern economic environment. Under these conditions, the key parameters for payment system functionality are transaction speed, security, ease of use, user ac-cessibility, and economic efficiency. However, the modernization of the banking sector's payment system is accompanied by new operational risks associated with cyber threats, technological dependence, growing digital transaction volumes, and the need to ensure the continuity of financial operations. This necessitates improv-ing monetary relations, developing regulatory mechanisms, and increasing the sta-bility of payment infrastructure at national and international levels.

The growing interest in developing payment systems is due to their strategic role in ensuring financial stability

and economic growth. Technological innovations are gradually transforming the architecture of payment systems to focus on users' needs and integration into the global financial system. Under these circumstances, central banks, banking institutions, payment service providers, and international organizations are intensifying their cooperation to combine the technological, insti-tutional, and regulatory aspects of payment system functionality. This cooperation is a prerequisite for ensuring the reliability, continuity, and security of payment systems in the modern operating environment.

Analysis of recent research and publications. Both Ukrainian and foreign researchers are actively studying the modernization of Ukraine's banking sector payment system, the introduction of innovative technologies, and operational risk management. These works cover the theoretical principles of payment system func-tioning, digitalization issues, state regulation, payment infrastructure security, and fintech innovation introduction. Significant contributions to this field have been made by researchers such as L. Sakhno. Sakhno examined the transformation of Ukraine's payment banking systems in the context of the digital economy and the integration of international fintech platforms. Sakhno also defined technological trends in payment infrastructure modernization, particularly the development of electronic payments, digital services, and compliance mechanisms in the banking sector. Significant emphasis is placed on the impact of global payment services on the competitiveness of the national banking system [1]. O. Fradynskyi investigated the nature, evolution, and risks associated with payment systems, offering an origi-nal periodization of their development. Particular attention is paid to the classifica-tion of payment system risks and management mechanisms, which are important for analyzing the operating environment of the banking sector [2]. V. Chernomor established the theoretical basis for developing payment systems in Ukraine, de-fined the principles for operating systemically important payment systems, and ex-aminated the practices for organizing them. He also demonstrated the importance of payment infrastructure for the financial stability of the state [3].

Yu. Shushkova analyzed trends in the development of the payment card market in Ukraine and their impact on expanding non-cash payments by accelerating the digitalization of banking services and stimulating levers for modernizing the payment infrastructure to increase financial inclusion of the population [4]. L. Ukrainskaya revealed the mechanisms of state regulation of payment systems, identifying the instruments of supervision, control, and regulatory influence of the state on the functioning of payment infrastructure, as well as the role of the regulator in ensuring the stability of the payment market, from the perspective of assessing institutional risks [5]. N. Koziy's research focuses on the security of digital payment services in Ukraine's banking sector and emphasizes the importance of preventing operational risks, particularly cyber threats, fraudulent transactions, and data leakage. The research also suggests ways to increase the cyber resilience of payment systems in the digital environment. Thus, modern scientific research demonstrates a comprehensive approach to studying the modernization of Ukraine's payment system through the lens of the digitalization of financial services, institutional regulation, innovative technologies, and operational risk management. Together, these studies lay the theoretical and methodological groundwork for examining innovations and risks in Ukraine's payment system within the context of its current operating environment.

Formation of research objectives. The purpose of the study is to substantiate the directions for implementing the mechanism for modernizing the payment system of Ukraine based on innovative financial technologies and improving risk management measures in the operating environment in order to increase the efficiency, security and stability of the payment infrastructure.

Presentation of the main research material. Ukraine's payment systems play a key role in ensuring the stable functioning of the financial system at both the national and global levels. It is through these systems that continuous money circulation occurs and financial relationships between economic agents are established. In the context of the digitalization of the economy and growing international financial integration, the efficiency with which payment infrastructure functions determines the speed, reliability, and security of payments. This directly affects the stability of the banking system and the economic development of the state. Payment market participants, central banks and international financial organizations are increasingly interacting with each other, combining technological, organizational and regulatory levels of cooperation,

which ensures the continuity of the functioning of national and cross-border payment systems [7].

In the context of modernizing Ukraine's payment system, establishing effective risk management areas in the operating environment is particularly important. International financial institutions, particularly the Bank for International Settlements, the World Bank, and the European Central Bank, use payment system oversight tools to ensure reliability, transparency, and financial stability by identifying and minimizing risks in a timely manner. This approach allows for a prompt response to changes that arise both in the activities of banking institutions and as a result of the transformation of the behavior of payment market participants and users of financial services [9].

Accordingly, implementing the mechanism to modernize Ukraine's payment system as a complex system of methods and tools determines the consistency of financial risk management organization in interbank settlements and fund transfers. Implementing such a mechanism aims to optimize banks' payment portfolios, increase the liquidity and profitability of settlement operations, and adapt banking institutions' activities to changes in the payment market environment. The mechanism's strategic guideline is to create favorable conditions for implementing effective monetary policy with minimal operational risk in banking institutions (Figure 1).

The economic component of the specified mechanism minimizes payment system risks and builds an optimal payment portfolio for banking institutions, taking into account their long-term operational goals. This involves establishing clear criteria for the effectiveness of bank operations, improving risk management methods, and ensuring the rational use of financial resources in payment transactions. The assessment of the economic component's effectiveness is based on a comprehensive analysis of the banking sector's operating environment, considering the regulator's influence on monetary policy, macroeconomic shocks to the payment market, and intra-bank mechanisms and risk management [10].

The economic component of the mechanism is structured with interconnected elements of the technical, technological, spatial-reactive, reactive-adaptive, control-monitoring, and post-operational support systems. Their comprehensive application allows reducing the impact of operational and financial risks in the process of making payments and transfers, taking into account the changing needs of payment service users and the dynamism of the digital environment of banking institutions [8].

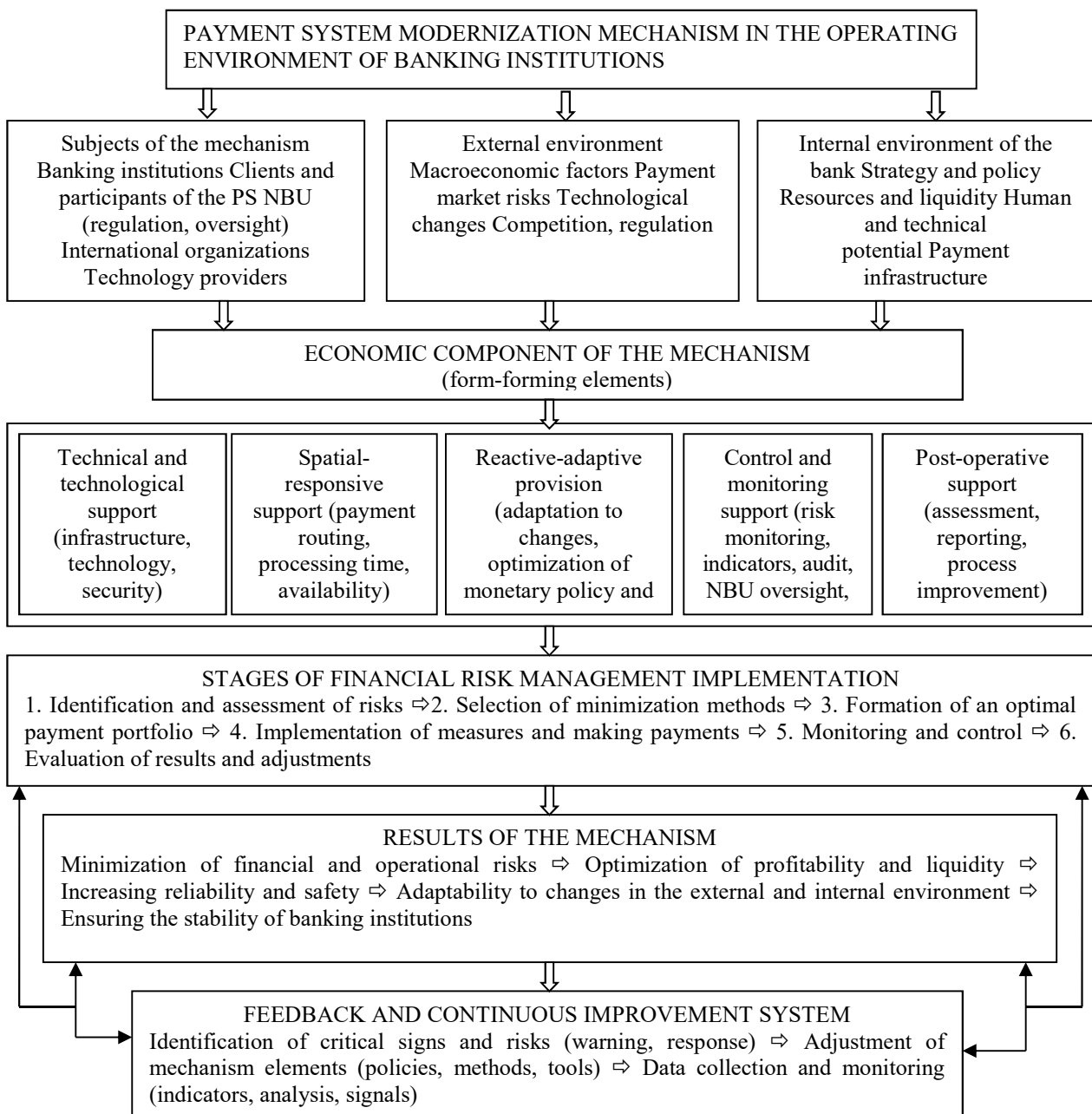


Figure 1 – Mechanism of payment system modernization in the operating environment of banking institutions

Source: constructed by the author

An important component of the mechanism is the implementation of a feed-back system that ensures the timely adjustment of its elements according to changes in the external and internal operating environment [11].

In this context, the proposed reactive-adaptive support element integrates tools that optimize banks' monetary policies, form anti-crisis measures, and implement innovative risk management technologies. Implementing this system increases the flexibility of the payment system, improves control of settlement processes, and ensures the financial stability of the banking sector.

Modernizing the payment system of Ukraine's banking sector should be comprehensive and continuous. This process should provide for the integration of innovative technologies, improve risk minimization mechanisms, and increase the adaptability of banking institutions to transformations in the operating environment. These changes create the prerequisites for effectively using payment systems and achieving the strategic goals of developing the financial system in the digital economy [7].

From 2017 to 2025, the risk profile of the Google Pay payment system in Ukraine underwent significant transformations, reflecting the influence of macroe-

conomic, institutional, and technological factors. Quantitatively, while most financial risks demonstrate a general downward trend, there was a pronounced crisis

surge in 2022. Technological risks, on the other hand, have a steady upward trend (Figure 2).

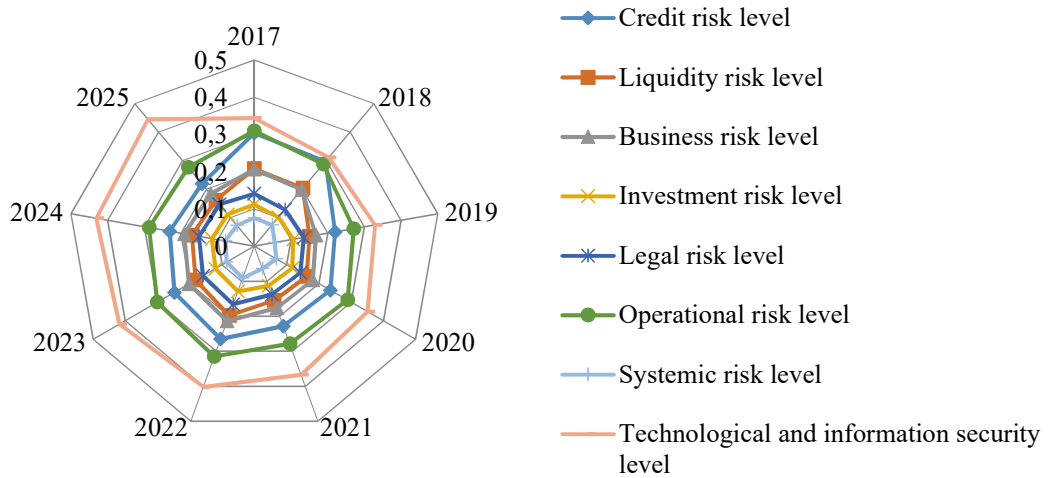


Figure 2 – Risks of the Google Pay payment system in Ukraine for 2017-2025

Source: calculated by the authors

Despite a temporary increase during the crisis period, the level of credit risk is characterized by a long-term downward trend. The indicator decreased from 0.304 in 2017 to 0.219 in 2025, a decline of 0.085 points, or 27.9%. The highest level of the 0.265 index was observed in 2022, which coincided with the growth of financial shocks in the country's banking sector. However, its impact gradually weakened and stabilized. During this period, the liquidity risk of the Google Pay payment system decreased by 22.6%. In 2022, however, there was a temporary increase in the indicator to 0.198. Since 2023, the indicator's value has steadily decreased, indicating the payment infrastructure's adaptation to increased loads and crisis conditions.

The business risk level of the Google Pay payment system in Ukraine decreased by 11.6% from 2017 to 2025. The indicator's maximum value was also recorded in 2022 at 0.214, reflecting the increased uncertainty of digital service functioning during periods of economic shock in the country. However, since 2023, it has demonstrated a stable downward trajectory. The risk level of storing assets and investments in the Google Pay payment system in Ukraine remained relatively stable throughout the period, with a slight change from 0.112 in 2017 to 0.111 in 2025. The peak value was 0.129 in 2022, indicating a short-term increase in investment uncertainty.

The legal risk of the Google Pay payment system increased during the crisis period but decreased in the long term. While the indicator was 0.141 in 2017, it was 0.146 in 2025, showing an insignificant overall change of +3.5%. The indicator reached a maximum of 0.166 in 2022, reflecting the banking sector's regulatory adaptation to new financial technology operating conditions within the payment infrastructure.

Operational risk in the Google Pay payment system decreased by 11.0%. After rising to 0.315 in 2022, the indicator gradually decreased, indicating an increase in processing system efficiency, operational automation, and internal control improvement in the banking institutions' operating environment. Systemic risk remains the lowest among all the studied indicators in the Google Pay payment system. Although it temporarily increased to 0.091 in 2022, it decreased by 3.9%, confirming the relatively high level of stability and integration of the payment system. The most pronounced trend is the steady growth of technological risk. The indicator increased by 29.4%. This growth has been almost continuous since 2020, indicating an increase in cyber threats, online transaction volume, and dependence on digital infrastructure.

In general, from 2017 to 2025, the risk profile of the Google Pay payment system in Ukraine underwent a structural transformation due to a 11-28% decrease in traditional financial risks (credit, liquidity, and operational). The peak of the crisis for most risks occurred in 2022. During this period, the dominant dangerous factors were the technological and informational levels of the payment system. These levels increased by almost 30%. The shift in risk towards digital and cyber confirms that the development of new-generation payment services is accompanied by threats and increased technological vulnerability. This requires strengthening regulatory measures and digital risk management in the modernization of the banking payment system.

Conclusions. Summarizing the results of the study, it is important to note that payment systems in Ukraine are a key element of financial infrastructure, ensuring the continuity of monetary circulation, the efficiency of

interbank settle-ments, and the stability of the banking sector. In the context of the digital transfor-mation of the economy, their role is significantly enhanced, necessitating the con-stant modernization of institutional, technological, organizational, and economic management mechanisms.

The analysis showed that, from 2017 to 2025, the risk profile of the Google Pay payment system in Ukraine was clearly dependent on macroeconomic condi-tions. The 2022 crisis caused simultaneous increases in credit risk (0.037 points), liquidity risk (0.043 points), business risk (0.038 points), legal risk (0.028 points), operational risk (0.036 points), and systemic risk (0.027 points), confirming their high sensitivity to external shocks. Conversely, from 2023 to 2025, there was a gradual decrease of 10-25%, indicating the payment system's adaptability and the effectiveness of regulatory impact measures and internal bank risk management.

However, it was also found that technological and informational risks in-creased by 29.4% over the studied period due to the active digitalization of pay-ment services, the increased use of mobile payment instruments, and the growing scale of cyber threats. In other words, there is a structural transformation of risks, in which financial risks are gradually losing their dominant role to technological risks. The current stage of development of payment systems in Ukraine is therefore characterized by a transition to a digital model of functioning where technological security, transaction processing speed, payment infrastructure reliability, and

the ability to quickly adapt to changes in the external environment are key factors of effectiveness.

In this context, the following areas should be identified for the moderniza-tion of Ukraine's payment systems:

Strengthening the management system of technological and cyber risks by implementing modern cyber protection tools, multi-level authentication systems, and constant monitoring of transaction activity.

Developing an institutional oversight mechanism for payment systems by the regulator that takes into account international standards. This will ensure increased transparency and reliability of the payment market.

Improving the liquidity management mechanisms of banking institutions by optimizing payment flows and introducing innovative financial instruments.

Integrating the national payment infrastructure into the international financial space. This will contribute to the increased efficiency of cross-border payments.

Introducing digital innovations (Big Data, Blockchain) into risk management processes. This will allow for increased accuracy in forecasting and minimizing risks.

Developing reactive and adaptive management mechanisms that ensure the flexible response of the payment system to crises and changes in user behavior. Further improvement of the efficiency of Ukraine's payment systems should be based on a comprehensive combination of financial, technological, and institutional management tools to ensure stability, security, and competitiveness in the global digital economy.

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